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2021/0213 (CNS)

Proposal for a

COUNCIL DIRECTIVE

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

(Text with EEA relevance)

{SEC(2021) 663 final} - {SWD(2021) 640 final} - {SWD(2021) 641 final} -
{SWD(2021) 642 final}

EXPLANATORY MEMORANDUM

1. CONTEXT OF THE PROPOSAL

• Reasons for and objectives of the proposal

The taxation of energy products and electricity plays an important role in the area of climate and energy policy. The harmonized rules set under the Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity ("Energy Taxation Directive" or "ETD") aim to ensure the proper functioning of the Internal Market.

However, since the adoption of the ETD, the underlying climate and energy policy framework changed radically and the Directive is no longer aligned with current EU policies. Furthermore, the ETD is no longer ensuring a proper functioning of the internal market.

The proposal for recasting is part of the European Green Deal ("EGD") and of the Fit for 55 legislative package, as it focuses on environmental and climate issues to support the Commission's commitment to tackling environmental-related challenges and achieve the EU's domestic greenhouse gas emissions reductions objectives and air pollution reduction.

The EGD launched a new growth strategy for the EU that aims to transform the EU into a fair and prosperous society. It reaffirms the Commission's ambition to increase its climate ambition and make Europe the first climate-neutral continent by 2050. The necessity and value of the European Green Deal have only grown in light of the very severe effects of the COVID-19 pandemic on the health and economic well-being of the Union's citizens.

Based on the EGD strategy and a comprehensive impact assessment, the Commission's Communication of September 2020 on **Stepping up Europe's 2030 climate ambition**¹ ('2030 Climate Target Plan') proposed to raise the EU's ambition and put forward a comprehensive plan to increase the European Union's binding target for 2030 towards at least 55% net emission reduction, in a responsible way. Raising the 2030 ambition now helps give certainty to policymakers and investors, so that decisions made in the coming years do not lock in emission levels inconsistent with the EU's objective to be climate neutral by 2050. The 2030 target is in line with the Paris Agreement objective to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C. The European Council endorsed the new EU binding target for 2030 at its meeting of December 2020².

The **European Climate Law**³, as agreed by the European Parliament and the European Council⁴, makes the EU's climate neutrality target legally binding, and raises the 2030 ambition by setting a target of at least 55% net emission reductions by 2030 compared to 1990.

In order to follow the pathway proposed in the European Climate Law, and deliver this increased level of ambition for 2030, the Commission has reviewed the climate and energy related legislation currently in place. The '**Fit for 55**' legislative package, as announced in the

¹ COM (2020) 562 final.

² European Council Conclusions 10-11 December 2020 EUCO 22/20 CO EUR 17 CONCL 8.

³ Proposal for a Regulation of the European Parliament and of the Council establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999 (European Climate Law), COM/2020/80 final.

⁴ See press release '[Commission welcomes provisional agreement on the European Climate Law](#)', IP/21/1828 of 21.04.2021.

2030 Climate Target Plan, is the most comprehensive building block in the efforts to implement the ambitious new 2030 climate target, and all economic sectors and policies will need to contribute.

In the EGD the Commission committed to review the ETD focusing on environmental issues and in order to ensure that energy taxation is aligned with climate objectives. Taxation plays a direct role in supporting the green transition by sending the right price signals and providing the right incentives for sustainable consumption and production.

In this context, effective environmental taxation and the removal of incentives for fossil fuel consumption throughout the EU are needed to deliver the greenhouse gas emission reductions together with other regulatory measures.

The ETD can contribute to the increased ambition of at least 55% reduction in greenhouse gas emissions by 2030 by ensuring that the taxation of motor and heating fuels reflects better the impact they have on the environment and on health. This can be achieved by removing disadvantages for clean technologies and introducing higher levels of taxation for inefficient and polluting fuels, in complement to carbon pricing through emissions trading. It will facilitate the transition away from fossil fuels towards cleaner energy to deliver on the EU's climate neutrality objective, in line with the commitments under the Paris Agreement.

The ETD was evaluated in 2019⁵. Following that evaluation, the Council adopted conclusions⁶ whereby it considered that energy taxation can play an important role as one of the economic incentives that steer successful energy transition, driving low greenhouse gas emissions and energy savings investments while contributing to sustainable growth and invited the Commission to revise the ETD.

The current ETD raises a series of issues linked to its disconnection from climate and energy efficiency objectives and its shortcomings regarding the functioning of the internal market.

Firstly, the ETD is not in line with EU climate and energy objectives. The Directive does not adequately promote greenhouse gas emissions reductions, energy efficiency and the take-up of electricity and alternative fuels (renewable hydrogen, synthetic fuels, advanced biofuels, etc.). The reason for this is that new, less carbon-intensive fuels are taxed as their fossil equivalent if the new fuel emerged since the 2003 adoption of the last ETD and therefore there is no explicit rate for it. Biofuels are disadvantaged by the volume-based taxation (rates expressed per litre). The reason for it is that one litre biofuel typically has a lower energy content than one litre of the competing fossil fuel while the same tax rate applies. As an overall result, the ETD does not provide sufficient incentives for investments in clean technologies.

Secondly, the ETD *de facto* favours fossil fuel use. Highly divergent national rates are applied in combination with a wide range of tax exemptions and reductions. The wide range of exemptions and reductions are forms of fossil fuel incentives, which are not in line with the objectives of the EGD. The new proposal would help reducing the use of fossil fuels in two ways. Firstly, by setting higher rates for fossil fuels and lower rates for renewables products thereby decreasing the relative price advantage of fossil fuels over less polluting alternatives. This would discourage the use of fossil fuels. Secondly by reviewing the possibility of tax reductions and exemptions, which currently lower the taxation of fossil fuels. Those include

⁵ SWD(2019) 329 final.

⁶ Council Conclusions 29 November 2019 14608/19 FISC 458.

gas oil used in agriculture, gas oil and coal used by households to heat (the possibility to exempt vulnerable households would remain) or fossil fuels used by energy intensive industries. Moreover, the proposal would end the current mandatory exemption of the aviation and waterborne navigation and fishing sector.

Thirdly, the ETD is no longer contributing to the proper functioning of the internal markets the minimum tax rates have lost their converging effect on national tax rates. Minimum rates are low as they have not been updated since 2003 although national rates are significantly above the ETD minima in most cases. In any case, the ETD minima therefore do no longer prevent a “race to the bottom” nor constitute a floor for taxation. All this, joined to the existence of exemptions and reductions, increases the fragmentation of the internal market and in particular distorts the level playing field across the involved sectors of the economy.

In addition, there are some aspects of the ETD that lack clarity, relevance and coherence, which creates legal uncertainty. These include, among others, the definition of taxable products and uses that are out of the scope of the Directive and the interpretation of the exemption related to motor fuels used in air and waterborne navigation. The present proposal, therefore, aims at the following objectives:

- (1) Providing an adapted framework contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal. This would involve aligning taxation of energy products and electricity with EU energy, environment and climate policies thus contributing to the EU efforts to reduce emissions.
- (2) Providing a framework that preserves and improves the EU internal market by updating the scope and the structure of rates as well as by rationalising the use of tax exemptions and reductions by Member States.
- (3) Preserving the capacity to generate revenues for the budgets of the Member States.

As mentioned above, these objectives will be achieved by switching from volume to energy content based taxation, by eliminating incentives for fossil fuel use and by introducing a ranking of rates according to their environmental performance. Moreover, the current tax structure will be simplified by grouping energy products (used as motor or heating fuels) and electricity into categories and by ranking them according to their environmental performance. The ‘environmental performance’ has been defined in relation to other EU policies under the European Green Deal and in particular to the rest of the proposals in the “Fit for 55” package. According to this ranking, conventional fossil fuels, such as gas oil and petrol will be taxed at the highest rate. The next category of rates applies to fuels that are fossil based but are less harmful and still have some potential to contribute to decarbonisation in the short and medium term. 2/3 of the reference rate applies for example to natural gas, LPG and hydrogen of fossil origin for a transitional period of 10 years. Thereafter this rate will increase to the full reference rate. The next category is that of sustainable but not advanced biofuels. To reflect their contribution to decarbonisation, 1/2 of the reference rate applies. The lowest rate applies to electricity, regardless of its use, advanced biofuels, bioliquids, biogases and hydrogen of renewable origin. The rate applicable to this group is set significantly below the reference rate as electricity and these fuels can drive the EU’s clean energy transition towards achieving the objectives of the European Green Deal and ultimately climate neutrality by 2050.

In some sectors, mainly in those that may currently benefit from total exemptions such as aviation, or heating fuels for non- vulnerable households, transition periods will apply to mitigate the economic and social costs of introducing taxation.

The proposal also takes into account the social dimension by introducing the possibility to exempt vulnerable households from taxation of heating fuels for a period of ten years and by introducing a transitional period of ten years for attaining the minimum rate of taxation.

Member States can also grant reductions not below the minima to heating fuels for all households. It is up to Member States to decide on the use of tax revenues and they can further ensure fairness by using those revenues to mitigate the social impact.

- **Consistency with existing policy provisions in the policy area**

Council Directive 2003/96/EC defines the taxable energy products, the uses that make them subject to tax and the minimum levels of taxation applicable to each product depending on whether it is used as propellant, for certain industrial and commercial purposes or for heating. Amended provisions will remain consistent with those provisions that remain unchanged.

- **Consistency with other Union policies**

The initiatives linked to the EU climate objectives under the EGD, in particular the 2030 climate target, are presented under the ‘Fit for 55 Package’. This package will cover in particular the review of sectorial legislation in the fields of climate, energy, transport, and taxation⁷.

This proposal for recasting of the ETD is part of this coherently designed package. In complement to the other proposals in the package, it contributes to the EU climate targets by addressing exemptions and reductions in energy taxation that constitute de facto fossil fuel incentives, while promoting energy efficiency and the take-up of cleaner fuels. The proposal for recasting of the ETD and the proposal revising the EU ETS, including the introduction of emissions trading for buildings and road transport, therefore complement each other.

The other initiatives of the ‘Fit for 55 Package’ include new proposals and the review of the existing acquis in the area of climate, energy and transport policy:

- the EU Emissions Trading System (ETS)⁸, to adapt it to the new climate target and to introduce emissions trading in the building, maritime and road transport sectors as well as to change the treatment of the aviation sector, which is already included in its scope;
- the Effort Sharing Regulation (ESR)⁹ on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030;
- the regulation setting CO₂ emission performance standards for cars and light commercial vehicles¹⁰;
- the Renewable Energy Directive (RED)¹¹;

⁷ European Commission. (2020). Commission Work Programme 2021: Annex I outlines all the instruments to be proposed, including among others the review of energy taxation (the ETD).

⁸ Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32).

⁹ Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement

¹⁰ Regulation (EU) 2019/631 on setting CO₂ emission performance standards for new passenger cars and for new light commercial vehicles

- the ‘ReFuelEU Aviation’ initiative aimed at boosting the production and uptake of sustainable aviation fuels in the air transport sector;
- the ‘FuelEU Maritime’ initiative aimed at increasing the demand of renewable and low-carbon fuels in the maritime transport sector;
- the Energy Efficiency Directive to implement the ambition of the new 2030 climate target (EED) and to contribute to a just transition;
- a new Carbon Border Adjustment Mechanism;
- the Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF)¹²;
- the Directive on deployment of alternative fuels infrastructure¹³;
- the Regulation on the establishment of the framework to facilitate sustainable investments (Taxonomy)¹⁴.

Furthermore, the recasting of the ETD is supportive of the zero-pollution ambition committed under the European Green Deal and of the R&I policies in climate, energy and mobility under the 2021-2027 Research Framework Programme Horizon 2020.

2. LEGAL BASIS, SUBSIDIARITY AND PROPORTIONALITY

• Legal basis

The proposal is based on Article 113 of the Treaty on the Functioning of the European Union (TFEU), which permits the EU to lay down harmonised rules in order to ensure the proper functioning of the internal market. Additionally, appropriate provisions of fiscal nature intended, inter alia, to preserve and protect the environment can be adopted according to Article 192(2), first subparagraph, of the TFEU.

• Subsidiarity (for non-exclusive competence)

The shortcomings of the present Directive can only be remedied by means of a revision of the ETD, in coordination with other EU policy measures. Under the existing ETD, Member States can increase the rates of their taxes on energy products and electricity, decide not to make use of possible exemptions and reductions or introduce environmental and climate related objectives. However, such national approaches risk distorting the internal market and undermining the EGD objectives due to the non-harmonised structure and level of the national taxes:

¹¹ Directive (EU) 2018/2001– This directive establishes an obligation on fuel suppliers to ensure a minimum mandatory share of renewable energy within the final consumption of energy in the transport sector by 2030.

¹² Regulation (EU) 2018/841 of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework

¹³ Directive 2014/94/EU of 22 October 2014 on the deployment of alternative fuels infrastructure

¹⁴ Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (OJ L 198, 22.6.2020, p. 13)

- (1) The current minimum rates may limit the level of environmental ambition that Member States can pursue with taxes on energy, in particular because energy taxation directly affects the costs for companies.
- (2) The harmonisation of energy taxation through the Energy Taxation Directive should contribute to reducing the harmful effects of energy tax competition between the Member States, stemming for example from the possible relocation of businesses to Member States with more beneficial tax regimes.
- (3) The EU Emissions Trading System (ETS) has proven to be an effective tool in reducing greenhouse gas emissions from installations covered by the scheme. The extension of the EU ETS to the maritime sector and introduction of emissions trading to road transport and buildings are proposed as part of the “Fit for 55” package. However, energy taxation in Member States coexists with emissions trading at EU level and the ETD needs to ensure that minimum tax rates set at EU level provide incentives which are aligned with EU energy, climate and environmental objectives. In that context, action at EU level can ensure the coherence between the application of the EU ETS and the taxation of energy products and electricity, as well as a common EU approach with respect to taxation of energy products.

Achieving EU climate and environmental objectives requires a mix of policy instruments and an effective EU taxation framework can, while supporting other EU policy measures, avoid national choices that lead to internal market distortions and/or double taxation.

The ETD recast and its timing need to be seen in the broader context of the European Green Deal agenda. The objective to bring the ETD more closely in line with its objectives can only be implemented by means of an act adopted by the Union, recasting the ETD.

- **Proportionality**

The proposal complies with the proportionality principle for the following reasons.

The objectives of the current proposal are best achieved by recasting the current Directive to the effect explained above. The proposal is mainly concerned with some essential components of the Directive: the structure of taxation and the relationship between the respective tax treatment of the various energy sources.

The proposal is in all respects limited to what is necessary in order to achieve the objectives pursued.

- **Choice of the instrument**

The proposal is a Directive. In this area already covered by an existing Directive, Member State should continue to retain a margin of flexibility, as explained above. Other means than a Directive amending Directive 2003/96/CE would thus be inadequate.

3. RESULTS OF EX-POST EVALUATIONS, STAKEHOLDER CONSULTATIONS AND IMPACT ASSESSMENTS

- **Ex-post evaluations/fitness checks of existing legislation¹⁵**

The ETD initially made an overall positive contribution towards its main objective of ensuring the proper functioning of the internal market, preventing double taxation or any distortion of trade and competition between energy sources and energy consumers and suppliers.

However, as technologies, national tax rates and energy markets evolved over the past 15 years, the ETD in its present form no longer delivers the same positive contribution. Furthermore, the EU legislative framework and policy objectives developed significantly since the adoption of the ETD in 2003 resulting in some issues of relevance and coherence. As a result, the overall EU added value of the ETD eroded significantly over time in particular due to the lack of indexation of the minimum rates and the extensive and highly divergent use of optional tax exemptions by Member States and because of the changing policy environment.

The present ETD contributes only to a very limited extent to the wider economic, social and environmental EU policy objectives. The ETD is at least partially coherent with policy efforts to promote the use of renewable energy and increased energy efficiency but less so with regard to the reduction of greenhouse and other gas emissions as well as energy diversification or energy independence and security. The main reasons identified for this lack of coherence include disregard of the energy content and CO₂ emissions of energy products and electricity, (too) low minimum levels of taxation and (too) many exemptions. For the same reasons, the ETD does not contribute to the decarbonisation of transport and the reduction of the air pollution emissions. As a result, the contribution of the ETD to meeting the objectives set in international agreements such as the 2015 Paris Agreement is limited. Moreover, the ETD does not differentiate between renewable and carbon intensive sources of electricity nor does it take into account the environmental performance of biofuels. The ETD provisions on taxation of biofuels are therefore not in line with the EU energy, climate change and environment policies.

The ETD covers a shrinking share of the EU's energy mix as new technologies and products (e.g. power- to- gas, fuels of non- biological origin) continue to emerge or come to importance. Consequently, the current regime of energy taxation cannot ensure preferential treatment of environmentally sustainable new technologies and products. For example, despite the growing market relevance of renewable fuels, their tax treatment under the ETD still relies on rules developed at that time when these fuels were niche alternatives.

The current ETD disadvantages petrol compared to diesel in the form of a lower minimum rate for diesel. This creates higher demand for diesel. Furthermore, emerging fuels are also disadvantaged. If they are not explicitly listed in the current ETD, the tax rate of the fuel that is used for equivalent purposes applies. The per litre energy content of these fuels is typically lower than that of the equivalent fuel. This leads to a higher per litre tax rate for new fuels.

¹⁵ Report - Evaluation of Energy Taxation Directive, 2019

Moreover, the mandatory tax exemption concerning international aviation and waterborne navigation is in particular problematic because is not coherent with the present climate challenges and policies.

Regarding aviation, the EU has negotiated, on behalf of the Union and of the Member States, horizontal air services agreements and comprehensive air transport agreements with third countries. Additionally, Member States have also concluded bilateral air services agreement with third countries. The horizontal air services agreements allow the EU to amend a number of provisions in Member States' bilateral agreements. The comprehensive air transport agreements supersede the bilateral agreements that have been concluded by individual Member States with third countries. In most situations, those agreements allow for the taxation of fuel supplied in Member States' territory for use in an aircraft that operates flights inside the EU.

Regarding waterborne transport, the revised Mannheim Convention of 17 October 1868 for the Navigation of the Rhine regulates the transport on the Rhine. In addition, the Agreement on customs and tax regime for gas oil applicable to the stores of vessels in Rhine navigation¹⁶ concluded in Strasbourg on 16 May 1952 ("the Strasbourg Agreement") provides for the exemption of gas oil used on the Rhine and its tributaries and other waterways. Since fuel used for waterborne transport should be equally taxed in the EU, the Member States parties to the Strasbourg Agreement have to take all appropriate steps to effectively eliminate the incompatibilities. According to Article 351, paragraph 2 TFEU, to the extent that treaties concluded by EU Member States with third countries are incompatible with EU law, Member States concerned must take all appropriate steps to eliminate the incompatibilities established.

Minimum rates for heating fuels are too low to contribute to the smooth functioning of the internal market as they represent only a negligible share of the price of these products. Moreover, the use of optional exemptions and reductions granted to households and business users alike further increase divergence, leading to effective taxation rates being significantly lower in some Member States than in others.

Highly divergent rates on electricity and natural gas are applied in combination with a wide range of tax exemptions and reductions which contribute to increase the fragmentation of the internal market.

As the levels of taxation under the ETD do not reflect any specific logic – for example, by not taking into account the energy content and externalities – Member States are allowed to set their national rates as they wish without having to follow any indication or ratio between products. Consequently, the current ETD can result in inappropriate price signals to users, disincentivising them from choosing greener and more efficient energy sources and no consistent treatment of energy sources is ensured at the national level.

The ETD did not create any considerable regulatory burden or cost for the Member States or the economic operators to comply with the Directive. Much of the costs and burdens come either from horizontal legislation or national implementing measures not prescribed in the Directive and varying significantly across Member States or sector of economic activity.

¹⁶ Accord relatif au régime douanier et fiscal du gasoil consommé comme ravitaillement de bord dans la navigation rhénane Conclu à Strasbourg le 16 mai 1952.

The difficulties with the ETD's implementation related to the complexity, the lack of clarity, ambiguous wording and interpretations of some of the ETD provisions. This in turn led to uncertainties such as unclear conditions for eligibility to preferential tax treatment. Such uncertainty can represent a cost for tax authorities and economic operators, particularly when it leads to litigation, expressed as opportunity costs or legal expenses.

- **Stakeholder consultations**

The present proposal has been formulated against the background of a wide range of external contributions. Stakeholders were consulted first via the Inception Impact Assessment feedback mechanism and via a dedicated Public Consultation.

The public consultation was open from 22 July 2020 to 14 October 2020. In total, 563 responses from 25 Member states and from 5 third countries were received, together with 129 position papers. An overwhelming majority of respondents agree with the general EU objectives of fighting climate change and pollution and with the application of these objectives to the revision of the ETD. In terms of priorities for the ETD review, most respondents agreed that the ETD revision should take into account greenhouse gas emissions in the definition of rates (which should also be expressed in energy content rather than in volume) and should introduce incentives for alternative energy sources such as clean hydrogen and sustainable biofuels. Overall, respondents showed their disagreement with taxation of sectors at risk of carbon leakage. The public consultation revealed some support to equalising the taxes for different transport modes so that they can compete on a level playing field and the development of more energy efficient and low carbon transport modes. With respect to accompanying social measures, most of the respondents supported a tax shift from labour taxation and social security contributions as well as social welfare programmes directed at poor households.

Besides the public consultation, direct consultations with Member States have taken place, including requests for input in view of the computation of effective tax rates, as well as with other stakeholders, were also undertaken.

- **Impact assessment**

In order to examine how the different policy objectives could best be addressed, a number of approaches were examined and compared to the baseline scenario.

The baseline represents the existing 2030 climate and energy legislative framework, namely the previously agreed climate and energy targets of 40% GHG emission reduction by 2030, as well as the main policy tools to implement these. This policy option assumes that the ETD remains unchanged.

Option 1 would index the minimum rates and partly broaden the tax basis while substantially keeping its structure intact. The intra-EU aviation and maritime sectors would be included in the scope with a zero minimum rate by removing the current tax exemptions.

Option 2 introduces a system of simplified rates. Minimum rates would be indexed and based on energy content and a transitional period (10 years for option 2a and a shorter period until 2030 for option 2b) would be applied. It focuses on energy content with an increased taxation level (mostly for heating fuels) and extension of the taxable base to intra-EU navigation in aviation and maritime sectors would be included in the scope of the Directive with minimum

rates which would be linearly increased during a transitional period of 10 years. Option 2c introduces a new component in order to determine the rates that takes into account air pollutant emissions of the products on top of the features of option 2a.

Option 3 brings in a carbon content component for the sectors that are currently not covered by the ETS, in order to ensure those sectors are subject to carbon pricing. As for option 2, also in this case, two transitional periods (10 years and a shorter period until 2030) are considered. The introduction of a pollution component is also analysed in this option.

Main results

When proposing, in September 2020, its updated 2030 greenhouse gas emissions reduction of at least 55%, compared to 1990, the European Commission also described the actions across all sectors of the economy that would complement national efforts to achieve the increased ambition. Impact assessments have been prepared to support the envisaged revisions of key legislative instruments in the “Fit for 55” package.

Against this background, this impact assessment has analysed the various options through which the revision of the Energy Taxation Directive could effectively and efficiently contribute to the delivery of the updated target as part of such a wider “Fit for 55” package while fulfilling the internal market objective avoiding revenues erosion.

Based on the options’ comparison as well as on the analysis of the specific policy options, both Option 2 and 3 would fulfil the objectives in a desirable way.

These options contribute to the Climate and Energy objectives as well as to the other policy objectives.

Concerning the transitional period, both periods (10 years or 7 years) will have the same impact by 2035 in every option. However, the options with a transitional period of ten years (option 2a and 3a) provide the best results compared to a shorter transitional period when considering the social dimension.

When the air pollution component is considered, the positive impact on emission reductions is associated with a negative social impact, through a substantial increase of the price of coal and biomass.

Considering that emissions trading should be introduced for carbon emissions of road transport and buildings, as proposed in the revision of the EU ETS proposal under the “Fit for 55” package, option 2a is considered the best option because it avoids any overlap between the two mechanisms.

A well-calibrated extension of the EU ETS to the maritime sector and introduction of emissions trading to road transport and buildings, coupled with option 2 for the ETD would help to achieve the EU’s ambitious climate objective of 55% emission reductions by 2030 while allowing attaining the rest of the objectives of the ETD review.

The impact assessment also showed that the ETD revision would not create an undue burden on the economy. The objectives set out above can be achieved with very limited economic costs and the revision can potentially bring economic benefits, in particular if additional revenue from general energy consumption taxation would be used by Member States for compensating unintended social costs.

The impact assessment has shown that increased taxation of fossil fuels may impact more on low-income households, in particular for heating. In those cases, the possible regressivity of energy taxes could be compensated by recycling those revenues to support the green

transition through financing investments in low-carbon and energy efficient goods and appliances or through lump sum transfers. For example, the analysis shows that when the extra tax revenues from energy taxes are transferred back to households in the form of a lump-sum, the proposed changes turn to be progressive as these transfers determine a larger increase in the disposable income of poorer households.

In the baseline, revenues in Member States are projected to decrease by nearly 32% between 2020 and 2035 due to the expected evolution of the energy system with a decreasing dependency on fuels thanks to energy savings and a shift from fossil fuels. The preferred option would mitigate largely this trend by increasing revenues.

- **Regulatory fitness and simplification**

Concerning the costs of the Directive's functioning, the specific implementation of the ETD is dependent upon several other factors. These include aspects such as specific national or other EU policies being applied in the same domain, national priorities and industrial legacy, prevailing economic and trading conditions or business models of individual sectors or companies.

According to the (already published) evaluation of the current ETD¹⁷, due to the wide ranging flexibility left by the current ETD to Member States to apply exemptions, reductions and refunds it was complex to calculate effective rates in a harmonised way across the EU. In particular, at the time of the evaluation no official data collection existed that was equipped to capture effective tax rates. It was therefore difficult to single out and quantify some effects of the Directive.

However, in the current impact assessment, some economic costs have been identified in the relevant section on impacts of the policy options.

Some regulatory costs (mostly managing authorisations, declarations and IT systems update) will arise for the traders in energy products newly introduced in the ETD's scope and for administrations as these products will be subject to some provisions of the excise general arrangements¹⁸; however these costs should be limited for hydrogen and solid biomass traders as these products will be allowed the same movement control simplifications as natural gas and coal respectively. The termination of excise duty exemptions for some fuels or sectors of activity (e.g. aviation and maritime) does not change the regulatory costs related to general arrangements as exempted fuels were anyway subject to holding and movement controls.

The collection of a fuel tax in the aviation sector is not expected to be problematic from an administrative perspective. Member States already have experience in collecting fuel taxes in other transport modes (mainly road transport). It is expected that an aviation fuel tax would be collected in a similar manner, with the fuel suppliers collecting the tax when they supply kerosene at airports, then transferring those funds to the relevant tax authorities.

In terms of efficiency, the costs of collecting the current motor fuel taxes can be used as a proxy for how much it would cost to collect an aviation fuel tax. A 2012 study¹⁹ found that administrative costs for public authorities represented between 0.65% and 0.85% of the

¹⁷ See the [Commission report: evaluation of the Energy Taxation Directive](#), SWD(2019) 329 final, of 11.09.2019.

¹⁸ Council Directive 2008/118/EC of 16 December 2008 concerning the general arrangements for excise duty and repealing Directive 92/12/EEC

¹⁹ CE Delft et al. (2012). An inventory of measures for internalising external costs in transport. Brussels: European Commission.

revenue of fuel tax. It is estimated that the collection of a kerosene fuel tax would be somewhat simpler, as the supply of kerosene is concentrated at airports, of which there are only a few in each Member State. Given this, the lowest figure of 0.65% of revenue is considered as representing the administrative costs of collecting a fuel tax.

An external study on the taxation of the aviation has also been commissioned by the Commission for the purposes, among others, of the impact assessment.

- **Fundamental rights**

The measure has no bearing on fundamental rights.

4. BUDGETARY IMPLICATIONS

The proposal has no implications for the budget of the Union.

5. OTHER ELEMENTS

- **Implementation plans and monitoring, evaluation and reporting arrangements**

Monitoring of taxation of energy consumption is regularly carried out at least once a year through the collection of information from Member States on the occasion of the meetings of the Indirect Tax Expert Group (ITEG). Moreover, twice yearly DG TAXUD together with the Member States update the information database on the applicable energy tax rates (Tax in Europe Database).

Moreover, the ETD provides for a regular examination, on the basis of a report and, where appropriate, a proposal from the Commission to modify the various provisions of the Directive and the minimum levels of taxation. This examination shall take into account the proper functioning of the internal market and the wider objectives of the Treaty. Once the ETD will be reviewed, this examination will have to focus in particular, on the following:

- (a) how Member States have implemented the new framework for the taxation of energy products and electricity in their national systems,
- (b) how it has allowed them to better integrate environmental and energy efficiency considerations and
- (c) what is the economic impact by taking into account the way in which Member States have used any additional revenues.

- **Explanatory documents (for directives)**

No explanatory documents on the transposition of the provisions of this proposal are considered necessary.

- **Detailed explanation of the specific provisions of the proposal**

The Commission proposes with effect from first of January 2023:

1) *Energy taxation based on the energy content of the energy products and electricity, and their environmental performance.*

To allow for the already mentioned diversified objectives (energy efficiency, reduction of greenhouse gases emissions, revenue generation, etc.), and to ensure, to the extent possible, that all of them can be pursued in a consistent manner, taxation should be linked to the energy content of the energy products and electricity, coupled with their environmental performance derived from the overall EU framework.

Taxation based on energy content provides a better reference to compare different energy products and electricity and eliminates the current possible disadvantageous tax treatment of certain products, such as biofuels.

The concept of ‘environmental performance’ and the corresponding ranking of applicable rates takes into account the specific characteristics of the different products and their treatment under the current ETD and in the Member States, the expected evolution of the EU energy mix and it is consistent with the other proposals in the “Fit for 55 package” (in particular the proposals to revise the EU ETS and RED II) and with the objective of zero pollution via the implementation of the polluter-pays principle, to ensure coherence and a contribution to the common objectives. Therefore, energy taxation would be based on the net calorific value of the energy products and electricity as set out in Annex IV to Directive 2012/27/EU²⁰. In the case of products derived from biomass the reference values shall be those set out in Annex III to Directive (EU) 2018/2001²¹ (see Article 1(2)(1st subpar.)).

Where the above-mentioned Directives do not contain a net calorific value for the product concerned, reference should be made to the relevant available information on its net calorific value (see Article 1(2)(2nd subpar.)).

Minimum levels of taxation are set out according to the mentioned environmental performance (meaning e.g. that sustainable biofuels would be taxed with lower rates) and are expressed in €/GJ (see Articles 7, 8, 9, 10 and Annex I).

2) List of energy products and applicable definitions

The scope of taxation should include, in the list of energy products, competing energy sources and consequently a unified and standardised fiscal treatment of them should be ensured, also in terms of their subjection to control and movement provisions (see Articles 2(1), and 21(1)).

Additional definitions coming from other parts of EU legislation (namely the above-mentioned Directive (EU) 2018/2001) or specified in the proposal will allow for a differentiated tax treatment (see the definitions in Article 2(4) and (5)).

In case of a product consisting of a mixture of one or more products, the taxation of each component should be determined accordingly, based on the applicable rates and independently from the CN code under which the product falls as a whole (see Article 2(6)).

²⁰ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315 14.11.2012, p. 1).

²¹ Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (OJ L 328 21.12.2018, p. 82).

Finally, reference is made to the version presently applicable of the Combined Nomenclature (CN)²². In order to ensure that the reference to CN codes is updated whenever needed, the power to adopt delegated acts should be conferred to the Commission for proceeding to the update (see Articles 2(8) and 29).

3) Provisions regarding the exclusion from the scope of the legal framework

Energy taxation covers energy products used as motor or heating fuels, and electricity. Consequently, only uses other than motor or heating fuel, and dual uses of energy products, as well as output taxation of heat, should be excluded from the scope of ETD. Electricity used in similar ways should be treated on an equal footing (see Article 3).

4) Ranking of rates and indexation of the minimum levels

To ensure that a consistent treatment of energy sources extends to the levels of taxation fixed nationally -above the minimum levels set in the proposal-, Member States should replicate the relationship between the minimum levels of taxation fixed in the proposal for the various energy sources and uses. For that requirement, electricity should always be among the least taxed energy sources in view of fostering its use, notably in the transport sector, and should be ranked together with other motor fuels and heating fuels (see Article 5(1)).

The ranking of energy products and electricity should be considered as a general principle equally applicable, *mutatis mutandis*, whenever the Directive allows for differentiations (see Articles 13, 14, 15, 16, 17 and 18).

Moreover, the real value of the minimum levels of taxation should be preserved. The minimum rates should be yearly adjusted to take into account the evolution of their real value in order to preserve the current level of rate harmonisation. To reduce the volatility stemming from energy and food prices, that alignment should be made on the basis of the changes in the EU-wide harmonised index of consumer prices excluding energy and unprocessed food as published by Eurostat. The Commission shall publish the resulting minimum levels of taxation in the Official Journal of the European Union (see Article 5(2)).

5) Different minimum levels of taxation for motor fuels, heating fuels and electricity

Different minimum levels of taxation should be set out for motor fuels for transport, for motor fuels used for specific purposes (such as in the primary sector), for heating fuels and for electricity. When a transitional period is applicable, the increase of the minimum levels of taxation -except for low-carbon fuels- should be fixed at one tenth per year until the end of the transitional period, taking also into account the need to index those minimum levels of taxation (see Articles 7, 8, 9, 10 and Annex I).

In accordance with the objectives of the proposal, no distinction should be made between commercial and non-commercial use of gas oil as motor fuel as well as business and non-business use for heating fuels and electricity.

²² Commission Implementing Regulation (EU) 2020/1577 of 21 September 2020 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff (OJ L 361, 30.10.2020, p. 1).

To simplify the structure of minimum tax levels where possible, the minimum levels of taxation for some uses of motor fuels (see Table B in Annex I) are aligned with the minimum levels of taxation applicable to heating fuels (see Table C in Annex I).

6) *Input used for electricity production*

Taxation of energy products and electricity used to produce electricity is allowed to Member States aside the ETD, without the need to respect the minimum levels of taxation provided for in the proposal, for reasons of environmental policy. Member States wishing to introduce such taxation should at least replicate the ranking set between the minimum levels laid down in the proposal, in order to provide the right environmental signals (see Article 13).

7) *Energy products and electricity used by aircrafts and vessels*

Without prejudice to international aviation-related agreements, energy products and electricity supplied for intra-EU air navigation²³ (except those supplied for cargo-only flights), and for intra-EU waterborne navigation, including fishing²⁴, should be taxed (see Articles 14 and 15).

A different level of taxation would be applicable to the use of energy products and electricity for intra-EU non-business aviation and non-pleasure flights. Energy products and electricity used for intra-EU business aviation and pleasure flights²⁵ should be subject to the standard levels of taxation applicable to motor fuels and electricity in the Member States.

In order to ensure a smooth implementation of the provisions regarding intra-EU non-business aviation and non-pleasure flights, the minimum levels of taxation for motor fuel use would be reached over a transitional period of ten years, whereas sustainable alternative fuels (including sustainable biofuels and biogas, low-carbon fuels, advanced sustainable biofuels and biogas, and renewable fuels of non-biological origin) and electricity would have a minimum rate of zero for ten years.

Energy products and electricity used for intra-EU air navigation of cargo-only should be exempt with a possibility for a Member State to tax those fuels either for domestic cargo-only flights or by virtue of bilateral or multilateral agreements concluded with other Member States.

For extra-EU air navigation, without prejudice to international obligations, Member States may exempt or apply the same levels of taxation as for intra-EU air navigation, according to the type of flight.

Regarding waterborne navigation, considering the risk of tankering fuel outside the EU, a different level of taxation would be applicable to the use of energy products and electricity for

²³ 'Intra-EU air navigation' would mean flights between two airports located in the EU, including domestic flights.

²⁴ 'Intra-EU maritime waterborne navigation' would mean navigation between two ports located in the EU, including domestic navigation.

²⁵ 'Business aviation' shall mean the operation or use of aircraft by companies for the carriage of passengers or goods as an aid to the conduct of their business, flown for purposes generally considered not for public hire and piloted by individuals having, at the minimum, a valid commercial pilot license with an instrument rating.

'Pleasure flights' shall mean the use of an aircraft for personal or recreational purposes not associated with a business or professional use.

intra-EU (from an EU port to another EU port) maritime and inland waterways regular service navigation, fishing and freight transport. Energy products and electricity used for the remaining intra-EU waterborne navigation (including among others navigation of private pleasure crafts) should be subject to the standard levels of taxation applicable to motor fuels and electricity in the Member States.

The uses for intra-EU maritime and inland waterways regular service navigation, fishing and freight transport, the minimum levels of taxation should be the ones applicable to motor fuel use for specific purposes (therefore lower than the ones applicable to general motor fuel use). In order to provide an incentive to their use, sustainable alternative fuels (including sustainable biofuels and biogas, low-carbon fuels, advanced sustainable biofuels and biogas, and renewable fuels of non-biological origin) and electricity would have a minimum rate of zero for ten years.

For extra-EU waterborne navigation, Member States may exempt or apply the same levels of taxation mentioned before, according to the type of activity.

Finally, in some harbours, a cleaner alternative to the production of electricity on board a vessel exists with the use of shore-side electricity (i.e. connection to the on-shore electricity grid). In order to set an incentive for its development and use, shore-side electricity provided to vessels while at berth in ports can be exempt.

The same treatment should be applicable to electricity supplied to stationary aircrafts.

8) Possibility for tax exemptions for certain products or for electricity from certain sources

The possibility to apply exemptions or reductions in the level of taxation would be justified by specific reasons, in particular energy efficiency and environmental protection objectives, in certain cases such as: electricity from renewable sources; electricity produced from combined heat and power generation, provided that the combined generators are environmentally friendly according to the EU definition; renewable fuels of non-biological origin, advanced sustainable biofuels, bioliquids, biogas and advanced sustainable products falling within CN codes 4401 and 4402 (see Article 16).

9) Possibility for tax reductions for certain uses

Targeted reductions, not going below the minimum levels set out by the proposal, may prove necessary for different reasons, such as implementing energy efficiency or taking into account social considerations (see Article 17).

Among others, a possible reduction not going below the minima would be applicable to energy products used as heating fuel and electricity if used by households. In that case, the minimum levels of taxation should start from zero and increase over a transitional period of ten years by one tenth of the final minimum rates in each year (see Article 17(c)).

Energy products and electricity used by households recognised as vulnerable according to a harmonised EU definition could be exempted for a maximum period of ten years after the entry into force of the Directive (see Article 17(c)).

As regards certain sectors (agricultural, horticultural or aquaculture works, and forestry), reductions in the level of taxation not going below the minima for energy products used for heating purposes and for electricity would be applicable (see Article 17(d)).

10) Energy intensive businesses and other business entities

Targeted reductions in the tax level not going below the minima may prove necessary to incentivise the achievement of environmental protection objectives and improvements in energy efficiency of the EU productive sector (see Article 18).

Those reductions would be linked either to a stringent definition or to verifiable efforts leading to the mentioned goals.

11) List of energy products subject to control and movement provisions

To improve the legal certainty and address the risk of fraud, selected energy products (e.g. lubricating oils) should be subject to control and movement provisions (see Article 21)

12) Chargeability of certain energy products

Considering the analogies in terms of physical properties, the chargeable event for hydrogen should be aligned to the one for natural gas, for which the tax is chargeable at the time of supply by the distributor or redistributor (see Article 22(4)(1st subpar.)).

As regards electricity, recent and future developments of storage technologies would require that electricity storage facilities and transformers of electricity could be considered redistributors when they supply electricity in order to avoid the risk of double taxation (see Article 22(4)(2nd subpar.)).

Moreover, due to the similarities in terms of physical properties and the diversified situations in the Member States, products falling within CN codes 2703 (peat), 4401 (fuel wood, wood in chips or particles, sawdust and wood waste and scrap) and 4402 (wood charcoal) should be subject to taxation and become chargeable at the time of delivery as for coal, coke and lignite and according to procedures laid down by each Member State (see Article 22(4)(5th subpar.)).

13) Definition of standard tanks

In order to ensure free movement whilst at the same time respecting the security requirements applicable to commercial motor vehicles and special containers, the definition of standard tanks of such vehicles should reflect the fact that fuel tanks are not exclusively fitted to commercial vehicles by their manufacturer (see Article 25).

14) Reporting obligation for Member States

In order to have precise information on the functioning of the Directive, Member States should inform the Commission of the levels of taxation which they apply as well as of the related volumes of energy products and electricity subject to taxation (see Article 26).

15) Report from the Commission to the Council

Every five years and for the first time five years after the entry into force of this Directive, the Commission should submit to the Council a report on the application of the Directive and, where appropriate, a proposal for its modification.

The report by the Commission should, inter alia, examine the minimum levels of taxation, the impact of innovation and technological developments, in particular as regards energy efficiency, the use of electricity in transport and the justification for the exemptions, reductions and differentiations laid down in the proposal. The report shall take into account the proper functioning of the internal market, environmental and social considerations, the real value of the minimum levels of taxation and the wider relevant objectives of the Treaties (see Article 31).

16) *Annex I and tables with minimum rates*

Annex I contains the tables with the minimum levels of taxation -expressed in EUR/GJ- generally applicable to motor fuels for the purposes of Articles 7 and Article 8(2), to heating fuels and to electricity (see Tables A, B, C and D).

Those minimum levels are likewise applicable when mentioned by other relevant provisions of the Directive.

Proposal for a

COUNCIL DIRECTIVE

restructuring the ~~Community~~ Union ~~Community~~ framework for the taxation of energy products and electricity (recast)

(Text with EEA relevance)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty ~~establishing the European Community~~ on the Functioning of the European Union, and in particular Article ~~93~~ 113 and Article 192(2), first subparagraph, point (a) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the European Economic and Social Committee,

Having regard to the opinion of the Committee of the Regions,

Acting in accordance with a special legislative procedure,

Whereas:

↓ new

- (1) Council Directive 2003/96/EC²⁶ has been substantially amended several times²⁷. Since further amendments are to be made, that Directive should be recast in the interests of clarity.
- (2) Directive 2003/96/EC was adopted in order to ensure the proper functioning of the internal market as regards the taxation of energy products and electricity. Directive 2003/96 also integrated environmental protection requirements, in particular, in the light of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

²⁶ Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (OJ L 283, 31.10.2003, p. 51).

²⁷ See Annex II, Part A.

↓ 2003/96/EC recital 1 (adapted)

~~The scope of Council Directive 92/81/EEC of 19 October 1992 on the harmonisation of the structures of excise duties on mineral oils²⁸ and of Council Directive 92/82/EEC of 19 October 1992 on the approximation of the rates of excise duties on mineral oils²⁹ is restricted to mineral oils.~~

↓ 2003/96/EC recital 2 (adapted)

~~The absence of Community provisions imposing a minimum rate of taxation on electricity and energy products other than mineral oils may adversely affect the proper functioning of the internal market.~~

↓ new

(3) It is necessary to ensure that clear taxation rules for energy products and electricity continue to contribute to the smooth functioning of the internal market while at the same time tackling the climate and environmental-related challenges in the context of the Communication from the Commission ‘The European Green Deal’³⁰. Energy taxation can contribute to the ambition of at least 55 % reduction in net greenhouse gas emissions by 2030 compared to 1990, as well as to the objective of zero pollution through the implementation of the polluter-pays principle, by ensuring that the taxation of motor fuels, heating fuels and electricity better reflects the impact they have on the environment and on health. The contribution of energy taxation to those objectives has been endorsed by the Council Conclusions on the EU energy taxation framework³¹.

↓ 2003/96/EC recital 3 (adapted)

~~The proper functioning of the internal market and the achievement of the objectives of other Community policies require minimum levels of taxation to be laid down at Community level for most energy products, including electricity, natural gas and coal.~~

↓ new

(4) Environmental taxation can be a cost-effective mean for Member States to achieve the targeted reductions of greenhouse gasses. The proper functioning of the internal market requires common rules on that taxation.

(5) Member States should, however, be able to use the energy taxation of motor fuels, heating fuels and electricity for a variety of purposes not necessarily nor specifically or exclusively related to the reduction of greenhouse gases.

²⁸ ~~OJ L 316, 31.10.1992, p. 12. Directive as last amended by Directive 94/74/EC (OJ L 365, 31.12.1994, p. 46).~~

²⁹ ~~OJ L 316, 31.10.1992, p. 19. Directive as last amended by Directive 94/74/EC.~~

³⁰ COM(2019) 640 final of 11 December 2019.

³¹ 14861/19 of 5 December 2019.

↓ 2003/96/EC recital 4

- (6) Appreciable differences in the national levels of energy taxation applied by Member States could prove detrimental to the proper functioning of the internal market.
-

↓ 2003/96/EC recital 5 (adapted)

- (7) The establishment of appropriate ~~Community~~ ☒ Union ☒ minimum levels of taxation may enable existing differences in the national levels of taxation to be reduced.
-

↓ 2003/96/EC recital 6 (adapted)

~~In accordance with Article 6 of the Treaty, environmental protection requirements must be integrated into the definition and implementation of other Community policies.~~

↓ 2003/96/EC recital 7 (adapted)

- (8) As a party to the United Nations Framework Convention on Climate Change, the ~~Community~~ ☒ Union ☒ has ratified the ~~Kyoto Protocol~~ ☒ Paris Agreement ☒ . The taxation of energy products and, where appropriate, electricity is one of the instruments available for achieving the ~~Kyoto Protocol~~ ☒ Paris Agreement ☒ objectives.
-

↓ new

- (9) Rules should be laid down to base energy taxation on the energy content of energy products and electricity, coupled with their environmental performances. For those purposes, reference should be made to the definitions of Directive 2012/27/EU of the European Parliament and of the Council³², to Directive (EU) 2018/2001 of the European Parliament and of the Council³³, and to Regulation (EU) 2020/852 of the European Parliament and of the Council³⁴. Moreover, the list of energy products should be updated to include certain energy products, in order to ensure a unified and standardised treatment of those fuels.
-

↓ 2003/96/EC recital 8 (adapted)

~~The Council needs to examine the exemptions and reductions and the minimum levels of taxation periodically, taking into consideration the proper functioning of the internal market,~~

³² Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

³³ Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (OJ L 328 21.12.2018, p. 82).

³⁴ Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (OJ L 198, 22.6.2020, p. 13).

~~the real value of the minimum levels of taxation, the competitiveness of Community businesses in the international framework and the wider objectives of the Treaty.~~

↓ new

(10) In the interest of fiscal neutrality, the same minimum levels of taxation should apply for each component of energy taxation, to all energy products put to a given use. Where equal minimum levels of taxation are thus set, Member States should, also for reason of fiscal neutrality, ensure equal levels of national taxation on all products concerned.

↓ 2003/96/EC recital 9 (adapted)

~~Member States should be given the flexibility necessary to define and implement policies appropriate to their national circumstances.~~

↓ new

(11) Member States should also replicate at any time the ranking of minimum levels of taxation as laid down in the annex in relation to different products for each given use in order to ensure an environmentally tailored structure of rates. The minimum levels of energy taxation should be automatically aligned every year to take into account the evolution of their real value in order to preserve the current level of rate harmonization and therefore reduce the volatility stemming from energy and food prices. This alignment should be made on the basis of the changes in the Union-wide harmonised index of consumer prices excluding energy and unprocessed food as published by Eurostat.

(12) In order to ensure a smooth implementation of certain provisions relating to some products or uses, a transitional period of application is needed.

↓ 2003/96/EC recital 10 (adapted)
⇒ new

(13) ⇒ As a general principle, Member States should apply to energy products and electricity levels of taxation not less than the minimum levels of taxation as set out by the Directive. ⇐ ~~Member States wish to introduce or retain different types of taxation on energy products and electricity. To that end,~~ Member States should be permitted to comply with the ~~Community~~ Union minimum taxation levels by taking into account the total charge levied in respect of all indirect taxes which they have chosen to apply (excluding VAT).

↓ 2003/96/EC recital 11 (adapted)

(14) Fiscal arrangements made in connection with the implementation of this ~~Community~~ Union framework for the taxation of energy products and electricity are a matter for each Member State to decide. In this regard, Member States might decide not to increase the overall tax burden if they consider that the implementation of such a principle of tax neutrality could contribute to the restructuring and the modernisation

of their tax systems by encouraging behaviour conducive to greater protection of the environment and increased labour use.

↓ 2003/96/EC recital 12 (adapted)

- (15) Energy prices are key elements of ~~Community~~ energy, transport and environment policies ~~↗~~ in the Union ~~↖~~.

↓ 2003/96/EC recital 13

~~Taxation partly determines the price of energy products and electricity.~~

↓ 2003/96/EC recital 14

~~The minimum levels of taxation should reflect the competitive position of the different energy products and electricity. It would be advisable in this connection to base the calculation of these minimum levels as far as possible on the energy content of the products. However, this method should not be applied to motor fuels.~~

↓ 2003/96/EC recital 15

~~The possibility of applying differentiated national rates of taxation to the same product should be allowed in certain circumstances or permanent conditions, provided that Community minimum levels of taxation and internal market and competition rules are respected.~~

↓ 2003/96/EC recital 16 (adapted)

- (16) As heat is only subject to very limited intra-~~Community~~ ~~↗~~ Union ~~↖~~ trade, output taxation of heat should remain outside the scope of this ~~Community~~ ~~↗~~ Union ~~↖~~ framework.

↓ 2003/96/EC recital 17 (adapted)

- (17) It is necessary to establish different ~~Community~~ ~~↗~~ Union ~~↖~~ minimum levels of taxation according to the use of the energy products and electricity.

↓ 2003/96/EC recital 18

⇒ new

- (18) Energy products used as a motor fuel for certain ~~industrial and commercial~~ purposes and those used as heating fuel are normally taxed at lower levels than those applicable to energy products used as a propellant. ⇒ Electricity should always be among the least taxed energy sources in view of fostering its use, notably in the transport sector. To that purpose, Member States should endeavour to apply the same level of taxation to electricity used to charge electric vehicles as for heating purposes during the necessary time following the entry into force of this Directive. ⇐

↓ 2003/96/EC recital 19

~~The taxation of diesel motor fuel used by hauliers, notably those engaging in intra-Community activities, requires a possibility for a specific treatment, including measures to allow for the introduction of a system of road user charges, in order to limit the distortion of competition operators might be confronted with.~~

↓ new

(19) The need to pursue the objectives of the Directive requires that no distinction is made between commercial and non-commercial diesel as well as business and non-business use for heating fuels and electricity.

↓ 2003/96/EC recital 20

~~Member States may need to differentiate between commercial and non-commercial diesel. Member States may use this possibility to reduce the gap between the taxation of non-commercial gas oil used as propellant and petrol.~~

↓ 2003/96/EC recital 21

~~Business use and non-business use of energy products and electricity may be treated differently for tax purposes.~~

↓ 2003/96/EC recital 22 (adapted)

(20) Energy products should essentially be subject to a ~~Community~~ ☒ Union ☒ framework when used as heating fuel or motor fuel. To that extent, it is in the nature and the logic of the tax system to exclude from the scope of the framework dual uses and non-fuel uses of energy products ~~as well as mineralogical processes~~. Electricity used in similar ways should be treated on an equal footing.

↓ 2003/96/EC recital 23

~~Existing international obligations and the maintaining of the competitive position of Community companies make it advisable to continue the exemptions of energy products supplied for air navigation and sea navigation, other than for private pleasure purposes, while it should be possible for Member States to limit these exemptions.~~

↓ new

(21) The Union and the Member States have concluded multilateral agreements regarding air services and air transport, or bilateral agreements with third countries. Those agreements include provisions related to the taxation of aviation fuel. Aviation fuel has traditionally had a privileged tax regime. The need to pursue the objectives of the Directive requires that, without prejudice to those international agreements, energy products and electricity supplied for intra-EU air navigation, except cargo-only flights should be taxed. The exemption for the fuel used by cargo-only flights is still needed in the absence of more efficient alternatives.

(22) In order to ensure a smooth implementation of this Directive, the minimum levels of taxation for motor fuels used for intra-EU non-business and non-pleasure flights would be reached over a transitional period of ten years, whereas sustainable alternative fuels and electricity would be subject to a zero minimum rate for ten years. Energy products and electricity used for intra-EU business aviation and pleasure flights should be subject to the standard levels of taxation applicable to motor fuels and electricity in the Member States.

(23) Fuel used for waterborne navigation, including fishing, should also be taxed, and the Member States party to international agreements providing for the exemption of that fuel, have to, by the date of the application of this Directive, ensure they eliminate the incompatibilities. It is necessary to allow for a different level of taxation to be applied to the use of energy products and electricity for intra-EU waterborne regular service navigation, fishing and freight transport and their respective at berth activities. Considering the specificity of those uses, the minimum levels of taxation should be lower than the ones applicable to general motor fuel use. In order to provide an incentive to the use of sustainable alternative fuels and electricity, such fuels and electricity should be exempted from taxation for ten years. Energy products and electricity used for the remaining intra-EU waterborne navigation should be subject to the standard levels of taxation applicable to motor fuels and electricity in the Member States.

(24) For extra-EU air navigation, without prejudice to international obligations, and for extra-EU waterborne navigation, including fishing, Member States may exempt or apply the same levels of intra-EU taxation, according to the type of activity.

↓ 2003/96/EC recital 24
⇒ new

(25) Member States should be permitted to apply certain other exemptions or reduced levels of taxation, where that will not be detrimental to the ⇒ environmental objectives, to the ⇐ proper functioning of the internal market and will not result in distortions of competition.

↓ 2003/96/EC recital 25
⇒ new

(26) In particular, ⇒ highly efficient ⇐ combined heat and power generation and, in order to promote the use of alternative energy sources, renewable forms of energy may qualify for preferential treatment.

↓ 2003/96/EC recital 26

~~It is desirable to establish a Community framework to allow Member States to exempt or reduce excise duties so as to promote biofuels, thereby contributing to the better functioning of the internal market and affording Member States and economic operators a sufficient degree of legal certainty. Distortions of competition should be limited and the incentive of a reduction in the basic costs for producers and distributors of biofuels should be maintained through, *inter alia*, the adjustments by Member States taking into account changes in raw material prices.~~

↓ 2003/96/EC recital 27 (adapted)

~~This Directive shall be without prejudice to the application of the relevant provisions of Council Directive 92/12/EEC of 25 February 1992 on the general arrangements for products subject to excise duty and on the holding, movement and monitoring of such products³⁵, and Council Directive 92/83/EEC of 19 October 1992 on the harmonization of the structures of excise duties on alcohol and alcoholic beverages³⁶, when the product intended for use, offered for sale or used as motor fuel or fuel additive is ethyl alcohol as defined in Directive 92/83/EEC.~~

↓ 2003/96/EC recital 28

~~Certain exemptions or reductions in the tax level may prove necessary; notably because of the lack of a stronger harmonisation at Community level, because of the risks of a loss of international competitiveness or because of social or environmental considerations.~~

↓ new

- (27) Targeted reductions in the tax level may prove necessary to incentivise the achievement of environmental protection objectives and improvements in energy efficiency of the Union productive sector.
- (28) Targeted reductions in the tax level may prove necessary to tackle the social impact of energy taxes. An exemption from taxation may temporarily prove necessary to protect vulnerable households.
-

↓ 2003/96/EC recital 29

~~Businesses entering into agreements to significantly enhance environmental protection and energy efficiency deserve attention; among these businesses, energy intensive ones merit specific treatment.~~

↓ 2003/96/EC recital 30

~~Transitional periods and arrangements may be required in order to allow Member States to smoothly adapt to the new levels of taxation, thus limiting possible negative side effects.~~

↓ 2003/96/EC recital 31

⇒ new

- (29) ⇒ In view of the financial, economic and environmental effects on each Member State, such as the need of electrification of the transport sector, ⇐ ~~It~~ is necessary to provide for a procedure authorising the introduction by Member States, for a set period, of other exemptions or reduced levels of taxation. ⇒ For reasons of protection of environment and human health, including the reduction of air pollution, it is

³⁵ OJ L 76, 23.3.1992, p. 1. Directive as last amended by Directive 2000/47/EC (OJ L 193, 29.7.2000, p. 73).

³⁶ OJ L 316, 31.10.1992, p. 21.

necessary to provide for a procedure authorising the introduction by Member States, for a set period, of specific increased rates. Such authorisation, following a justified request by Member States and on a proposal from the Commission, should be adopted by means of a Council implementing decision in accordance with Article 291 of the TFEU. ~~Such exemptions or reductions~~ measures should be under regular review.

↓ new

- (30) The list of energy products subject to the control and movement provisions of Council Directive 2008/118/EC³⁷ should include selected energy products, in order to ensure a unified and standardised treatment of those products and to take into account the risk of tax evasion, avoidance or abuse.
- (31) In order to ensure free movement whilst at the same time respecting the security requirements applicable to commercial motor vehicles and special containers, the definition of standard tanks of such vehicles should reflect the fact that fuel tanks are not exclusively fitted to commercial vehicles by their manufacturer.
-

↓ 2003/96/EC recital 32 (adapted)

- (32) Provision should be made for the Member States to notify the Commission of certain national measures. Such notification does not release Member States from the obligation, laid down in Article ~~88~~ 108 (3) of the ~~Treaty~~ TFEU, to notify certain national measures. This Directive ~~does~~ should not prejudice the outcome of any future State aid procedure that may be undertaken in accordance with Articles ~~87~~ 107 and ~~88~~ 108 of the ~~Treaty~~ TFEU.
-

↓ 2003/96/EC recital 33

- (33) The scope of ~~Directive 92/12/EEC~~ Directive 2008/118/EC should, where appropriate, be extended to the products and indirect taxes covered by this Directive.
-

↓ new

- (34) In order to ensure uniform conditions for the implementation of this Directive, implementing powers should be conferred on the Commission to determine whether the control and movement provisions of Directive 2008/118/EC are to apply to the products giving rise to evasion, avoidance or abuse. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 of the European Parliament and of the Council³⁸.

³⁷ Council Directive 2008/118/EC of 16 December 2008 concerning the general arrangements for excise duty and repealing Directive 92/12/EEC (OJ L 9, 14.1.2009, p. 12).

³⁸ Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

↓ 2003/96/EC recital 34 (adapted)

~~The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission³⁹;~~

↓ new

- (35) Reference should be made to the version presently applicable of the Combined Nomenclature. In order to ensure that the references to Combined Nomenclature (CN) codes in this Directive are updated whenever necessary, and that the minimum rates of taxation reflect prices evolution, the power to adopt acts in accordance with Article 290 of the TFEU should be delegated to the Commission in respect of updating the reference to those CN codes, and in respect of updating the minimum tax rates based on yearly variations of the consumer price index. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making. In particular, to ensure equal participation in the preparation of delegated acts, the Council receives all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.
- (36) Every five years and for the first time five years after the entry into force of this Directive, the Commission should report to the Council on the application of this Directive, examining in particular the minimum levels of taxation, the impact of innovation and technological developments, especially as regards energy efficiency, the use of electricity in transport and the justification for the exemptions, reductions and differentiations laid down in this Directive. The report should take into account the proper functioning of the internal market, environmental and social considerations, the real value of the minimum levels of taxation and the wider relevant objectives of the Treaties.
- (37) The obligation to transpose this Directive into national law should be confined to those provisions which represent a substantive amendment as compared to the earlier Directive. The obligation to transpose the provisions which are unchanged arises under the earlier Directive.
- (38) This Directive should be without prejudice to the obligations of the Member States relating to the time-limits for the transposition into national law and the dates of application of the Directives set out in Annex II, Part B,

³⁹ [OJ L 184, 17.7.1999, p. 23](#)

↓ 2003/96/EC

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. Member States shall impose taxation on energy products and electricity in accordance with this Directive.

↓ new

2. For the purposes of this Directive, taxation shall be calculated in EUR/Gigajoules on the basis of net calorific value of the energy products and electricity as set out in Annex IV to Directive 2012/27/EU, converted in Gigajoules. In the case of products derived from biomass the reference values shall be those set out in Annex III to Directive (EU) 2018/2001, converted in Gigajoules.

Where Directive 2012/27/EU or Directive (EU) 2018/2001, as the case may be, do not contain a net calorific value for the product concerned, Member States shall refer to relevant available information on its net calorific value.

↓ 2003/96/EC
⇒ new

Article 2

1. For the purposes of this Directive, the term ‘energy products’ shall apply to products:
- (a) falling within CN codes 1507 to 1518, if these are intended for use as heating fuel or motor fuel;
 - (b) falling within CN codes ⇒ 2207, 2208 90 91 and 2208 90 99 if these are intended for use as heating fuel or motor fuel and are exempted from the harmonized excise duty on alcohol and alcoholic beverages in accordance with Article 27(1), points (a) or (b), of Directive 92/83/EC⁴⁰ ⇐ ~~2701, 2702 and 2704 to 2715~~;
 - (c) falling within CN codes ⇒ 2701 to 2715 ⇐ ~~2901 and 2902~~;
 - (d) falling within CN code ⇒ 2804 10 ⇐ ~~2905 1100, which are not of synthetic origin~~, if these are intended for use as heating fuel or motor fuel;
-

↓ new

- (e) falling within CN code 2814, if these are intended for use as motor fuel;

⁴⁰ Council Directive 92/83/EEC of 19 October 1992 on the harmonization of the structures of excise duties on alcohol and alcoholic beverages (OJ L 316, 31.10.1992, p. 21)

↓ 2003/96/EC (adapted)
⇒ new

- (ef) falling within CN code ~~3403~~ ⇒ 2901 and 2902 ⇐ ;
- (fg) falling within CN code ~~3811~~ ⇒ 2905 11 00, which are not of synthetic origin, if these are intended for use as heating fuel or motor fuel ⇐ ;
- (gh) falling within CN code ~~3817~~ ⇒ 2909 19 10 and 2909 19 90, the latter if intended for use as heating fuel or motor fuel ⇐ ;
- (hi) falling within CN codes ⇒ 3403; ⇐ ~~38249986, 38249992 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 38249993, 38249996 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 38260010 and 38260090 if these are intended for use as heating fuel or motor fuel.~~

↓ new

- (j) falling within CN code 3811;
- (k) falling within CN code 3814, if these are intended for use as heating fuel or motor fuel;
- (l) falling within CN code 3817;
- (m) falling within CN code 3823 19, if these are intended for use as heating fuel or motor fuel;
- (n) falling within CN codes 3824 99 86, 3824 99 92 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 3824 99 93, 3824 99 96 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 3826 00 10 and 3826 00 90 if these are intended for use as heating fuel or motor fuel;
- (o) falling within CN codes 4401 and 4402, if these are intended for use as heating fuel in installations with a total rated thermal input equal to or exceeding 5 MW.

↓ 2003/96/EC (adapted)
⇒ new

2. This Directive shall also apply to:

Electricity falling within CN code 2716.

3. When intended for use, offered for sale or used as motor fuel or heating fuel, energy products other than those for which a minimum level of taxation are specified in this Directive shall be taxed according to use, at the rate for the equivalent heating fuel or motor fuel.

~~In addition to the taxable products listed in paragraph 1, any product intended for use, offered for sale or used as motor fuel, or as an additive or extender in motor fuels, shall be taxed at the rate for the equivalent motor fuel.~~

~~In addition to the taxable products listed in paragraph 1, any other hydrocarbon, except for peat, intended for use, offered for sale or used for heating purposes shall be taxed at the rate for the equivalent energy product.~~

↓ new

Products other than energy products, if intended for use, offered for sale or used as motor fuel shall be taxed at the rate for the equivalent motor fuel.

Additives and extenders to motor fuels, other than water, shall be taxed at the rate for the equivalent motor fuel.

Hydrocarbons other than those listed in paragraph 1 and intended for use, offered for sale or used for heating purposes shall be taxed at the rate for the equivalent energy product.

↓ 2003/96/EC

~~4. This Directive shall not apply to:~~

~~(a) output taxation of heat and the taxation of products falling within CN codes 4401 and 4402;~~

~~(b) the following uses of energy products and electricity:~~

~~energy products used for purposes other than as motor fuels or as heating fuels,~~

~~dual use of energy products~~

~~An energy product has a dual use when it is used both as heating fuel and for purposes other than as motor fuel and heating fuel. The use of energy products for chemical reduction and in electrolytic and metallurgical processes shall be regarded as dual use,~~

~~electricity used principally for the purposes of chemical reduction and in electrolytic and metallurgical processes,~~

~~electricity, when it accounts for more than 50 % of the cost of a product. 'Cost of a product' shall mean the addition of total purchases of goods and services plus personnel costs plus the consumption of fixed capital, at the level of the business, as defined in Article 11. This cost is calculated per unit on average. 'Cost of electricity' shall mean the actual purchase value of electricity or the cost of production of electricity if it is generated in the business,~~

~~mineralogical processes~~

~~'Mineralogical processes' shall mean the processes classified in the NACE nomenclature under code DI 26 'manufacture of other non-metallic mineral products' in Council Regulation (EEC) No 3037/90 of 9 October 1990 on the statistical classification of economic activities in the European Community⁴¹;~~

~~However, Article 20 shall apply to these energy products.~~

~~5. References in this Directive to codes of the combined nomenclature shall be to those of Commission Regulation (EC) No 2031/2001 of 6 August 2001, amending Annex I to~~

⁴¹ OJ L 293, 24.10.1990, p. 1. Regulation as last amended by Commission Regulation (EC) No 29/2002 (OJ L 6, 10.1.2002, p. 3).

~~Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff⁴².~~

~~A Decision to update the codes of the combined nomenclature for the products referred to in this Directive shall be taken once every year in accordance with the procedure laid down in Article 27. The Decision must not result in any changes in the minimum tax rates applied in this Directive or to the addition or removal of any energy products and electricity.~~

↓ new

4. Taxable products, referred to in paragraphs 1 and 3, produced or derived from biomass are subject under fiscal control to the specific levels of taxation set out for those products in accordance with this Directive, provided that they fulfil either of following criteria:

- a) the sustainability and greenhouse gas saving criteria set out in Article 29 of Directive (EU) 2018/2001, excluding high indirect land-use change-risk products set out in Article 26(2) of that Directive;
- b) are produced from the feedstock listed in Annex IX of Directive (EU) 2018/2001.

For the purposes of this Directive the definitions in Article 2 points (24), for ‘biomass’, (28), for ‘biogas’, (32), for ‘bioliquids’, (33), for ‘biofuels’ and (34), for ‘advanced biofuels’, of Directive (EU) 2018/2001 shall apply.

For the purposes of this Directive, ‘advanced’ biogas, bioliquids and products falling within CN codes 4401 and 4402 shall mean products produced from the feedstock listed in part A of Annex IX to Directive (EU) 2018/2001. Biofuels, biogas and bioliquids produced from the feedstock listed in part B of Annex IX to that Directive shall be considered equivalent to advanced products.

5. Taxable products, referred to in paragraphs 1 and 3, falling within the definition of ‘renewable fuels of non-biological origin’ or ‘low-carbon fuels’, may be subject under fiscal control to the specific levels of taxation set out for those products in accordance with this Directive, where:

- a) ‘renewable fuels of non-biological origin’, shall mean fuels other than biofuels, bioliquids or biogas, the energy content of which is derived from renewable sources other than biomass;
- b) ‘low-carbon fuels’ shall mean low-carbon hydrogen and synthetic gaseous and liquid fuels the energy content of which is derived from low-carbon hydrogen, as well as any fossil-based fuels, which meet the technical screening criteria for determining the conditions under which a specific economic activity qualifies as contributing substantially to climate change mitigation according to Article 10 of Regulation (EU) 2020/852 of the European Parliament and of the Council⁴³ and Annex I to Delegated Regulation (EU) [...]/⁴⁴. ‘Recycled Carbon

⁴² ~~OJ L 279, 23.10.2001, p. 1.~~

⁴³ Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (OJ L 198, 22.6.2020, p. 13)

⁴⁴ Commission Delegated Regulation (EU) [...]/⁴⁴ supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives, C/2021/2800 final (OJ [...], p.[...]).

Fuels', as defined by Article 2(35) of Directive (EU) 2018/2001, shall be included in this category.

6. Where part of a taxable product consists of one or more products referred to in the previous paragraphs, taxation of those parts shall be determined accordingly based on this Directive, independently from the CN code under which the product falls as a whole.

7. For the purposes of paragraph 1, points (a), (b), (d), (e), (g), (h), (k), (m), (n) and (o) of this Article, and of Article 21(1), points (a), (b), (h), (i), (l), (m) and (n), products destined for supply shall be considered to be intended for use as heating fuel or motor fuel when the supplier is aware, or should reasonably be aware, that the recipient intends to use the products as heating fuel or motor fuel. Products referred to in paragraph 1, point (a) of this Article and Article 21(1), point (a) shall not be considered to be intended for use as heating fuel or motor fuel if they are supplied to a producer of goods referred to in paragraph 1, point (n) of this Article and Article 21(1), point (n).

8. References in this Directive to codes of the Combined Nomenclature shall be understood as references to the codes of Combined Nomenclature in Council Regulation (EEC) No 2658/87⁴⁵ as amended by Commission Implementing Regulation (EU) 2020/1577⁴⁶.

Where the Regulation referred to in the first subparagraph is replaced or where an amendment to the Combined Nomenclature necessitates a modification of the codes referred to in this Directive, the Commission is empowered to adopt delegated acts in accordance with Article 29 in order to update the codes of the Combined Nomenclature of the products referred to in this Directive or in order to update the reference provided for in the first subparagraph so as to align it to the applicable version of the Combined Nomenclature.

Those delegated acts shall not result in any changes in the minimum tax rates set in this Directive or in the addition or removal of any energy products and electricity.

↓ 2003/96/EC

~~Article 3~~

~~References in Directive 92/12/EEC to 'mineral oils' and 'excise duty', insofar as it applies to mineral oils, shall be interpreted as covering all energy products, electricity and national indirect taxes referred to respectively in Articles 2 and 4(2) of this Directive.~~

↓ new

Article 3

1. This Directive shall not apply to the following:

(a) output taxation of heat;

⁴⁵ Council Regulation (EEC) No 2658/87 of 23 July 1987 on the tariff and statistical nomenclature and on the Common Customs Tariff (OJ L 256, 7.9.1987, p. 1).

⁴⁶ Commission Implementing Regulation (EU) 2020/1577 of 21 September 2020 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff (OJ L 361, 30.10.2020, p. 1).

(b) the following uses of energy products and electricity:

— energy products used for purposes other than as motor fuels or as heating fuels,

— dual use of energy products

An energy product has a dual use when it is used both as heating fuel and for purposes other than as motor fuel and heating fuel. The use of energy products for chemical reduction and in electrolytic and metallurgical processes, when energy products are used directly in or to provide a direct energy input to the process, or their consumption is connected to the process, shall be regarded as dual use,

— electricity used principally for the purposes of chemical reduction and in electrolytic and metallurgical processes, when electricity is used directly in or to provide a direct energy input to the process, or its consumption is connected to the process,

2. Article 21 shall apply to energy products used as provided for in paragraph 1, point (b) of this Article.

↓ 2003/96/EC

Article 4

1. The levels of taxation which Member States shall apply to the energy products and electricity listed in Article 2 may not be less than the minimum levels of taxation prescribed by this Directive.

2. For the purpose of this Directive ‘level of taxation’ is the total charge levied in respect of all indirect taxes (except VAT) calculated directly or indirectly on the quantity of energy products and electricity at the time of release for consumption.

~~Article 5~~

~~Provided that they respect the minimum levels of taxation prescribed by this Directive and that they are compatible with Community law, differentiated rates of taxation may be applied by Member States, under fiscal control, in the following cases:~~

~~— when the differentiated rates are directly linked to product quality;~~

~~— when the differentiated rates depend on quantitative consumption levels for electricity and energy products used for heating purposes;~~

~~— for the following uses: local public passenger transport (including taxis), waste collection, armed forces and public administration, disabled people, ambulances;~~

~~— between business and non-business use, for energy products and electricity referred to in Articles 9 and 10.~~

↓ new

Article 5

1. Member States shall ensure that where equal minimum levels of taxation are laid down in Annex I in relation to a given use, equal levels of taxation are fixed for products put to that use. Member States shall also replicate at any time the ranking of minimum levels of taxation as laid down in Annex I in relation to different products for each given use.

For the purposes of the first subparagraph, each use for which a minimum level of taxation is identified, respectively, in Tables A, B and C of Annex I shall be considered to be a single use, unless otherwise specified in this Directive.

For the purposes of ranking mentioned in the first subparagraph, electricity shall be considered together with other motor fuels and heating fuels indicated in Tables B and C of Annex I, except when Member States apply a specific level of taxation to electricity used to charge electric vehicles, in which case electricity shall be considered together with motor fuels indicated in Table A of Annex I, unless otherwise specified in this Directive.

For the purposes of the third subparagraph of this paragraph, ‘electric vehicle’ shall mean an electric vehicle as defined in Article 2, point (2) of Directive 2014/94/EU of the European Parliament and of the Council⁴⁷.

2. The minimum levels of taxation laid down in this Directive shall be adapted every year starting from 1 January 2024 to take account of the changes in the harmonised index of consumer prices excluding energy and unprocessed food as published by Eurostat. The minimum levels shall be adapted automatically, by increasing or decreasing the base amount in euro by the percentage change in that index over the preceding calendar year.

The Commission is empowered to adopt delegated acts in accordance with Article 29 to amend the minimum levels of taxation as referred to in the first subparagraph.

↓ 2003/96/EC (adapted)
⇒ new

Article 6

Member States shall be free to give effect to the exemptions or reductions in the level of taxation prescribed by this Directive either:

- (a) directly,
 - (b) by means of a differentiated rate,
- or
- (c) by refunding all or part of the amount of taxation.

⁴⁷ Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure (OJ L 307, 28.10.2014, p. 1).

Article 7

~~1.~~ As from 1 January ~~2004 and from 1 January 2010~~ ⇨ 2023 ⇐, the minimum levels of taxation applicable to motor fuels shall be fixed as set out in ~~Table A of Annex I~~ ~~Table A~~.

⇩ new

Without prejudice to Article 5(2), when a transitional period is applicable as provided for in Table A of Annex I, the increase in the minimum levels of taxation shall be fixed at one tenth per year until 1 January 2033. For low-carbon fuels, the minimum level of taxation set for the first year of the transitional period shall apply until 1 January 2033.

⇩ 2003/96/EC (adapted)
⇨ new

~~Not later than 1 January 2012, the Council, acting unanimously after consulting the European Parliament, shall, on the basis of a report and a proposal from the Commission, decide upon the minimum levels of taxation applicable to gas oil for a further period beginning on 1 January 2013.~~

~~2. Member States may differentiate between commercial and non-commercial use of gas oil used as propellant, provided that the Community minimum levels are observed and the rate for commercial gas oil used as propellant does not fall below the national level of taxation in force on 1 January 2003, notwithstanding any derogations for this use laid down in this Directive.~~

~~3. 'Commercial gas oil used as propellant' shall mean gas oil used as propellant for the following purposes:~~

~~(a) the carriage of goods for hire or reward, or on own account, by motor vehicles or articulated vehicle combinations intended exclusively for the carriage of goods by road and with a maximum permissible gross laden weight of not less than 7,5 tonnes;~~

~~(b) the carriage of passengers, whether by regular or occasional service, by a motor vehicle of category M2 or category M3, as defined in Council Directive 70/156/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the type approval of motor vehicles and their trailers⁴⁸;~~

~~4. Notwithstanding paragraph 2, Member States which introduce a system of road user charges for motor vehicles or articulated vehicle combinations intended exclusively for the carriage of goods by road may apply a reduced rate on gas oil used by such vehicles, that goes below the national level of taxation in force on 1 January 2003, as long as the overall tax burden remains broadly equivalent, provided that the Community minimum levels are observed and that the national level of taxation in force on 1 January 2003 for gas oil used as propellant is at least twice as high as the minimum level of taxation applicable on 1 January 2004.~~

⁴⁸

~~OJL 42, 23.2.1970, p. 1.~~

Article 8

1. As from 1 January ~~2004~~ ⇒ 2023 ⇐ , notwithstanding Article 7, the minimum levels of taxation applicable to products used as motor fuel for the purposes set out in paragraph 2 of this Article shall be fixed as set out in Table B of Annex I ~~Table B~~.

⇓ new

Without prejudice to Article 5(2), when a transitional period is applicable as provided for in Table B of Annex I, the increase in the minimum levels of taxation shall be fixed at one tenth per year until 1 January 2033. For low-carbon fuels, the minimum level of taxation set for the first year of the transitional period shall apply until 1 January 2033.

⇓ 2003/96/EC (adapted)
⇒ new

2. ~~This Article~~ Paragraph 1 shall apply to the following ~~industrial and commercial~~ purposes:

- (a) agricultural, horticultural or ~~piscicultural~~ aquaculture works, and in forestry;
- (b) stationary motors;
- (c) plant and machinery used in construction, civil engineering and public works;
- (d) vehicles intended for use off the public roadway or which have not been granted authorisation for use mainly on the public roadway.

Article 9

~~1.~~ As from 1 January ~~2004~~ ⇒ 2023 ⇐ , the minimum levels of taxation applicable to heating fuels shall be fixed as set out in Table C of Annex I ~~Table C~~.

⇓ new

Without prejudice to Article 5(2), when a transitional period is applicable as provided for in Table C of Annex I, the increase in the minimum levels of taxation shall be fixed at one tenth per year until 1 January 2033. For low-carbon fuels, the minimum level of taxation set for the first year of the transitional period shall apply until 1 January 2033.

⇓ 2003/96/EC (adapted)
⇒ new

~~2. Member States, which on 1 January 2003 are authorised to apply a monitoring charge for heating gas oil, may continue to apply a reduced rate of EUR 10 per 1000 litres for that product. This authorisation shall be repealed on 1 January 2007 if the Council, acting unanimously on the basis of a report and a proposal from the Commission, so decides, having noted that the level of the reduced rate is too low to avoid problems of trade distortion between the Member States.~~

Article 10

~~1.~~ As from 1 January ~~2004~~ ⇒ 2023 ⇐ , the minimum levels of taxation applicable to electricity shall be fixed as set out in ~~☒~~ Table D of ~~☒~~ Annex I ~~Table C~~.

~~2.~~ Above the minimum levels of taxation referred to in paragraph 1, Member States will have the option of determining the applicable tax base provided that they respect Directive 92/12/EEC.

Article 11

~~1.~~ In this Directive, 'business use' shall mean the use by a business entity, identified in accordance with paragraph 2, which independently carries out, in any place, the supply of goods and services, whatever the purpose or results of such economic activities.

~~The economic activities comprise all activities of producers, traders and persons supplying services including mining and agricultural activities and activities of the professions.~~

~~States, regional and local government authorities and other bodies governed by public law shall not be considered as business entities in respect of the activities or transactions in which they engage as public authorities. However, when they engage in such activities or transactions, they shall be considered as a business in respect of these activities or transactions where treatment as non-business would lead to significant distortions of competition.~~

~~2.~~ With respect to this Directive, the business entity cannot be considered as smaller than a part of an enterprise or a legal body that from an organisational point of view constitutes an independent business, that is to say an entity capable of functioning by its own means.

~~3.~~ Where mixed use takes place, taxation shall apply in proportion to each type of use, although where either the business or non-business use is insignificant, it may be treated as nil.

~~4.~~ Member States may limit the scope of the reduced level of taxation for business use.

Article ~~12~~11

1. Member States may express their national levels of taxation in units other than ~~those~~ ~~☒~~ that ~~☒~~ specified in Articles 7 to 10 provided that the corresponding levels of taxation, following conversion into those units, are not below the minimum levels specified in this Directive.

~~2.~~ For energy products specified in Articles 7, 8 and 9, with levels of taxation based on ~~volumes~~, ⇒ When volume units are applied, ⇐ the volume shall be measured at a temperature of 15° C.

Article ~~13~~12

1. For Member States that have not adopted the euro, the value of the euro in national currencies to be applied to the value of the levels of taxation shall be fixed once a year. The rates to be applied shall be those obtaining on the first working day of October and published in the *Official Journal of the European Union* and shall have effect from 1 January of the following calendar year.

2. Member States may maintain the amounts of taxation in force at the time of the annual adjustment provided for in paragraph 1 if the conversion of the amounts of the level of

taxation expressed in euro would result in an increase of less than 5 % or EUR 5, whichever is the lower amount, in the level of taxation expressed in national currency.

↓ new

Article 13

1. Member States shall exempt from taxation under fiscal control energy products and electricity used to produce electricity and electricity used to maintain the ability to produce electricity.

2. By derogation from paragraph 1, Member States may, for reasons of environmental policy, subject the products referred to in paragraph 1 to taxation without having to respect the minimum levels of taxation laid down in this Directive. In such case, the taxation of those products shall replicate the ranking between the minimum levels of taxation as laid down in Annex I and shall not be taken into account for the purposes of satisfying the minimum level of taxation on electricity laid down in Article 10.

↓ 2003/96/EC

Article 14

~~1. In addition to the general provisions set out in Directive 92/12/EEC on exempt uses of taxable products, and without prejudice to other Community provisions, Member States shall exempt the following from taxation under conditions which they shall lay down for the purpose of ensuring the correct and straightforward application of such exemptions and of preventing any evasion, avoidance or abuse:~~

~~(a) energy products and electricity used to produce electricity and electricity used to maintain the ability to produce electricity. However, Member States may, for reasons of environmental policy, subject these products to taxation without having to respect the minimum levels of taxation laid down in this Directive. In such case, the taxation of these products shall not be taken into account for the purpose of satisfying the minimum level of taxation on electricity laid down in Article 10;~~

~~(b) energy products supplied for use as fuel for the purpose of air navigation other than in private pleasure flying.~~

~~For the purposes of this Directive 'private pleasure flying' shall mean the use of an aircraft by its owner or the natural or legal person who enjoys its use either through hire or through any other means, for other than commercial purposes and in particular other than for the carriage of passengers or goods or for the supply of services for consideration or for the purposes of public authorities.~~

~~Member States may limit the scope of this exemption to supplies of jet fuel (CN code 27101921);~~

~~(c) energy products supplied for use as fuel for the purposes of navigation within Community waters (including fishing), other than private pleasure craft, and electricity produced on board a craft.~~

~~For the purposes of this Directive 'private pleasure craft' shall mean any craft used by its owner or the natural or legal person who enjoys its use either through hire or~~

~~through any other means, for other than commercial purposes and in particular other than for the carriage of passengers or goods or for the supply of services for consideration or for the purposes of public authorities.~~

~~2. Member States may limit the scope of the exemptions provided for in paragraph 1(b) and (c) to international and intra-Community transport. In addition, where a Member State has entered into a bilateral agreement with another Member State, it may also waive the exemptions provided for in paragraph 1(b) and (c). In such cases, Member States may apply a level of taxation below the minimum level set out in this Directive.~~

↓ new

Article 14

1. Without prejudice to international obligations and to Article 5 of this Directive, as applicable as a single use to intra-EU air navigation of flights other than business and pleasure flights, Member states shall apply under fiscal control not less than the minimum levels of taxation prescribed in this Directive to energy products supplied for use as fuel to aircrafts, and to electricity used directly for charging electric aircrafts, for the purposes of intra-EU air navigation of those flights.

For the purposes of the first subparagraph, electricity shall be ranked among motor fuels indicated in Table A of Annex I.

The minimum levels of taxation referred to in the first subparagraph shall start from zero and increase each year by one tenth of the final minimum rates, set out in Tables A and D of Annex I, over a transitional period of ten years. A minimum rate of zero shall apply to sustainable biofuels and biogas, low-carbon fuels, renewable fuels of non-biological origin, advanced sustainable biofuels and biogas, and electricity over that transitional period of ten years.

For the purposes of this Article, ‘intra-EU air navigation’ shall mean flights between two airports located in the Union, including domestic flights.

For the purposes of this Article, ‘business aviation’ shall mean the operation or use of aircraft by companies or individuals for the carriage of passengers or goods as an aid to the conduct of their business, flown for purposes generally considered not for public hire and piloted by individuals having, at the minimum, a valid commercial pilot license with an instrument rating.

For the purposes of this Article, ‘pleasure flights’ shall mean the use of an aircraft for personal or recreational purposes not associated with a business or professional use.

2. Energy products supplied for use as fuel to aircrafts and electricity used directly for charging electric aircrafts, for the purposes of intra-EU air navigation of cargo-only flights shall be exempted.

By derogation from the first subparagraph of this paragraph, Member states may apply the same level of taxation laid down in paragraph 1 to cargo-only domestic flights referred to in the first subparagraph of this paragraph.

Where a Member State has entered into an agreement with one or several Member States, it may also apply the same level of taxation laid down in paragraph 1 to intra-EU air navigation of cargo-only flights mentioned in the first subparagraph.

For the purposes of this paragraph, ‘cargo-only flight’ shall mean a scheduled or non-scheduled air service performed by aircraft carrying revenue loads other than revenue passengers, excluding flights carrying one or more revenue passengers and flights listed in published timetables as open to passengers.

3. Without prejudice to international obligations, Member States may exempt or apply the same levels of taxation applied for intra-EU air navigation to extra-EU air navigation according to the type of flight.

4. Motor fuels used in the field of the manufacture, development, testing and maintenance of aircraft shall be subject to the level of taxation provided for in paragraph 1.

5. Member States may apply under fiscal control total or partial exemptions to electricity supplied to stationary aircrafts.

For the purposes of the first subparagraph, ‘electricity supply to stationary aircraft’ shall mean the supply of electricity through a standardised fixed or mobile interface to aircraft when stationed at the gate or at an airport outfield position.

Article 15

1. Without prejudice to Article 5, Member states shall apply, as a single use, under fiscal control not less than minimum levels of taxation as set out in Tables B and D of Annex I to energy products supplied for use as fuel to vessels, and to electricity used directly for charging electric vessels, for the purposes of intra-EU waterborne regular service navigation, fishing and freight transport.

For the purposes of the first subparagraph, electricity shall be ranked among motor fuels indicated in Table B of Annex I.

Over a transitional period of ten years, minimum rates of zero shall apply to sustainable biofuels and biogas, low-carbon-fuels, renewable fuels of non-biological origin, advanced sustainable biofuels and biogas and electricity.

For the purposes of this Article, ‘intra-EU waterborne navigation’ shall mean navigation between two ports located in the Union, including domestic navigation.

For the purposes of this Article, ‘regular service’ shall mean a series of ro-ro passenger ship or high-speed passenger craft crossings operated so as to serve traffic between the same two or more ports, or a series of voyages from and to the same port without intermediate calls, either: according to a published timetable or with crossings so regular or frequent that they constitute a recognisable systematic series.

For the purposes of this Article, ‘freight transport’ shall mean a scheduled or non-scheduled service performed by vessel carrying revenue loads other than revenue passengers, excluding voyages carrying one or more revenue passengers and voyages listed in published timetables as open to passengers.

2. Member states may exempt or apply the same levels of taxation applied for intra-EU waterborne navigation to extra-EU waterborne navigation according to the type of activity.

3. Member States shall subject to taxation laid down in the first paragraph motor fuels and electricity used in the field of the manufacture, development, testing and maintenance of vessels, and motor fuels and electricity used for dredging operations in navigable waterways and in ports.

4. Electricity produced on board a vessel shall be exempted from taxation.

5. Member States may apply under fiscal control total or partial exemptions to electricity directly supplied to vessels berthed in ports.

↓ 2003/96/EC (adapted)
⇒ new

Article ~~15~~16

~~1.~~ Without prejudice to other ~~Community~~ Union provisions, Member States may apply under fiscal control ~~total or partial~~ exemptions or reductions in the level of taxation to:

- (a) taxable products used under fiscal control in the field of pilot projects for the technological development of more environmentally-friendly products or in relation to fuels from renewable resources;
- (b) electricity:
 - of solar, wind, wave, tidal or geothermal origin;
 - of hydraulic origin produced in hydroelectric installations;
 - generated from sustainable biomass or from products produced from sustainable biomass;
 - generated from methane emitted by abandoned coalmines;
 - generated from fuel cells;

↓ new

Member States may also refund to the producer some or all of the amount of tax paid by the consumer on electricity produced from products specified in this paragraph.

↓ 2003/96/EC
⇒ new

~~(c) energy products and electricity used for combined heat and power generation;~~

~~(c)~~ (c) electricity produced from combined heat and power generation, provided that cogeneration by the combined generators ~~are environmentally friendly~~ is high-efficiency cogeneration as defined in Article 2, point (34), of Directive 2012/27/EU. Member States may apply national definitions of ‘environmentally friendly’ (or high efficiency) cogeneration production until the Council, on the basis of a report and a proposal from the Commission, unanimously adopts a common definition;

↓ new

(d) renewable fuels of non-biological origin, advanced sustainable biofuels, bioliquids, biogas and advanced sustainable products falling within CN codes 4401 and 4402;

(e) products falling within CN code 2705 used for heating purposes.

~~(e) energy products and electricity used for the carriage of goods and passengers by rail, metro, tram and trolley bus;~~

~~(f) energy products supplied for use as fuel for navigation on inland waterways (including fishing) other than in private pleasure craft, and electricity produced on board a craft;~~

~~(g) natural gas in Member States in which the share of natural gas in final energy consumption was less than 15 % in 2000;~~

~~The total or partial exemptions or reductions may apply for a maximum period of ten years after the entry into force of this Directive or until the national share of natural gas in final energy consumption reaches 25 %, whichever is the sooner. However, as soon as the national share of natural gas in final energy consumption reaches 20 %, the Member States concerned shall apply a strictly positive level of taxation, which shall increase on a yearly basis in order to reach at least the minimum rate at the end of the period referred to above.~~

~~The United Kingdom of Great Britain and Northern Ireland may apply the total or partial exemptions or reductions for natural gas separately for Northern Ireland;~~

~~(h) electricity, natural gas, coal and solid fuels used by households and/or by organisations recognised as charitable by the Member State concerned. In the case of such charitable organisations, Member States may confine the exemption or reduction to use for the purpose of non-business activities. Where mixed use takes place, taxation shall apply in proportion to each type of use. If a use is insignificant, it may be treated as nil;~~

~~(i) natural gas and LPG used as propellants;~~

~~(j) motor fuels used in the field of the manufacture, development, testing and maintenance of aircraft and ships;~~

~~(k) motor fuels used for dredging operations in navigable waterways and in ports;~~

~~(l) products falling within CN code 2705 used for heating purposes.~~

~~2. Member States may also refund to the producer some or all of the amount of tax paid by the consumer on electricity produced from products specified in paragraph 1(b).~~

~~3. Member States may apply a level of taxation down to zero to energy products and electricity used for agricultural, horticultural or piscicultural works, and in forestry.~~

~~On the basis of a proposal from the Commission, the Council shall before 1 January 2008 examine if the possibility of applying a level of taxation down to zero shall be repealed.~~

Article 16

~~1. Member States may, without prejudice to paragraph 5, apply an exemption or a reduced rate of taxation under fiscal control on the taxable products referred to in Article 2 where such products are made up of, or contain, one or more of the following products:~~

~~products falling within CN codes 1507 to 1518;~~

~~products falling within CN codes 38249955 and 38249980, 38249985, 38249986, 38249992 (excluding anti-rust preparations containing amines as active constituents~~

~~and inorganic composite solvents and thinners for varnishes and similar products), 38249993, 38249996 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 38260010 and 38260090 for their components produced from biomass;~~

~~products falling within CN codes 22072000 and 29051100 which are not of synthetic origin;~~

~~products produced from biomass, including products falling within CN codes 4401 and 4402.~~

~~Member States may also apply a reduced rate of taxation under fiscal control on the taxable products referred to in Article 2 where such products contain water (CN codes 2201 and 28539010).~~

~~'Biomass' shall mean the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.~~

~~2. The exemption or reduction in taxation resulting from the application of the reduced rate laid down in paragraph 1 may not be greater than the amount of taxation payable on the volume of the products referred to in paragraph 1 present in the products eligible for the reduction.~~

~~The levels of taxation applied by Member States on the products made up of or containing the products referred to in paragraph 1 may be lower than the minimum levels specified in Article 4.~~

~~3. The exemption or reduction in taxation applied by Member States shall be adjusted to take account of changes in raw material prices to avoid over-compensating for the extra costs involved in the manufacture of the products referred to in paragraph 1.~~

~~4. Until 31 December 2003, Member States may exempt or continue to exempt products solely or almost solely made up of the products referred to in paragraph 1.~~

~~5. The exemption or reduction provided for the products referred to in paragraph 1 may be granted under a multiannual programme by means of an authorisation issued by an administrative authority to an economic operator for more than one calendar year. The exemption or reduction authorised may not be applied for a period of more than six consecutive years. This period may be renewed.~~

~~As part of a multiannual programme authorised by an administrative authority prior to 31 December 2012, Member States may apply the exemption or reduction under paragraph 1 after 31 December 2012 and until the end of the multiannual programme. The period may not be renewed.~~

~~6. Should Member States be required by Community law to comply with legally binding obligations to place on their markets a minimum proportion of the products referred to in paragraph 1, paragraphs 1 to 5 shall cease to apply as from the date when such obligations become binding on the Member States.~~

~~7. Member States shall communicate to the Commission the schedule of tax reductions or exemptions applied in accordance with this Article by 31 December 2004 and every 12 months thereafter.~~

~~8. No later than 31 December 2009, the Commission shall report to the Council on the fiscal, economic, agricultural, energy, industrial and environmental aspects of the reductions granted in accordance with this Article.~~

↓ new

Article 17

Without prejudice to Article 5, as applicable as single uses, Member States may apply under fiscal control:

(a) reductions in the level of taxation, which shall not go below the minima as set out in Table C and D of Annex I, to energy products and electricity used for combined heat and power generation, without prejudice to Article 13;

(b) reductions in the level of taxation, which shall not go below the minima as set out in Table B and D of Annex I, to energy products and electricity used for the carriage of goods and passengers by rail, metro, tram and trolley bus, and for local public passenger transport, waste collection, armed forces and public administration, disabled people and ambulances;

For the purposes of point (b), electricity shall be ranked among motor fuels indicated in Annex I Table B;

(c) reductions in the level of taxation, which shall not go below the minima as set out in Table C and D of Annex I, to energy products used as heating fuel and electricity if used by households and/or by organisations recognised as charitable by the Member State concerned. In the case of such charitable organisations, Member States shall confine the reduction to use for the purpose of non-business activities. Where mixed use takes place, taxation shall apply in proportion to each type of use. If a use is insignificant, it may be treated as nil.

For the purposes of point (c), the minimum levels of taxation as set out in Tables C and D of Annex I shall start from zero and increase over a transitional period of ten years by one tenth of the final minimum rates in each year.

For the purposes of point (c), energy products and electricity used by households recognised as vulnerable may be exempt for a maximum period of ten years after the entry into force of this Directive. For the purposes of this paragraph, ‘vulnerable households’ shall mean households significantly affected by the impacts of this Directive which, for the purpose of this Directive, means that they are below the ‘at risk of poverty’ threshold, defined as 60% of the national median equivalised disposable income.

(d) reductions in the level of taxation, which shall not go below the minima as set out in Table C and D of Annex I to energy products used for heating purposes and to electricity, used for agricultural, horticultural or aquaculture works, and in forestry.

↓ 2003/96/EC (adapted)
⇒ new

Article ~~17~~18

~~1. Provided the minimum levels of taxation prescribed in this Directive are respected on average for each business,~~ ⇒ Without prejudice to Article 5, as applicable as a single use, ⇐ Member States may apply tax reductions ⇒ , which shall not go below the relevant minima as set out in Tables B, C and D of Annex I ⇐ on the consumption of energy products used for heating purposes or for the purposes of Article 8(2) ☒ , points ☒ (b) and (c), and on electricity in the following cases:

(a) in favour of energy-intensive business

An ‘energy-intensive business’ shall mean a business entity, as referred to in Article 19, where either the purchases of energy products and electricity amount to at least 3,0 % of the production value or the national energy tax payable amounts to at least 0,5 % of the added value. ~~Within this definition, Member States may apply more restrictive concepts, including sales value, process and sector definitions.~~

‘Purchases of energy products and electricity’ shall mean the actual cost of energy purchased or generated within the business. Only electricity, heat and energy products that are used for heating purposes or for the purposes of Article 8(2)(b) and (c) are included. All taxes are included, except deductible VAT.

‘Production value’ shall mean turnover, including subsidies directly linked to the price of the product, plus or minus the changes in stocks of finished products, work in progress and goods and services purchased for resale, minus the purchases of goods and services for resale.

~~‘Value added’~~ Added value shall mean the total turnover liable to VAT including export sales minus the total purchases liable to VAT including imports.

↓ 2003/96/EC
⇒ new

~~Member States, which currently apply national energy tax systems in which energy-intensive businesses are defined according to criteria other than energy costs in comparison with production value and national energy tax payable in comparison with value added, shall be allowed a transitional period until no later than 1 January 2007 to adapt to the definition set out in point (a) first subparagraph;~~

(b) where agreements are concluded with ~~undertakings~~ ⇒ business entities as referred to in Article 19 ⇐ or associations of ~~undertakings~~ ⇒ such business entities ⇐, or where tradable permit schemes or equivalent ~~arrangements~~ ⇒ measures ⇐ are implemented, as far as they lead to the achievement of environmental protection objectives or to improvements in energy efficiency.

↓ new

For the purposes of the first paragraph, ‘tradable permit schemes’ shall mean tradable permit schemes other than the Union scheme within the meaning of Directive 2003/87/EC of the European Parliament and of the Council ⁴⁹.

↓ 2003/96/EC

~~2. Notwithstanding Article 4(1), Member States may apply a level of taxation down to zero to energy products and electricity as defined in Article 2, when used by energy-intensive businesses as defined in paragraph 1 of this Article.~~

⁴⁹ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32).

~~3. Notwithstanding Article 4(1), Member States may apply a level of taxation down to 50 % of the minimum levels in this Directive to energy products and electricity as defined in Article 2, when used by business entities as defined in Article 11, which are not energy-intensive as defined in paragraph 1 of this Article.~~

~~4. Businesses that benefit from the possibilities referred to in paragraphs 2 and 3 shall enter into the agreements, tradable permit schemes or equivalent arrangements as referred to in paragraph 1(b). The agreements, tradable permit schemes or equivalent arrangements must lead to the achievement of environmental objectives or increased energy efficiency, broadly equivalent to what would have been achieved if the standard Community minimum rates had been observed.~~

~~Article 18~~

~~1. By way of derogation from the provisions of the present Directive, the Member States specified in Annex II are authorised to continue to apply the reductions in the levels of taxation or the exemptions set out in that Annex.~~

~~Subject to a prior review by the Council, on the basis of a proposal from the Commission, this authorisation shall expire on 31 December 2006 or on the date specified in Annex II.~~

~~2. Notwithstanding the periods set out in paragraphs 3 to 13 and provided that this does not significantly distort competition, Member States with difficulties in implementing the new minimum levels of taxation will be allowed a transitional period of until 1 January 2007, particularly in order to avoid jeopardising price stability.~~

~~3. The Kingdom of Spain may apply a transitional period until 1 January 2007 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 and until 1 January 2012 to reach EUR 330. Until 31 December 2009, it may furthermore apply a special reduced rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 287 per 1000 l and that the national levels of taxation in force on 1 January 2003 are not reduced. From 1 January 2010 until 1 January 2012, it may apply a differentiated rate on commercial use of gas oil used as propellant, provided that it does not result in taxation at below EUR 302 per 1000 l and that the national levels of taxation in force on 1 January 2010 are not reduced. The special reduced rate on commercial use of gas oil used as propellant may also be applied for taxis until 1 January 2012. With respect to Article 7(3)(a), it may apply, until 1 January 2008, a maximum permissible gross laden weight of not less than 3,5 tonnes in the definition of commercial purposes.~~

~~4. The Republic of Austria may apply a transitional period until 1 January 2007 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 and until 1 January 2012 to reach EUR 330. Until 31 December 2009, it may furthermore apply a special reduced rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 287 per 1000 l and that the national levels of taxation in force on 1 January 2003 are not reduced. From 1 January 2010 until 1 January 2012, it may apply a differentiated rate on commercial use of gas oil used as propellant, provided that it does not result in taxation at below EUR 302 per 1000 l and that the national levels of taxation in force on 1 January 2010 are not reduced.~~

~~5. The Kingdom of Belgium may apply a transitional period until 1 January 2007 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 and until 1 January 2012 to reach EUR 330. Until 31 December 2009, it may furthermore apply a special reduced rate on commercial use of gas oil used as propellant,~~

~~provided that this does not result in taxation at below EUR 287 per 1000 l and that the national levels of taxation in force on 1 January 2003 are not reduced. From 1 January 2010 until 1 January 2012, it may apply a differentiated rate on commercial use of gas oil used as propellant, provided that it does not result in taxation at below EUR 302 per 1000 l and that the national levels of taxation in force on 1 January 2010 are not reduced.~~

~~6. — The Grand Duchy of Luxembourg may apply a transitional period until 1 January 2009 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 and until 1 January 2012 to reach EUR 330. Until 31 December 2009, it may furthermore apply a special reduced rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 272 per 1000 l and that the national levels of taxation in force on 1 January 2003 are not reduced. From 1 January 2010 until 1 January 2012, it may apply a differentiated rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 302 per 1000 l and that the national levels of taxation in force on 1 January 2010 are not reduced.~~

~~7. — The Portuguese Republic may apply levels of taxation on energy products and electricity consumed in the Autonomous Regions of the Azores and Madeira lower than the minimum levels of taxation laid down in this Directive in order to compensate for the transport costs incurred as a result of the insular and dispersed nature of these regions.~~

~~The Portuguese Republic may apply a transitional period until 1 January 2009 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 and until 1 January 2012 to reach EUR 330. Until 31 December 2009, it may furthermore apply a differentiated rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 272 per 1000 l and that the national levels of taxation in force on 1 January 2003 are not reduced. From 1 January 2010 until 1 January 2012, it may apply a differentiated rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 302 per 1000 l and that the national levels of taxation in force on 1 January 2010 are not reduced. The differentiated rate on commercial use of gas oil used as propellant may also be applied for taxis until 1 January 2012. With respect to Article 7(3)(a) it may apply, until 1 January 2008, a maximum permissible gross laden weight of not less than 3,5 tonnes in the definition of commercial purposes.~~

~~The Portuguese Republic may apply total or partial exemptions in the level of taxation of electricity until 1 January 2010.~~

~~8. — The Hellenic Republic may apply levels of taxation up to EUR 22 per 1000 l lower than the minimum rates laid down in this Directive on gas oil used as propellant and on petrol consumed in the departments of Lesbos, Chios, Samos, the Dodecanese and the Cyclades and on the following islands in the Aegean: Thasos, North Sporades, Samothrace and Skiros.~~

~~The Hellenic Republic may apply a transitional period until 1 January 2010 to convert its current input electricity taxation system into an output taxation system and to reach the new minimum level of taxation for petrol.~~

~~The Hellenic Republic may apply a transitional period until 1 January 2010 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 per 1000 l and until 1 January 2012 to reach EUR 330. Until 31 December 2009 it may furthermore apply a differentiated rate on commercial use of gas oil used as propellant, provided that this does not result in taxation at below EUR 264 per 1000 l and that the national levels of taxation in force on 1 January 2003 are not reduced. From 1 January 2010 until 1 January 2012, it may apply a differentiated rate on commercial use of gas oil used as~~

~~propellant, provided that this does not result in taxation at below EUR 302 per 1000 l and that the national levels of taxation in force on 1 January 2010 are not reduced. The differentiated rate on commercial use of gas oil used as propellant may also be applied for taxis until 1 January 2012. With respect to Article 7(3)(a) it may apply, until 1 January 2008, a maximum permissible gross laden weight of not less than 3,5 tonnes in the definition of commercial purposes.~~

~~9. — Ireland may apply total or partial exemptions or reductions in the level of taxation of electricity until 1 January 2008.~~

~~10. — The French Republic may apply total or partial exemptions or reductions for energy products and electricity used by the State, regional and local government authorities or other bodies governed by public law, in respect of the activities or transactions in which they engage as public authorities until 1 January 2009.~~

~~The French Republic may apply a transitional period until 1 January 2009 to adapt its current electricity taxation system to the provisions set out in this Directive. During this period, the global average level of the current local electricity taxation is to be taken into account to assess whether the minimum rates set out in this Directive are respected.~~

~~11. — The Italian Republic may apply, until 1 January 2008, a maximum permissible gross laden weight of not less than 3,5 tonnes in the definition of commercial purposes as given in Article 7(3)(a).~~

~~12. — The Federal Republic of Germany may apply, until 1 January 2008, a maximum permissible gross laden weight of 12 tonnes in the definition of commercial purposes as given in Article 7(3)(a).~~

~~13. — The Kingdom of the Netherlands may apply, until 1 January 2008, a maximum permissible gross laden weight of 12 tonnes in the definition of commercial purposes as given in Article 7(3)(a).~~

~~14. — Within the transitional periods established, Member States shall progressively reduce their respective gaps with respect to the new minimum levels of taxation. However, when the difference between the national level and the minimum level does not exceed 3 % of that minimum level, the Member State concerned may wait until the end of the period to adjust its national level.~~

↓ new

Article 19

1. For the purposes of Article 18, ‘business entity’ shall mean an entity, identified in accordance with paragraph 2 of this Article, which independently carries out, in any place, the supply of goods and services, whatever is the purpose or results of such economic activities.

The economic activities comprise all activities of producers, traders and persons supplying services including mining and agricultural activities and activities of the professions.

States, regional and local government authorities and other bodies governed by public law shall not be considered as business entities in respect of the activities or transactions in which they engage as public authorities. However, when they engage in such activities or transactions, they shall be considered as a business entities in respect of those activities or transactions where treatment as non-business entities would lead to significant distortions of competition.

2. For the purposes of paragraph 1, the business entity cannot be considered as smaller than a part of an enterprise or a legal body that from an organisational point of view constitutes an independent business, that is to say an entity capable of functioning by its own means.

↓ 2004/74/EC Art. 1.2 amended
by Corrigendum, OJ L 195,
2.6.2004, p. 26

~~Article 18a~~

~~1. By way of derogation from the provisions of the present Directive, the Member States specified in Annex III are authorised to apply the reductions in the levels of taxation or the exemptions set out in that Annex.~~

~~Subject to a prior review by the Council, on the basis of a proposal from the Commission, this authorisation shall expire on 31 December 2006 or on the date specified in Annex III.~~

~~2. Notwithstanding the periods set out in paragraphs 3 to 11 and provided that this does not significantly distort competition, Member States with difficulties in implementing the new minimum levels of taxation shall be allowed a transitional period until 1 January 2007, particularly in order to avoid jeopardising price stability.~~

~~3. The Czech Republic may apply total or partial exemptions or reductions in the level of taxation of electricity, solid fuels and natural gas until 1 January 2008.~~

~~4. The Republic of Estonia may apply a transitional period until 1 January 2010 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 330 per 1000 l. However, the level of taxation on gas oil used as propellant shall be no less than EUR 245 per 1000 l as from 1 May 2004.~~

~~The Republic of Estonia may apply a transitional period until 1 January 2010 to adjust its national level of taxation on unleaded petrol used as propellant to the new minimum level of EUR 359 per 1000 l. However, the level of taxation on unleaded petrol shall be no less than EUR 287 per 1000 l as from 1 May 2004.~~

~~The Republic of Estonia may apply a total exemption from taxation of oil shale until 1 January 2009. Until 1 January 2013, it may furthermore apply a reduced rate in the level of taxation of oil shale, provided that it does not result in taxation at below 50 % of the relevant Community minimum rate as from 1 January 2011.~~

~~The Republic of Estonia may apply a transitional period until 1 January 2010 to adjust its national level of taxation on shale oil used for district heating purposes to the minimum level of taxation.~~

~~The Republic of Estonia may apply a transitional period until 1 January 2010 to convert its current input electricity taxation system into an output electricity taxation system.~~

~~5. The Republic of Latvia may apply a transitional period until 1 January 2011 to adjust its national level of taxation on gas oil and kerosene used as propellant to the new minimum level of EUR 302 per 1000 l and until 1 January 2013 to reach EUR 330. However, the level of taxation on gas oil and kerosene shall be no less than EUR 245 per 1000 l as from 1 May 2004 and no less than EUR 274 per 1000 l as from 1 January 2008.~~

~~The Republic of Latvia may apply a transitional period until 1 January 2011 to adjust its national level of taxation on unleaded petrol used as propellant to the new minimum level of~~

~~EUR 359 per 1000 l. However, the level of taxation on unleaded petrol cannot be less than EUR 287 per 1000 l as from 1 May 2004 and no less than EUR 323 per 1000 l as from 1 January 2008.~~

~~The Republic of Latvia may apply a transitional period until 1 January 2010 to adjust its national level of taxation on heavy fuel oil used for district heating purposes to the minimum level of taxation.~~

~~The Republic of Latvia may apply a transitional period until 1 January 2010 to adjust its national level of taxation on electricity to the relevant minimum levels of taxation. However, the level of taxation on electricity shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~The Republic of Latvia may apply a transitional period until 1 January 2009 to adjust its national level of taxation on coal and coke to the relevant minimum levels of taxation. However, the level of taxation on coal and coke shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~6. The Republic of Lithuania may apply a transitional period until 1 January 2011 to adjust its national level of taxation on gas oil and kerosene used as propellant to the new minimum level of EUR 302 per 1000 l and until 1 January 2013 to reach EUR 330. However, the level of taxation on gas oil and kerosene shall be no less than EUR 245 per 1000 l as from 1 May 2004 and no less than EUR 274 per 1000 l as from 1 January 2008.~~

~~The Republic of Lithuania may apply a transitional period until 1 January 2011 to adjust its national level of taxation on unleaded petrol used as propellant to the new minimum level of EUR 359 per 1000 l. However, the level of taxation on unleaded petrol shall be no less than EUR 287 per 1000 l as from 1 May 2004 and no less than EUR 323 per 1000 l as from 1 January 2008.~~

~~7. The Republic of Hungary may apply a transitional period until 1 January 2010 to adjust its national level of taxation on electricity, natural gas, coal and coke, used for district heating purposes, to the relevant minimum levels of taxation.~~

~~8. The Republic of Malta may apply a transitional period until 1 January 2010 to adjust its national level of taxation on electricity. However, the levels of taxation on electricity shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~The Republic of Malta may apply a transitional period until 1 January 2010 to adjust its national level of taxation on gas oil and kerosene used as propellant to the minimum levels of EUR 330 per 1000 l. However, the levels of taxation on gas oil and kerosene used as propellant shall be no less than EUR 245 per 1000 l as from 1 May 2004.~~

~~The Republic of Malta may apply a transitional period until 1 January 2010 to adjust its national level of taxation on unleaded petrol and leaded petrol used as propellant to the relevant minimum levels of taxation. However, the levels of taxation on unleaded petrol and leaded petrol shall be no less than EUR 287 per 1000 l and EUR 337 per 1000 l respectively as from 1 May 2004.~~

~~The Republic of Malta may apply a transitional period until 1 January 2010 to adjust its national level of taxation on natural gas used as heating fuel to the relevant minimum levels of taxation. However, the effective tax rates applied to natural gas shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~The Republic of Malta may apply a transitional period until 1 January 2009 to adjust its national level of taxation on solid fuel to the relevant minimum levels of taxation. However,~~

~~the effective tax rates applied to the energy products concerned shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~9. — The Republic of Poland may apply a transitional period until 1 January 2009 to adjust its national level of taxation on unleaded petrol used as propellant to the new minimum level of EUR 359 per 1000 l. However, the level of taxation on unleaded petrol shall be no less than EUR 287 per 1000 l as from 1 May 2004.~~

~~The Republic of Poland may apply a transitional period until 1 January 2010 to adjust its national level of taxation on gas oil used as propellant to the new minimum level of EUR 302 per 1000 l and until 1 January 2012 to reach EUR 330. However, the level of taxation on gas oil shall be no less than EUR 245 per 1000 l as from 1 May 2004 and no less than EUR 274 per 1000 l as from 1 January 2008.~~

~~The Republic of Poland may apply a transitional period until 1 January 2008 to adjust its national level of taxation on heavy fuel oil to the new minimum level of EUR 15 per 1000 kg. However, the level of taxation on heavy fuel oil shall be no less than EUR 13 per 1000 kg as from 1 May 2004.~~

~~The Republic of Poland may apply a transitional period until 1 January 2012 to adjust its national level of taxation on coal and coke used for district heating to the relevant minimum level of taxation.~~

~~The Republic of Poland may apply a transitional period until 1 January 2012 to adjust its national level of taxation on coal and coke used for heating purposes other than district heating to the relevant minimum levels of taxation.~~

~~The Republic of Poland may, until 1 January 2008, apply total or partial exemptions or reductions for gas oil used as heating fuel by schools, nursery schools and other public utilities, in respect of the activities or transactions in which they engage as public authorities.~~

~~The Republic of Poland may apply a transitional period until 1 January 2006 to align its electricity taxation system with the Community framework.~~

~~10. — The Republic of Slovenia may apply, under fiscal control, total or partial exemption from or reduction in the level of taxation to natural gas. The total or partial exemption or reduction may apply until May 2014 or until the national share of natural gas in final energy consumption reaches 25 %, whichever is the sooner. However, as soon as the national share of natural gas in final energy consumption reaches 20 %, it shall apply a strictly positive level of taxation, which shall increase on a yearly basis in order to reach at least the minimum rate at the end of the period referred to above.~~

~~11. — The Slovak Republic may apply a transitional period until 1 January 2010 to adjust its national level of taxation on electricity and natural gas used as heating fuel to the relevant minimum levels of taxation. However, the level of taxation on electricity and natural gas used as heating fuel shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~The Slovak Republic may apply a transitional period until 1 January 2009 to adjust its national level of taxation on solid fuels to the relevant minimum levels of taxation. However, the level of taxation on solid fuels shall be no less than 50 % of the relevant Community minimum rates as from 1 January 2007.~~

~~12. — Within the transitional periods established, Member States shall progressively reduce their respective gaps with regard to the new minimum levels of taxation. However, where the difference between the national level and the minimum level does not exceed 3 % of that~~

~~minimum level, the Member State concerned may wait until the end of the period to adjust its national level.~~

↓ 2004/75/EC Art. 1.1 amended
by Corrigendum, OJ L 195,
2.6.2004, p. 31

~~Article 18b~~

~~1. Notwithstanding the periods set out in paragraph 2 and provided that this does not significantly distort competition, Member States with difficulties in implementing the new minimum levels of taxation shall be allowed a transitional period until 1 January 2007, particularly in order to avoid jeopardising price stability.~~

~~2. The Republic of Cyprus may apply a transitional period until 1 January 2008 to adjust its national level of taxation on gas oil and kerosene used as propellant to the new minimum level of EUR 302 per 1000 l and until 1 January 2010 to reach EUR 330. However, the level of taxation on gas oil and kerosene used as propellant shall be not less than EUR 245 per 1000 l as from 1 May 2004.~~

~~The Republic of Cyprus may apply a transitional period until 1 January 2010 to adjust its national level of taxation on unleaded petrol used as propellant to the new minimum level of EUR 359 per 1000 l. However, the level of taxation on unleaded petrol shall be not less than EUR 287 per 1000 l as from 1 May 2004.~~

~~3. Within the transitional periods established, Member States shall progressively reduce their respective gaps with respect to the new minimum levels of taxation. However, where the difference between the national level and the minimum level does not exceed 3 % of that minimum level, the Member State concerned may wait until the end of the period to adjust its national level.~~

↓ 2003/96/EC (adapted)
⇒ new

~~Article 1920~~

1. In addition to the provisions set out in the previous Articles, in particular in Articles ~~5~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ and ~~18~~, the Council, acting unanimously on a proposal from the Commission, may ~~authorise~~ ~~authorise~~ ~~authorising~~ any Member State to introduce further exemptions or reductions for specific policy considerations. ~~Where it is necessary, for reasons of protection of environment and human health, including the reduction of air pollution, the Council, acting unanimously on a proposal from the Commission, may adopt implementing acts, authorising any Member State to introduce specific increased rates derogating from the ranking between the minimum levels of taxation as laid down in Annex I.~~

A Member State wishing to introduce ~~such a~~ ~~those~~ ~~measure~~ ~~s~~ shall inform the Commission accordingly and shall also provide the Commission with all relevant and necessary information.

The Commission shall examine the request, taking into account, *inter alia*, the proper functioning of the internal market, the need to ensure fair competition and ~~Community~~ Union health, environment, energy and transport policies.

Within three months of receiving all relevant and necessary information, the Commission shall either present a proposal for the authorisation of such a measure by the Council or, alternatively, shall inform the Council of the reasons why it has not proposed the authorisation of such a measure.

2. The authorisations referred to in paragraph 1 shall be granted for a maximum period of 6 years, with the possibility of renewal in accordance with the procedure set out in paragraph 1.

3. If the Commission considers that the ~~exemptions or reductions~~ measures provided for in paragraph 1 are no longer sustainable, particularly in terms of fair competition or distortion of the operation of the internal market, or in terms of ~~Community~~ Union policy in the areas of health, protection of the environment, energy and transport, it shall submit appropriate proposals to the Council. The Council shall take a unanimous decision on these proposals.

Article ~~2021~~

1. Only the following energy products shall be subject to the control and movement provisions of ~~Directive 92/12/EEC~~ Directive 2008/118/EC:

(a) products falling within CN codes 1507 to 1518, if these are intended for use as heating fuel or motor fuel;

new

(b) products falling within CN codes 2207, 2208 90 91 and 2208 90 99 if these are intended for use as heating fuel or motor fuel and are exempted from the harmonized excise duty on alcohol and alcoholic beverages in accordance with Article 27(1)(a) or (b) of Directive 92/83/EC⁵⁰;

2003/96/EC
 ₁ 2018/552 Art. 1.3(a)
 ₂ 2018/552 Art. 1.3(b)
 ₃ 2018/552 Art. 1.3(c)
 ₄ 2018/552 Art. 1.3(d)
 new

~~(bc)~~ products falling within CN codes 2707 10, 2707 20, 2707 30 and 2707 50;

~~(ed)~~ products falling within CN codes ₁ 2710 12 to 2710 19 68 and 2710 19 71 to 2710 19 99 and 2710 20 to 2710 20 39 and 2710 20 90 (only for products of which less than 90 % by volume (including losses) distils at 210 °C and 65 % or more by volume (including losses) distils at 250 °C by the ISO 3405 method (equivalent to the ASTM D 86 method)) . However, for products falling within CN codes ₂ 2710 12 21 , ₃ 2710 12 25 and ₄ 2710 19 29 and 2710 20 90

⁵⁰ Council Directive 92/83/EEC of 19 October 1992 on the harmonization of the structures of excise duties on alcohol and alcoholic beverages (OJ L 316, 31.10.1992, p. 21)

(only for products of which less than 90 % by volume (including losses) distils at 210 °C and 65 % or more by volume (including losses) distils at 250 °C by the ISO 3405 method (equivalent to the ASTM D 86 method)) ~~←~~, ~~⇒~~ and 2710 19 71 to 2710 19 99, ~~⇐~~ the control and movement provisions shall only apply to bulk commercial movements;

~~(de)~~ products falling within CN codes 2711 (except 2711 11, 2711 21 and 2711 29);

~~(ef)~~ products falling within CN code 2901 10;

~~(fg)~~ products falling within CN codes 2902 20, 2902 30, 2902 41, 2902 42, 2902 43 and 2902 44;

~~(gh)~~ products falling within CN code 2905 11 00, which are not of synthetic origin, if these are intended for use as heating fuel or motor fuel;

↓ new

(i) products falling within CN codes 2909 19 10 and 2909 19 90, the latter if intended for use as heating fuel or motor fuel;

(j) products falling within CN codes 3403. The control and movement provisions shall only apply to bulk commercial movements;

(k) products falling within CN codes 3811;

(l) products falling within CN codes 3814, if these are intended for use as heating fuel or motor fuel. The control and movement provisions shall only apply to bulk commercial movements;

(m) products falling within CN codes 3823 19, if these are intended for use as heating fuel or motor fuel.

↓ 2003/96/EC

~~(nn)~~ products falling within CN codes 3824 99 86, 3824 99 92 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 3824 99 93, 3824 99 96 (excluding anti-rust preparations containing amines as active constituents and inorganic composite solvents and thinners for varnishes and similar products), 3826 00 10 and 3826 00 90 if these are intended for use as heating fuel or motor fuel;

↓ new

For the purposes of paragraph 1, 'bulk commercial movement' shall mean unpackaged product transported in containers that are either an integral part of the means of transport (such as road tank, wagons, railway tank wagons, tanker vessels), or in ISO-tanks. The term shall also include unpackaged product transported in other containers exceeding 210 litres volume.

2. If a Member State finds that energy products other than those referred to in paragraph 1 are intended for use, offered for sale or used as heating fuel, motor fuel or are otherwise giving rise to evasion, avoidance or abuse, it shall advise the Commission forthwith. This provision shall also apply for electricity. The Commission shall transmit the communication to the other Member States within one month of receipt. ⇒ Within two months of that communication, the Member States shall communicate to the Commission their views regarding the detected practice of evasion, avoidance or abuse concerning those energy products and electricity. Based on the views received from the Member States, and in case there is a risk for the proper functioning of the internal market or for the environment, the Commission shall adopt implementing acts ⇐ ~~A Decision as to~~ ⇒ determine that ⇐ ~~whether the products in question should be made subject to~~ the control and movement provisions of ~~Directive 92/12/EEC~~ Directive 2008/118/EC ⇒ are to apply to the products concerned. Those implementing acts shall be adopted ⇐ ~~shall then be taken~~ in accordance with the ☒ examination ☒ procedure ~~laid down~~ ☒ referred to ☒ in Article 28(2).

3. Member States may, pursuant to bilateral arrangements, dispense with some or all of the control measures set out in ~~Directive 92/12/EEC~~ Directive 2008/118/EC in respect of some or all of the products referred to in paragraph 1 ☒ of this Article ☒, insofar as they are not covered by Articles 7, 8 and ~~to~~ 9 of this Directive. Such arrangements shall not affect Member States which are not party to them. All such bilateral arrangements shall be notified to the Commission, which shall inform the other Member States.

Article ~~21~~22

1. In addition to the general provisions defining the chargeable event and the provisions for payment set out in ~~Directive 92/12/EEC~~ Directive 2008/118/EC, the amount of taxation on energy products shall also become due on the occurrence of one of the chargeable events mentioned in Article 2(3) ☒ of this Directive ☒.

~~2. For the purpose of this Directive, the word 'production' in Article 4(c) and 5(1) of Directive 92/12/EEC shall be deemed to include 'extraction', when appropriate.~~

~~32.~~ The consumption of energy products within the curtilage of an establishment producing energy products shall not be considered as a chargeable event giving rise to taxation, if the consumption consist of energy products produced within the curtilage of the establishment. Member States may also consider the consumption of electricity and other energy products not produced within the curtilage of such an establishment and the consumption of energy products and electricity within the curtilage of an establishment producing fuels to be used for generation of electricity as not giving rise to a chargeable event. Where the consumption is for purposes not related to the production of energy products and in particular for the propulsion of vehicles, this shall be considered a chargeable event, giving rise to taxation.

~~43.~~ Member States may also provide that taxation on energy products and electricity shall become due when it is established that a final use condition laid down in national rules for the purpose of a reduced level of taxation or exemption is not, or is no longer, fulfilled.

~~54.~~ For the purpose of applying Articles ~~52~~ and ~~67~~ of ~~Directive 92/12/EEC~~ Directive 2008/118/EC, electricity, ~~and~~ natural gas ⇒ and hydrogen ⇐ shall be subject to taxation and shall become chargeable at the time of supply by the distributor or redistributor. Where the

delivery to consumption takes place in a Member State where the distributor or redistributor is not established, the tax of the Member States of delivery shall be chargeable to a company that has to be registered in the Member State of delivery. Tax shall in all cases be levied and collected according to procedures laid down by each Member State.

↓ new

For the purposes of the first subparagraph, electricity storage facilities and transformers of electricity may be considered as redistributors when they supply electricity.

↓ 2003/96/EC (adapted)
⇒ new

Notwithstanding the first subparagraph, Member States have the right to determine the chargeable event, in the case where there are no connections between their gas pipe lines and those of other Member States.

An entity producing electricity for its own use is regarded as a distributor. Notwithstanding Article ~~14(1)(a)~~ 13, Member States may exempt small producers of electricity provided that they tax the energy products used for the production of that electricity.

For the purpose of applying Articles 52 and 67 of ~~Directive 92/12/EEC~~ Directive 2008/118/EC, coal, coke, ~~and~~ lignite and products falling within CN codes 2703, 4401 and 4402 shall be subject to taxation and shall become chargeable at the time of delivery by companies, which have to be registered for that purpose by the relevant authorities. Those authorities may allow the producer, trader, importer or fiscal representative to substitute the registered company for the fiscal obligations imposed upon it. Tax shall be levied and collected according to procedures laid down by each Member State.

65. Member States need not treat as ‘production of energy products’:

- (a) operations during which small quantities of energy products are obtained incidentally;
- (b) operations by which the user of an energy product makes its reuse possible in his own undertaking provided that the taxation already paid on such product is not less than the taxation which would be due if the reused energy product were again to be liable to taxation;
- (c) an operation consisting of mixing, outside a production establishment or a tax warehouse, energy products with other energy products or other materials, provided that:
 - (i) taxation on the components has been paid previously; and
 - (ii) the amount paid is not less than the amount of the tax which would be chargeable on the mixture.

The condition under (i) shall not apply where the mixture is exempted for a specific use.

Article ~~22~~23

When taxation rates are changed, stocks of energy products already released for consumption may be subject to an increase in, or a reduction of, the tax.

Article ~~2324~~

Member States may refund the amounts of taxation already paid on contaminated or accidentally mixed energy products sent back to a tax warehouse for recycling.

Article ~~2425~~

1. Energy products released for consumption in a Member State, contained in the standard tanks of commercial motor vehicles and intended to be used as fuel by those same vehicles, as well as in special containers, and intended to be used for the operation, during the course of transport, of the systems equipping those same containers shall not be subject to taxation in any other Member State.

2. For the purposes of this Article, 'standard tanks' shall mean:

~~the tanks permanently fixed by the manufacturer to all motor vehicles of the same type as the vehicle in question and whose permanent fitting enables fuel to be used directly, both the purpose of propulsion and, where appropriate, for the operation, during transport, of refrigeration systems and other systems. Gas tanks fitted to motor vehicles designed for the direct use of gas as a fuel and tanks fitted to the other systems with which the vehicle may be equipped shall also be considered to be standard tanks;~~

~~the tanks permanently fixed by the manufacturer to all containers of the same type as the container in question and whose permanent fitting enables fuel to be used directly for the operation, during transport, of the refrigeration systems and other systems with which special containers are equipped.~~

~~'Special container' shall mean any container fitted with specially designed apparatus for refrigeration systems, oxygenation systems, thermal insulation systems or other systems.~~

↓ new

(a) the tanks permanently fixed to a motor vehicle by the manufacturer or by a third party and which, according to the registration documents or the certificate of roadworthiness of the vehicle, comply with the applicable technical and security requirements, and whose permanent fitting enables fuel to be used directly, both for the purpose of propulsion and, where appropriate, for the operation, during transport, of refrigeration systems and other systems, including gas tanks fitted to motor vehicles designed for the direct use of gas as a fuel and tanks fitted to the other systems with which the vehicle may be equipped;

(b) the tanks permanently fixed to a special container by the manufacturer or a third party which, according to the registration documents of the container, comply with the applicable technical and security requirements, and whose permanent fitting enables fuel to be used directly for the operation, during transport, of the refrigeration systems and other systems with which special containers are equipped.

For the purposes of this Article, 'special container' shall mean any container fitted with specially designed apparatus for refrigeration systems, oxygenation systems, thermal insulation systems or other systems

Article ~~25~~26

1. Member States shall inform the Commission of the levels of taxation which they apply to the products listed in Article 2 on 1 January each year and following each change in national law ⇒ as well as the related volumes ⇐ .
2. Where the levels of taxation applied by the Member States are expressed in units of measurement other than ~~those~~ ☒ that ☒ specified for each product in Articles 7 to 10, Member States shall also notify the corresponding levels of taxation following conversion into these units.

Article ~~26~~27

1. Member States shall inform the Commission of measures taken pursuant to Articles ☒ 13 to 18 ☒ ~~5, 14(2), 15, and 17.~~
2. Measures such as tax exemptions, tax reductions, tax differentiation and tax refunds within the meaning of this Directive might constitute State aid and in those cases have to be notified to the Commission pursuant to Article ~~88~~ ☒ 108 ☒ (3) of the Treaty ☒ on the Functioning of the European Union ☒.

Information provided to the Commission on the basis of this Directive does not free Member States from the notification obligation pursuant to Article ~~88~~ ☒ 108 ☒ (3) of the Treaty ☒ on the Functioning of the European Union ☒.

~~3. The obligation to inform the Commission pursuant to paragraph 1 of measures taken pursuant to Article 5 does not free Member States from any notification obligations pursuant to Directive 83/189/EEC.~~

Article ~~27~~28

1. The Commission shall be assisted by the Committee on Excise Duties set up by Article ~~24(1)43 of Directive 92/12/EEC~~ Directive 2008/118/EC. ⇒ That committee shall be a committee within the meaning of Regulation (EU) No 182/2011. ⇐

2. Where reference is made to this paragraph, Article 5 ~~and 7 of Decision 1999/468/EC~~ of Regulation (EU) 182/2011⁵¹ shall apply.

~~The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.~~

3. ~~The Committee shall adopt its Rules of Procedure.~~

Article 29

⁵¹ Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13)

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.
2. The power to adopt the delegated acts referred to in Article 2(8) and Article 5(2) shall be conferred on the Commission for an indeterminate period of time from 1 January 2023.
3. The delegation of power referred to in Article 2(8) and Article 5(2) may be revoked at any time by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.
4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making⁵².
5. As soon as it adopts a delegated act, the Commission shall notify it to the Council.
6. A delegated act adopted pursuant to Article 2(8) and Article 5(2) shall enter into force only if no objection has been expressed by the Council within a period of two months of notification of that act to the Council or if, before the expiry of that period, the Council have informed the Commission that it will not object. That period shall be extended by two months at the initiative of the Council.
7. The European Parliament shall be informed of the adoption of delegated acts by the Commission, of any objection formulated to them, or of the revocation of the delegation of powers by the Council.

↓ 2003/96/EC (adapted)
⇒ new

Article ~~28~~30

1. Member States shall adopt and publish ~~the laws,~~ ☒ by ☒ ⇒ [31 December 2022] ⇐, ☒ the laws, ☒ regulations and administrative provisions necessary to comply ☒ with Article 1(2), Article 2(1), points (b) to (o), Article 2(3), second, third and fourth subparagraphs, Article 2(4) to (8), Article 3, Article 5, Article 7, Article 8(1), Article 9(1), Article 13, Articles 14 and 15, Article 16, point (b), last sentence, Article 16, point (c), (d) and (e), Article 17, Article 18, Article 19, Article 21(1), point (b), Article 21(1), point (d), Article 21(1), points (i) to (m), Article 21(1), second subparagraph, Article 21(2), Article 22 (1), Article 22(4), Article 25(2), Article 26(1), Article 28, Article 29, Article 30, Article 31 and Annex I ☒ ~~this Directive not later than 31 December 2003~~. They shall ~~forthwith inform the Commission thereof~~ ☒ immediately communicate the text of those measures to the Commission ☒.

~~2~~ They shall apply ~~these provisions~~ ☒ those measures ☒ from ⇒ [1 January 2023] ⇐ ~~± January 2004, except the provisions laid down in Articles 16 and 18(1), which may be applied by the Member States from 1 January 2003.~~

~~3~~ When Member States adopt ~~these~~ ☒ those ☒ measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. ☒ They shall also include a statement that references in existing laws,

⁵² OJ L 123, 12.5.2016, p. 1.

regulations and administrative provisions to the Directive(s) repealed by this Directive shall be construed as references to this Directive. Member States shall determine how such reference is to be made and how that statement is to be formulated ~~The methods of making such reference shall be laid down by the Member States.~~

42. Member States shall communicate to the Commission the texts of the main provisions of national law which they adopt in the field ~~governed~~ covered by this Directive.

Article 29

~~The Council, acting on the basis of a report and, where appropriate, a proposal from the Commission, shall periodically examine the exemptions and reductions and the minimum levels of taxation laid down in this Directive and, acting unanimously after consulting the European Parliament, shall adopt the necessary measures. The report by the Commission and the consideration by the Council shall take into account the proper functioning of the internal market, the real value of the minimum levels of taxation and the wider objectives of the Treaty.~~

↓ new

Article 31

Every five years and for the first time five years after 1 January 2023, the Commission shall submit to the Council a report on the application of this Directive.

The report by the Commission shall, inter alia, examine the minimum levels of taxation, the impact of innovation and technological developments, in particular as regards energy efficiency, the use of electricity in transport and the justification for the exemptions, reductions and differentiations laid down in this Directive. The report shall take into account the proper functioning of the internal market, environmental and social considerations, the real value of the minimum levels of taxation and the relevant wider objectives of the Treaties.

↓ 2003/96/EC (adapted)
⇒ new

Article ~~30~~32

~~Notwithstanding Article 28(2), Directives 2003/96/EC 92/81/EEC and 92/82/EEC as amended by the acts listed in Annex II, Part A, shall be is repealed with effect as from 1 January 2023 31 December 2003, without prejudice to the obligations of the Member States relating to the time-limits for the transposition into national law and the dates of application of the Directives set out in Annex II, Part B .~~

↓ 2004/75/EC Art. 1.2 amended by Corrigendum, OJ L 195, 2.6.2004, p. 31 (adapted)

References to the repealed directives shall be construed as references to this Directive and shall be read in accordance with the correlation table in Annex III .

Article ~~31~~33

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

Article 1(1), Article 2(1), point (a), Article 2(2), Article 2(3), first subparagraph, Article 4, Article 6, Article 8(2), Article 10, Article 11, Article 12, Article 16, point (a), Article 16, point (b), Article 20, Article 21(1), point (a), Article 21(1), point (c), Article 21(1), points (e) to (h), Article 21(1), point (n), Article 21(3), Article 22(2) and (3), Article 22(5), Article 23, Article 24, Article 25(1), Article 26(2), and Article 27, which are unchanged by comparison with the repealed Directive, shall apply from 1 January 2023.

Article ~~32~~34

This Directive is addressed to the Member States.

Done at Brussels,

For the European Parliament
The President

For the Council
The President



Brussels, 14.7.2021
COM(2021) 563 final

ANNEXES 1 to 3

ANNEXES

to the

PROPOSAL FOR A COUNCIL DIRECTIVE

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

(Text with EEA relevance)

{SEC(2021) 663 final} - {SWD(2021) 640 final} - {SWD(2021) 641 final} -
{SWD(2021) 642 final}

ANNEX I

| Table A. Minimum levels of taxation applicable to motor fuels | | |
|---|---------------------------|---------------------------|
| | 1 January 2004 | 1 January 2010 |
| Leaded petrol (in euro per 1000 l) CN codes 27101231, 27101251 and 27101259 | 421 | 421 |
| Unleaded petrol (in euro per 1000 l) CN codes 27101231, 27101241, 27101245 and 27101249 | 359 | 359 |
| Gas oil (in euro per 1000 l) CN codes 27101943 to 27101948 and 27102011 to 27102019 | 302 | 330 |
| Kerosene (in euro per 1000 l) CN codes 27101921 and 27101925 | 302 | 330 |
| LPG (in euro per 1000 kg) CN codes 27111211 to 27111900 | 125 | 125 |
| Natural gas (in euro per gigajoule gross calorific value) CN codes 27111100 and 27112100 | 2,6 | 2,6 |

| Table B. Minimum levels of taxation applicable to motor fuels used for the purpose set out in Article 8(2) | |
|---|---------------|
| Gas oil (in euro per 1000 l) CN codes 27101943 to 27101948 and 27102011 to 27102019 | 21 |
| Kerosene | 21 |

| | |
|--|----------------|
| (in euro per 1000 l) CN codes 27101921 and 27101925 | |
| LPG (in euro per 1000 kg) CN codes 27111211 to 27111900 | 41 |
| Natural gas (in euro per gigajoule gross calorific value) CN codes 27111100 and 27112100 | 0,3 |

| Table C. Minimum levels of taxation applicable to heating fuels and electricity | | |
|---|-------------------------|-----------------------------|
| | Business use | Non-business use |
| Gas oil (in euro per 1000 l) CN codes 3 27101943 to 27101948 and 27102011 to 27102019 | 21 | 21 |
| Heavy fuel oil (in euro per 1000 kg) CN codes 3 27101962 to 27101968 and 27102031 to 27102039 | 15 | 15 |
| Kerosene (in euro per 1000 l) CN codes 27101921 and 27101925 | 0 | 0 |
| LPG (in euro per 1000 kg) CN codes 27111211 to 27111900 | 0 | 0 |
| Natural gas (in euro per gigajoule gross calorific value) CN codes 27111100 and 27112100 | 0,15 | 0,3 |
| Coal and coke (in euro per gigajoule gross calorific value) CN codes 2701, 2702 and 2704 | 0,15 | 0,3 |
| Electricity | 0,5 | 1,0 |

(in euro per MWh)

EN code 2716

ANNEX II

Reduced rates of taxation and exemptions from such taxation referred to in Article 18(1)

1. BELGIUM:

~~for liquid petroleum gas (LPG), natural gas and methane;~~

~~for local public passenger transport vehicles;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for navigation in private pleasure craft;~~

~~for a reduction in the rate of excise duty on heavy fuel oil to encourage the use of more environmentally friendly fuels. Such reduction shall be specifically linked to sulphur content and in no case can the reduced rate fall below EUR 6,5 per tonne;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty;~~

~~for a differentiated rate of excise duty on low sulphur (50 ppm) and low aromatic (35 %) unleaded petrol;~~

~~for a differentiated rate of excise duty on low sulphur (50 ppm) diesel.~~

2. DENMARK:

~~for a differentiated rate of excise duty, from 1 February 2002 to 31 January 2008, to heavy fuel oil and heating oil used by energy-intensive firms to produce heating and hot water. The maximum amount of the authorised differentiation in the excise duty is EUR 0,0095 per kg on heavy fuel oil and EUR 0,008 per litre on heating oil. The reductions in excise duty must comply with the terms of this Directive, and in particular the minimum rates;~~

~~for a reduction in the rate of duty on diesel to encourage the use of more environmentally friendly fuels, provided that such incentives are linked to established technical characteristics including specific gravity, sulphur content, distillation point, cetane number and index and provided that such rates are in accordance with the obligations laid down in this Directive;~~

~~for the application of differentiated rates of excise duty between petrol distributed from petrol stations equipped with a return system for petrol fumes and petrol distributed from other petrol stations, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty;~~

~~for differentiated rates of excise duties on petrol, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for local public passenger transport vehicles;~~

~~for differentiated rates of excise duties on gas oil, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for partial reimbursement to the commercial sector, provided that the taxes concerned are in conformity with Community law and provided that the amount of~~

~~the tax paid and not reimbursed at all times respects the minimum rates of duty or monitoring charge on mineral oils as provided for in Community law;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for the application of a reduced rate of excise duty of a maximum of DKK 0,03 per litre on petrol distributed from petrol stations meeting more stringent standards of equipment and operation designed to reduce leakage of methyl tertiary butyl ether into ground water, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty.~~

~~3. GERMANY:~~

~~for a differentiated rate on excise duty on fuels with a maximum sulphur content of 10 ppm from 1 January 2003 until 31 December 2005;~~

~~for the use of waste hydrocarbon gases as heating fuel;~~

~~for a differentiated rate of excise duty on mineral oils used as fuel in local public passenger transport vehicles, subject to compliance with the obligations laid down in Directive 92/82/EEC;~~

~~for samples of mineral oils intended for analysis, tests on production or for other scientific purposes;~~

~~for a differentiated rate of excise duty on heating oils used by manufacturing industries, provided that the differentiated rates are in accordance with the obligations laid down in this Directive;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

~~4. GREECE:~~

~~for use by national armed forces;~~

~~to grant relief from the excise duties on mineral oils for fuels intended to be used to power the official vehicles of the Ministry of the Presidency and the national police force;~~

~~for local public passenger transport vehicles;~~

~~for differentiated rates of tax on unleaded petrol to reflect different environmental categories, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for LPG and methane used for industrial purposes.~~

~~5. SPAIN:~~

~~for LPG used as fuel in local public transport vehicles;~~

~~for LPG used as fuel in taxis;~~

~~for differentiated rates of tax on unleaded petrol to reflect different environmental categories, provided that the differentiated rates are in accordance with the~~

~~obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty;~~

~~6. FRANCE:~~

~~for differential rates of tax on diesel used in commercial vehicles, until 1 January 2005, which cannot be less than EUR 380 per 1000 l as from 1 March 2003;~~

~~in the framework of certain policies aimed at assisting areas suffering from depopulation;~~

~~for consumption on the island of Corsica, provided that the reduced rates at all times respect the minimum rates of duty on mineral oils as provided for under Community law;~~

~~for a differentiated rate of excise duty on a new fuel composed of a water and antifreeze/diesel emulsion stabilised by surfactants, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty;~~

~~for a differentiated rate of excise duty for premium grade unleaded petrol containing a potassium based additive to improve resistance to valve burn out (or any other additive of equivalent effect);~~

~~for fuel used in taxis, within the limits of an annual quota;~~

~~for exemption from excise duty on gases used as fuel for public transport subject to an annual quota;~~

~~for an exemption from excise duties for gases used as engine fuels in gas powered refuse collection vehicles;~~

~~for a reduction in the rate of taxation on heavy fuel oil to encourage the use of more environmentally friendly fuels; this reduction shall be specifically linked to sulphur content and the rate of duty charged on heavy fuel oil must correspond to the minimum rate of taxation on heavy fuel oil as provided for in Community law;~~

~~for an exemption for heavy fuel oil used as fuel for the production of alumina in the region of Gardanne;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for gasoline delivered from the harbours of Corsica to private pleasure craft;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty;~~

~~for local public passenger transport vehicles until 31 December 2005;~~

~~for the granting of permits for the application of a differentiated rate of excise duty to the fuel mixture 'petrol/ethyl alcohol derivatives whose alcohol component is of agricultural origin' and for the application of a differentiated rate of excise duty to the fuel mixture 'diesel/vegetable oil esters'. To allow a reduction in excise duty on blends incorporating vegetable oil esters and ethyl alcohol derivatives which are used as fuel within the meaning of this Directive, the French authorities must issue the necessary permits to the biofuel production units concerned by 31 December 2003 at~~

~~the latest. The authorisations will be valid for a maximum of six years from the date of issue. The reduction specified in the authorisation may be applied after 31 December 2003 until the expiry of the authorisation. The reductions in excise duties shall not exceed EUR 35,06/hl or EUR 396,64/t for vegetable oil esters and EUR 50,23/hl or EUR 297,35/t for ethyl alcohol derivatives used in the mixtures referred to. The reductions in excise duties shall be adjusted to take account of changes in the price of raw materials to avoid overcompensating for the extra costs involved in the manufacture of biofuels. This Decision shall apply with effect from 1 November 1997. It shall expire on 31 December 2003;~~

~~for the granting of permits for the application of a differentiated rate of excise duty to the mixture 'domestic heating fuel/vegetable oil esters'. To allow a reduction in excise duty on mixtures incorporating vegetable oil esters and used as fuel within the meaning of this Directive, the French authorities must issue the necessary permits to the biofuel production units concerned by 31 December 2003 at the latest. The authorisations will be valid for a maximum of six years from the date of issue. The reduction specified in the authorisation may be applied after 31 December 2003 until the expiry of the authorisation, but may not be extended. The reductions in excise duties shall not exceed EUR 35,06/hl or EUR 396,64/t for the vegetable oil esters used in the mixtures referred to. The reductions in excise duty shall be adjusted to take account of changes in the price of raw materials to avoid overcompensating for the extra costs involved in the manufacture of biofuels. This Decision shall apply with effect from 1 November 1997. It shall expire on 31 December 2003.~~

~~7. IRELAND:~~

~~for LPG, natural gas and methane used as motor fuel;~~

~~in motor vehicles used by the disabled;~~

~~for local public passenger transport vehicles;~~

~~for differentiated rates of tax on unleaded petrol to reflect different environmental categories, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for a differentiated rate of excise on low sulphur diesel;~~

~~for the production of alumina in the Shannon region;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for navigation in private pleasure craft;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

~~8. ITALY:~~

~~for differentiated rates of excise duty on mixtures used as motor fuels containing 5 % or 25 % of biodiesel until 30 June 2004. The reduction in excise duty may not be greater than the amount of excise duty payable on the volume of biofuels present in the products eligible for the reduction. The reduction in excise duty shall be adjusted to take account of changes in the price of raw materials to avoid overcompensating for the extra costs involved in the manufacture of biofuels;~~

~~for a reduction in the rate of excise duty used as fuel by road transport operators, until 1 January 2005, which cannot be less than EUR 370 per 1000 l as from 1 January 2004;~~

~~for waste hydrocarbon gases used as fuel;~~

~~for a reduced rate of excise duty to water/diesel emulsions and water/heavy fuel oil emulsions from 1 October 2000 until 31 December 2005 provided that the reduced rate is in accordance with the obligations laid down in this Directive, and in particular with the minimum rates of excise duty;~~

~~for methane used as fuel in motor vehicles;~~

~~for the national armed forces;~~

~~for ambulances;~~

~~for local public passenger transport vehicles;~~

~~for fuel used in taxis;~~

~~in certain particularly disadvantaged geographical areas, for reduced rates of excise duty on domestic fuel and LPG used for heating and distributed through the networks of such areas, provided that the rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty;~~

~~for consumption in the regions of Val d'Aosta and Gorizia;~~

~~for a reduction in the rate of excise duty on petrol consumed on the territory of Friuli Venezia Giulia, provided that the rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty;~~

~~for a reduction in the rate of excise duty on mineral oils consumed in the regions of Udine and Trieste, provided that the rates are in accordance with the obligations laid down in this Directive;~~

~~for an exemption from excise duty on mineral oils used as fuel for alumina production in Sardinia;~~

~~for a reduction in the rate of excise duty on fuel oil, for the production of steam, and for gas oil, used in ovens for drying and 'activating' molecular sieves in Reggio Calabria, provided that the rates are in accordance with the obligations laid down in this Directive;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

9. LUXEMBOURG:

~~for LPG, natural gas and methane;~~

~~for local public passenger transport vehicles;~~

~~for a reduction in the rate of excise duty on heavy fuel oil to encourage the use of more environmentally friendly fuels. Such reduction shall be specifically linked to sulphur content and in no case can the reduced rate fall below EUR 6,5 per tonne;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

10. NETHERLANDS:

~~for LPG, natural gas and methane;~~

~~for samples of mineral oils intended for analysis, tests on production or for other scientific purposes;~~

~~for use by the national armed forces;~~

~~for the application of differentiated rates of excise duty on LPG used as fuel in public transport;~~

~~for a differentiated rate of excise duty on LPG used as fuel for waste collection, drain suction and by street cleaning vehicles;~~

~~for a differentiated rate of excise duty on low sulphur (50 ppm) diesel to 31 December 2004;~~

~~for a differentiated rate of excise duty on low sulphur (50 ppm) petrol to 31 December 2004.~~

11. AUSTRIA:

~~for natural gas and methane;~~

~~for LPG used as fuel by local public transport vehicles;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

12. PORTUGAL:

~~for differentiated rates of tax on unleaded petrol to reflect different environmental categories, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for exemption from excise duty on LPG, natural gas and methane used as fuel in local public passenger transport;~~

~~for a reduction in the rate of excise duty on fuel oil consumed in the autonomous region of Madeira; this reduction may not be greater than the additional costs incurred in transporting the fuel oil to that region;~~

~~for a reduction in the rate of excise duty on heavy fuel oil to encourage the use of more environmentally friendly fuels; this reduction shall be specifically linked to sulphur content and the rate of duty charged on heavy fuel oil must correspond to the minimum rate of duty on heavy fuel oil as provided for in Community law;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

13. FINLAND:

~~for natural gas used as fuel;~~

~~for an exemption from excise duty for methane and LPG for all purposes;~~

~~for reduced excise duty rates on diesel fuel and heating gas oil, provided that the rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Articles 7 to 9;~~

~~for reduced excise duty rates on reformulated unleaded and leaded petrol, provided that the rates are in accordance with the obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for navigation in private pleasure craft;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

14. SWEDEN:

~~for reduced tax rates for diesel in accordance with environmental classifications;~~

~~for differentiated rates of tax on unleaded petrol to reflect different environmental categories, provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty;~~

~~for a differentiated rate of energy tax to alkylate-based petrol for two-stroke engines, until 30 June 2008, provided that the total excise duty applicable comply with the terms of this Directive;~~

~~for an exemption from excise duty for biologically produced methane and other waste gases;~~

~~for a reduced rate of excise duty on mineral oils used for industrial purposes, provided that the rates are in accordance with the obligations laid down in this Directive;~~

~~for a reduced rate of excise duty on mineral oils used for industrial purposes by introducing both a rate which is lower than the standard rate and a reduced rate for energy-intensive enterprises, provided that the rates are in accordance with the obligations laid down in this Directive, and do not give rise to distortions of competition;~~

~~for air navigation other than that covered by Article 14(1)(b) of the present Directive.~~

15. UNITED KINGDOM:

~~for differentiated rates of excise duty for road fuel containing biodiesel and biodiesel used as pure road fuel, until 31 March 2007. Community minimum rates have to be respected and no overcompensation for the extra costs involved in the manufacture of biofuels can take place;~~

~~for LPG, natural gas and methane used as motor fuel;~~

~~for a reduction in the rate of excise duty on diesel to encourage the use of more environmentally friendly fuels;~~

~~for differentiated rates of tax on unleaded petrol to reflect different environmental categories, provided that the differentiated rates are in accordance with the~~

~~obligations laid down in this Directive, and in particular the minimum levels of taxation provided for in Article 7 thereof;~~

~~for local public passenger transport vehicles;~~

~~for a differentiated rate of excise duty on water/diesel emulsion provided that the differentiated rates are in accordance with the obligations laid down in this Directive, and in particular the minimum rates of excise duty;~~

~~for air navigation other than that covered by Article 14(1)(b) of this Directive;~~

~~for navigation in private pleasure craft;~~

~~for waste oils which are reused as fuel, either directly after recovery or following a recycling process for waste oils, and where the reuse is subject to duty.~~

↓ 2004/74/EC Art. 1.3 and Annex amended by Corrigendum, OJ L 195, 2.6.2004, p. 26

ANNEX III

~~Reduced rates of taxation and exemptions from such taxation referred to in Article 18a(1):~~

~~1. *Latvia*~~

~~for energy products and electricity used in local public passenger transport vehicles;~~

~~2. *Lithuania*~~

~~for coal, coke and lignite, until 1 January 2007;~~

~~for natural gas and electricity, until 1 January 2010;~~

~~for orimulsion used for purposes other than to produce electricity or heat until 1 January 2010;~~

~~3. *Hungary*~~

~~for coal and coke, until 1 January 2009;~~

~~4. *Malta*~~

~~for navigation in private pleasure craft;~~

~~for air navigation other than that covered by Article 14(1)(b) of Directive 2003/96/EC;~~

~~5. *Poland*~~

~~for aviation fuel and turbo-combustion engine fuels and engine oils for aviation engines, sold by the producer of such fuels on the order of the Minister of National Defence or the competent minister for internal affairs, for purposes of the aviation industry, or the Agency of Material Reserves to supplement State reserves, or organisational units of sanitary aviation for purposes of such units;~~

~~gas oil for ship engines and engines for sea technology and engine oils for ship engines and for sea technology, sold by the producer of such fuel on the order of the Agency of Stock Reserves to supplement State reserves, or on the order of the Minister of National Defence to be used for purposes of the navy, or on the order of the competent minister for internal affairs to be used for sea engineering;~~

~~aviation fuel, turbo-combustion engine fuel and gas oil for ship engines and engines for sea technology and oils for aviation engines, ship engines and engines for sea technology, sold by the Agency of Stock Reserves on the order of the Minister of National Defence or the competent minister for internal affairs.~~

ANNEX I

Table A. — Minimum levels of taxation applicable to motor fuels for the purposes of Article 7 (in EUR/Gigajoule)

| | Start of transitional period (01.01.2023) | Final rate after completion of transitional period (01.01.2033) before indexation |
|--|--|--|
| Petrol | 10,75 | 10,75 |
| Gasoil | 10,75 | 10,75 |
| Kerosene | 10,75 | 10,75 |
| Non-sustainable biofuels | 10,75 | 10,75 |
| Liquefied Petroleum Gas (LPG) | 7,17 | 10,75 |
| Natural gas | 7,17 | 10,75 |
| Non-sustainable biogas | 7,17 | 10,75 |
| Non renewable fuels of non-biological origin | 7,17 | 10,75 |
| Sustainable food and feed crop biofuels | 5,38 | 10,75 |
| Sustainable food and feed crop biogas | 5,38 | 10,75 |
| Sustainable biofuels | 5,38 | 5,38 |
| Sustainable biogas | 5,38 | 5,38 |
| Low-carbon fuels | 0,15 | 5,38 |
| Renewable fuels of non-biological origin | 0,15 | 0,15 |
| Advanced sustainable biofuels and biogas | 0,15 | 0,15 |

Table B. — Minimum levels of taxation applicable to motor fuels used for the purpose set out in Article 8(2) (in EUR/Gigajoule)

| | Start of transitional period (01.01.2023) | Final rate after completion of transitional period (01.01.2033) before indexation |
|----------------|--|--|
| Gas oil | 0,9 | 0,9 |
| Heavy fuel oil | 0,9 | 0,9 |

| | | |
|--|------|------|
| Kerosene | 0,9 | 0,9 |
| Non-sustainable biofuels | 0,9 | 0,9 |
| Liquefied Petroleum Gas (LPG) | 0,6 | 0,9 |
| Natural gas | 0,6 | 0,9 |
| Non-sustainable biogas | 0,6 | 0,9 |
| Non renewable fuels of non-biological origin | 0,6 | 0,9 |
| Sustainable food and feed crop biofuels | 0,45 | 0,9 |
| Sustainable food and feed crop biogas | 0,45 | 0,9 |
| Sustainable biofuels | 0,45 | 0,45 |
| Sustainable biogas | 0,45 | 0,45 |
| Low-carbon fuels | 0,15 | 0,45 |
| Renewable fuels of non-biological origin | 0,15 | 0,15 |
| Advanced sustainable biofuels and biogas | 0,15 | 0,15 |

Table C. — Minimum levels of taxation applicable to heating fuels (in EUR/Gigajoule)

| | Start of transitional period (01.01.2023) | Final rate after completion of transitional period (01.01.2033) before indexation |
|---|--|--|
| Gas oil | 0,9 | 0,9 |
| Heavy fuel oil | 0,9 | 0,9 |
| Kerosene | 0,9 | 0,9 |
| Coal and coke | 0,9 | 0,9 |
| Non-sustainable bioliquids | 0,9 | 0,9 |
| Non-sustainable solid products falling within CN codes 4401 and 4402 | 0,9 | 0,9 |
| Liquefied Petroleum Gas (LPG) | 0,6 | 0,9 |
| Natural gas | 0,6 | 0,9 |
| Non-sustainable biogas | 0,6 | 0,9 |
| Non renewable fuels of non-biological origin | 0,6 | 0,9 |

| | | |
|--|------|------|
| Sustainable food and feed crop bioliquids | 0,45 | 0,9 |
| Sustainable food and feed crop biogas | 0,45 | 0,9 |
| Sustainable bioliquids | 0,45 | 0,45 |
| Sustainable biogas | 0,45 | 0,45 |
| Sustainable solid products falling within CN codes 4401 and 4402 | 0,45 | 0,45 |
| Low-carbon fuels | 0,15 | 0,45 |
| Renewable fuels of non-biological origin | 0,15 | 0,15 |
| Advanced sustainable bioliquids, biogas and products falling within CN codes 4401 and 4402 | 0,15 | 0,15 |

Table D. — Minimum levels of taxation applicable to electricity (in EUR/Gigajoule)

| | Start of transitional period (01.01.2023) | Final rate after completion of transitional period (01.01.2033) before indexation |
|-------------|--|---|
| Electricity | 0,15 | 0,15 |



ANNEX II

Part A

Repealed Directive with list of the successive amendments thereto (referred to in Article 32)

Council Directive 2003/96/EC
(OJ L 283, 31.10.2003, p. 51)

Council Directive 2004/74/EC
(OJ L 157, 30.4.2004, p. 87)

Council Directive 2004/75/EC
(OJ L 157, 30.4.2004, p. 100)

Commission Implementing Decision (EU)
2018/552
(OJ L 91, 9.4.2018, p. 27)

Part B

Time-limits for transposition into national law (referred to in Article 32)

| Directive | Time-limit for transposition |
|------------|------------------------------|
| 2003/96/EC | 31 December 2003 |
| 2004/74/EC | 1 May 2004 |
| 2004/75/EC | 1 May 2004 |

ANNEX III

CORRELATION TABLE

| Directive 2003/96/EC | This Directive |
|--|--|
| Article 1 | Article 1(1) |
| - | Article 1(2) |
| Article 2(1), point (a) | Article 2(1), point (a) |
| Article 2(1), points (b) to (h) | - |
| - | Article 2(1), points (b) to (o) |
| Article 2(2) | Article 2(2) |
| Article 2(3), first subparagraph | Article 2(3), first subparagraph |
| Article 2(3), second and third subparagraphs | - |
| - | Article 2(3), second, third and fourth subparagraphs |
| Article 2(4) and (5) | - |
| - | Article 2(4) to (8) |
| Article 3 | - |
| - | Article 3 |
| Article 4 | Article 4 |
| Article 5 | - |
| - | Article 5 |
| Article 6 | Article 6 |
| Article 7 | - |
| - | Article 7 |
| Article 8(1) | - |
| - | Article 8(1) |
| Article 8(2) | Article 8(2) |
| Article 9(1) | - |

| | |
|----------------------------------|--------------------------------------|
| - | Article 9(1) |
| Article 9(2) | - |
| Article 10(1) | Article 10 |
| Article 10(2) | - |
| Article 11 | - |
| Article 12 | Article 11 |
| Article 13 | Article 12 |
| - | Article 13 |
| Article 14 | - |
| - | Articles 14 and 15 |
| Article 15(1), point (a) | Article 16, point (a) |
| Article 15(1), point (b) | Article 16, point (b) |
| - | Article 16, point (b), last sentence |
| Article 15(1), point (c) | - |
| Article 15(1), point (d) | - |
| - | Article 16, point (c), (d) and (e) |
| Article 15(1), points (e) to (l) | - |
| Article 15(2) and (3) | - |
| Article 16 | - |
| - | Article 17 |
| Article 17 | - |
| - | Article 18 |
| Article 18 | - |
| Articles 18a and 18b | - |
| - | Article 19 |
| Article 19 | Article 20 |

| | |
|----------------------------------|------------------------------------|
| Article 20(1), point (a) | Article 21(1), point (a) |
| - | Article 21(1), point (b) |
| Article 20(1), point (b) | Article 21(1), point (c) |
| Article 20(1), point (c) | - |
| - | Article 21(1), point (d) |
| Article 20(1), points (d) to (g) | Article 21(1), points (e) to (h) |
| - | Article 21(1), points (i) to (m) |
| Article 20(1), point (h) | Article 21(1), point (n) |
| -- | Article 21(1), second subparagraph |
| Article 20(2) | Article 21(2) |
| Article 20(3) | Article 21(3) |
| Article 21(1) | - |
| - | Article 22(1) |
| Article 21(2) | - |
| Article 21(3) and (4) | Article 22(2) and (3) |
| Article 21(5) | - |
| - | Article 22(4) |
| Article 21(6) | Article 22(5) |
| Article 22 | Article 23 |
| Article 23 | Article 24 |
| Article 24(1) | Article 25(1) |
| Article 24(2) | - |
| - | Article 25(2) |
| Article 25(1) | - |
| - | Article 26(1) |
| Article 25(2) | Article 26(2) |

| | |
|-----------------------|-----------------------|
| Article 26(1) and (2) | Article 27(1) and (2) |
| Article 26(3) | - |
| Article 27 | - |
| - | Article 28 |
| - | Article 29 |
| Article 28 | - |
| - | Article 30 |
| Article 29 | - |
| - | Article 31 |
| Article 30 | - |
| - | Article 32 |
| Article 31 | - |
| - | Article 33 |
| Article 32 | Article 34 |
| Annexes I, II and III | - |
| - | Annexes I, II and III |



Brussels, 14.7.2021
SWD(2021) 640 final

COMMISSION STAFF WORKING DOCUMENT

Subsidiarity Grid

Accompanying the document

Proposal for a Council Directive

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

{COM(2021) 563 final} - {SWD(2021) 641 final} - {SWD(2021) 642 final} -
{SEC(2021) 663 final}

Subsidiarity Grid

| |
|---|
| <p>1. Can the Union act? What is the legal basis and competence of the Unions' intended action?</p> |
| <p>1.1 Which article(s) of the Treaty are used to support the legislative proposal or policy initiative?</p> <p>The proposal is based on Article 113 of the Treaty on the Functioning of the European Union (TFEU), which permits the EU to lay down harmonised rules in order to ensure the proper functioning of the internal market. This article provides for the Council, acting unanimously in accordance with a special legislative procedure and after consulting the European Parliament and the Economic and Social Committee, to adopt provisions for the harmonisation of Member States' rules in the area of indirect taxation. Additionally, appropriate provisions of fiscal nature intended, inter alia, to preserve and protect the environment can be adopted according to Article 192(2), first paragraph, of the TFEU.</p> |
| <p>1.2 Is the Union competence represented by this Treaty article exclusive, shared or supporting in nature?</p> <p>In the case of taxation, the Union's competence is shared. Article 113 of the Treaty on the Functioning of the European Union provides that the Council shall adopt provisions for the harmonisation of legislation concerning excise duties to the extent that such harmonisation is necessary to ensure the establishment and the functioning of the internal market.</p> <p><i>Subsidiarity does not apply for policy areas where the Union has exclusive competence as defined in Article 3 TFEU¹. It is the specific legal basis which determines whether the proposal falls under the subsidiarity control mechanism. Article 4 TFEU² sets out the areas where competence is shared between the Union and the Member States. Article 6 TFEU³ sets out the areas for which the Unions has competence only to support the actions of the Member States.</i></p> |
| <p>2. Subsidiarity Principle: Why should the EU act?</p> |
| <p>2.1 Does the proposal fulfil the procedural requirements of Protocol No. 2⁴:</p> <ul style="list-style-type: none"> - Has there been a wide consultation before proposing the act? - Is there a detailed statement with qualitative and, where possible, quantitative indicators allowing an appraisal of whether the action can best be achieved at Union level? <p>The present proposal has been formulated taking into account a wide range of external contributions. Stakeholders were consulted first via the Inception Impact Assessment feedback mechanism and then via a dedicated Public Consultation. The public consultation was open from 22 July 2020 to 14 October 2020. In total, 563 responses from 25 Member States and from 5 third countries were received, together with 129 position papers. Besides the public consultation, direct consultations with Member States, including requests for input in view of the computation of effective tax rates, as well as with other stakeholders were also undertaken. An external study on the taxation of the aviation has also been commissioned by DG TAXUD for the purpose of the impact assessment.</p> |
| <p>2.2 Does the explanatory memorandum (and any impact assessment) accompanying the Commission's proposal contain an adequate justification regarding the conformity with the principle of subsidiarity?</p> |

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12008E003&from=EN>

² <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12008E004&from=EN>

³ <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12008E006:EN:HTML>

⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12016E/PRO/02&from=EN>

The proposal falls under shared Union and Member State competence. Therefore, the subsidiarity principle applies. Article 113 of the Treaty on the Functioning of the European Union provides that the Council shall adopt provisions for the harmonisation of legislation concerning excise duties to the extent that such harmonisation is necessary to ensure the establishment and the functioning of the internal market. Additionally, appropriate provisions of fiscal nature intended, inter alia, to preserve and protect the environment can be adopted according to Article 192(2), first paragraph, of the TFEU. The proposal for the revision of the ETD and its timing need to be seen in the broader context of the EU energy and climate change agenda. The objective to bring the ETD more closely in line with the EU objectives and goals in this field can only be implemented by means of an act adopted by the Union, recasting the ETD.

2.3 Based on the answers to the questions below, can the objectives of the proposed action be achieved sufficiently by the Member States acting alone (necessity for EU action)?

The contribution of taxation to the European Green Deal climate and environmentally-related objectives can be ensured most adequately at the EU level. In fact, only a harmonised framework can help to attain the EU levels of ambition in these areas while seeking to preserve both the competitiveness of the productive sectors and the adequate level playing field among sectors and energy uses. Similarly, the EU's contribution to achieve higher climate ambitions globally will be most effective if the EU coordinates all the possible policy instruments, including taxation, in the context of an ambition plan, which encompasses also the extension of the ETS and other relevant policy actions. Member States acting alone cannot achieve the objectives of the proposed action.

(a) Are there significant/appreciable transnational/cross-border aspects to the problems being tackled? Have these been quantified?

The Energy Taxation Directive (ETD) is predominantly a single market directive so the great majority of the issues at stake are of a cross-border nature. There are no global quantified cross-border impacts of the inharmonious application of the ETD due to the complexity of framework and the flexible application throughout the EU. However, it is recognised that motor fuels that can be easily and legally transported across borders. If the final prices in the neighbouring states vary significantly, it creates an incentive to consumers crossing borders in order to refuel their vehicles at lower prices (tank tourism) in bordering regions thus depleting revenues in one Member States while inflating in another. The extent of this phenomenon, while observable, is nevertheless of a local nature.

(b) Would national action or the absence of the EU level action conflict with core objectives of the Treaty⁵ or significantly damage the interests of other Member States?

It could happen, particularly in the frontier regions of countries with significantly diverging frameworks, including effective tax rates. If the Member States apply highly divergent national rates, in particular in combination with a wide range of tax exemptions and reductions, they create a risk of distortion of the level playing field across the involved sectors of the economy and an erosion of the tax base in high-taxing countries, notably for motor fuels that can be easily and legally transported across borders as explained above. The harmonisation of energy taxation through the Energy Tax Directive should contribute to avoid the harmful effects of energy tax competition between the Member States, stemming for example from the relocation of consumers of energy (in particular businesses) to Member States with more beneficial tax regimes.

Besides, without coordinated effort and same goals in perspective, the actions of one Member State could be threatened, or neutralised, by the lack of similar action – or, in worst case scenario, a contrary action – by another Member State.

⁵ https://europa.eu/european-union/about-eu/eu-in-brief_en

(c) To what extent do Member States have the ability or possibility to enact appropriate measures?

Under the existing provisions, Member States can increase the rates of their energy taxes, decide not to make use of possible exemptions and reductions or introduce climate related objectives. They are in principle free to set the levels of taxation as they please as long as the minimum levels specified in the Directive are respected. However, such national approaches risk distorting the internal market and undermining the Green Deal objectives due to the non-harmonised structure and level of the national taxes. The Member States would need to multilaterally approximate their rates to create a more even level playing field but that is unlikely to happen as the directive leave a great room for manoeuvre and the Member States fix their rates in the context of their national energy, climate, fiscal and social policies. Since the actions of any given economic agent, including a state, are driven by own interest, in order to preserve the internal market, a framework of common acceptable rules with common acceptable minimum rates would preserve the interest of the EU as a whole.

(d) How does the problem and its causes (e.g. negative externalities, spill-over effects) vary across the national, regional and local levels of the EU?

Some problems are indeed accentuated in frontier areas between neighbouring Member States, where there was evidence of relocation of the consumption of motor fuels and heating fuels. For example, Member States have the possibility of setting national rates above the minimum levels defined in the ETD, resulting in highly divergent national rates for transport fuels. These differences induced a phenomenon of consumers crossing borders in order to refuel their vehicles at lower prices (tank tourism) in bordering regions. This indicates local distortion of competition while in all conformity with the current framework.

(e) Is the problem widespread across the EU or limited to a few Member States?

The Energy Tax Directive is predominantly a single market directive and most of its shortcomings relate to the functioning of the internal market as a whole. The directive does not affect all the Member States in the same way given its ample scope for flexibility of its application, depending on national prerogatives. In general, two groups of Member States can be distinguished:

- a group of "low-taxing Member States", typically taxing at rates close to the minima and having had often, although not in all cases, introduced taxation only as a consequence of the existence of common minimum rates;
- a group of "high-taxing Member States" with tax levels more or less clearly above the minima. For these countries the existence of common minima is particularly important to reduce competitive disadvantages for their industry. These countries also often make use of the possibility to apply reduced rates for energy-intensive businesses.

(f) Are Member States overstretched in achieving the objectives of the planned measure?

Measures at Member State level alone would not be able to achieve the objectives of the proposed initiative or the objectives of broader EU policies. Any future natural alignment across the EU Member States would likely be a lengthy and inefficient process.

(g) How do the views/preferred courses of action of national, regional and local authorities differ across the EU?

One of the main concerns raised by the stakeholders relates to the relevance of the current ETD in terms of its static definition of energy products and electricity. The consultation conducted in the course of evaluation of the ETD also revealed that national authorities and economic operators are generally in favour of bringing new products under the coverage of the ETD, mostly to ensure equal

tax treatment of different products for the same use. At the same time, no Member State or economic operator was in favour of excluding any further energy products or uses, which are currently covered by the ETD.

In some cases economic operators were motivated to include new products and uses into the scope of the ETD in order for those to be covered by exemptions and reductions. Although the ETD qualifies many of those products as taxable if used as motor fuel or for heating purposes, it does not provide any clear legal framework for the exemption of these alternative products used for similar purposes, as its provisions on exemptions and reductions mostly contain explicit references to energy products and electricity.

2.4 Based on the answer to the questions below, can the objectives of the proposed action be better achieved at Union level by reason of scale or effects of that action (EU added value)?

(a) Are there clear benefits from EU level action?

Yes. The absence of an increase in minimum rates for more than a decade at EU level has eroded the tax-induced price signal that was supposed to encourage investment in energy-efficient technology and behaviour. Moreover, as some Member States have increased their national level of taxation since then while others have not, there is risk of growing distortion of competition in the single market and an erosion of the tax base in high-taxing countries, notably for motor fuels that can be easily and legally transported across borders. In spite of repeated Commission calls for a shift in the taxation from labour to environmental taxes, the overall percentage of tax revenues from environmental taxes in the EU has remained relatively unchanged over the last decade.

Another consideration concerns the current' directive's scope, the static definition of energy products and the evolving energy mix. The ETD was adopted long before the emergence of new technologies and uses that are predicted to become important building blocks on the path to the EU's decarbonised future. As a result, the current ETD regime is not properly devised to ensure the preferential treatment of these new energy products and applications. In the worst cases, uncertainties resulting from the ETD hinder investment in low-carbon technologies. By default, the ETD applies standard tax treatment to electricity and biofuels, without differentiating between renewable and fossil fuel based electricity or the environmental performance of biofuels. In the absence of differentiation of biofuels in the ETD, Member States would continue applying their own, often diverging classifications, which on top of it often cannot be applied to the characteristics of biofuels produced in other Member States. Clearly, a common agreed framework for definition and treatment of energy and energy products would be by far more predictable, stable and less distortion-prone than individual actions by even group of Member States.

(b) Are there economies of scale? Can the objectives be met more efficiently at EU level (larger benefits per unit cost)? Will the functioning of the internal market be improved?

It is not about the economies of scale but about a coordinated approach and harmonised rules. The rules set out currently are no longer adapted to the new climate change and energy policy framework and contain several shortcomings from the perspective of the proper functioning of the internal market and in relation to the needs of the other EU policies. In particular energy and climate policies and initiatives have substantially developed since the ETD's adoption. The EU and its Member States have committed to swiftly and fully implement the Paris Agreement, to contribute to the fulfilment of sustainable finance goals, and to continue to lead in the fight against climate change. Taxation is set to play an important role in the achievement of these objectives but without a well designed EU framework, it will not happen.

For example, the share of the ETD minimum in industrial prices has become insignificant and thus not

allowing for a positive contribution to the functioning of the EU internal market. Thus, the potential of the ETD to reinforce core EU policies aimed at driving progress towards the completion of the internal market remains untapped unless this is uniformly corrected throughout the entire EU. As put forward by the Commission in its 2018 Communication on a “Clean Planet for all - A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy”, taxation and climate action and energy policies should be aligned. This was reiterated in the 2019 Commission Communication, where it was stressed that a future energy taxation framework should: (i) support the clean energy transition; (ii) contribute to sustainable and fair growth; and (iii) reflect social equity considerations.

(c) What are the benefits in replacing different national policies and rules with a more homogenous policy approach?

The proposal does not intend to replace national policies and rules but to approximate approach, coverage and tax treatment of energy and energy products across the EU to preserve the internal market. The ETD sets (only) the minimum levels of taxation. Member States are free to set their respective rates above these minima and introduce additional taxes, without an upper limit. These minimum rates have not been updated since the ETD was adopted, nor are they indexed to external developments such as inflation or a CO2 benchmark. As a result, they have remained unchanged since the adoption of the current Directive, which has led to an erosion of the impact of minimum rates as well as to the increasingly diverging national implementation of nominal tax rates. Bringing the minima to the levels corresponding to the contemporary conditions and broader policy objectives would provide the safety net for the internal market and prevent race-to-the-bottom and unfair competition between Member States (and sectors). The current directive is no longer fit to achieve this purpose.

The ETD also lists possible reductions and exemptions. The conditions under which these can be granted are defined very broadly, resulting in highly divergent national implementation of exemptions and reductions. Beyond the discretionary application of exemptions and reductions, the discretionary implementation of other provisions also undermine the objective of harmonisation. Such include: uncertainty in the application of the control and movement provisions and the definition of the conditions establishing the chargeable event. A divergent interpretation and implementation of these provisions may be an obstacle to the free movement of goods and investment capital.

For example, in some Member States, exemptions and reductions granted to large industrial users, result in an effective rate 90% lower than the nominal rate. In other Member States, the impact of reductions for the same type of consumer is limited to below 5%.

Moreover, as highlighted in the Communication, the presence of sector-specific energy tax exemptions or reductions, notably in the aviation, maritime and road haulage sectors and for energy-intensive industries, in general substantially weakens the incentives for investing in more energy-efficient capital stock and production processes in these sectors. These tax exemptions or reductions also constitute a burden for other sectors and/or private households that have to make up the revenue shortfalls triggered by them. Furthermore, they may distort competition between industrial sectors and may promote inefficient and polluting modes of transport.

(d) Do the benefits of EU-level action outweigh the loss of competence of the Member States and the local and regional authorities (beyond the costs and benefits of acting at national, regional and local levels)?

The flexibility principle would remain for member States as they would still be allowed to apply some exemptions and set rates freely as long as they stay above the minima. The competence transfer would be limited to agreeing on a common set of definitions and coordinated treatment of energy and energy products for tax purposes, including agreed minimum rates. Revision of the energy

taxation rules would help to address global challenges, expressed also in the EU strategic policies, starting with the European Green Deal's climate neutrality objectives as well as energy market integration, bringing ultimate benefits to all EU citizens. Therefore, acting at the EU level will enable to support and reinforce the cooperation of all the Member States in contributing to the achievement of key energy and climate policy objectives.

(e) Will there be improved legal clarity for those having to implement the legislation?

Yes. The high divergence of national frameworks for taxation of energy and energy products adds to the complexity of the system and increases uncertainty for the businesses. Such issues are nevertheless case specific and depend on the nature and geographical scope of activities of any given business. The main shortcomings with regard to clarity and completeness of provisions as well as structure of the ETD include: eleven cases of late transposition, outdated classification under the Combined Nomenclature (CN), and lack of clarity of several provisions of the ETD.

Albeit the ETD allows for the update of CN codes, such updates cannot result in the addition or removal of products from the scope of the ETD. Since the technology advanced and the energy market exhibits an array of new products not included in the current directive, a section of the energy and energy products market is unregulated. Bringing the new products into the scope of the directive would provide common definitions, approach and this increase the certainty for businesses, amongst other improvements.

In relation to the clarity of the ETD, different national interpretations emerged for specific provisions. These include: definition of taxable products; tradable permit schemes; definitions of the uses which are out of the scope – mineralogical and metallurgical processes; or interpretation of the exemption related to motor fuels used in air and water navigation, etc. There is also the need to align the terminology of the ETD with case-law by the CJEU. Following the adoption of the Directive the CJEU has clarified the interpretation of certain provisions. As a result, the text of the Directive and the Court's interpretation could lead to diverging application of the ETD by the Member States and to different understanding by the economic operators.

For example, in the absence of differentiation of biofuels in the ETD, Member States apply their own classifications. These are often diverging or cannot be applied to the characteristics of biofuels produced in other Member States. As a result, economic operators have no certainty whether preferential tax treatment applies to their products in other Member States. This might create an insecure business environment for biofuel producers operating across borders.

In addition, removing provisions that are no longer applicable, would improve the clarity of the legislation.

Finally, provisions governing exemptions and reductions are not presented in the ETD in a structured way. Instead, such provisions are spread across the Directive, with some sectors, such as energy intensive industries, being subject to multiple provisions contained in various sections of the legislation.

3. Proportionality: How the EU should act

3.1 Does the explanatory memorandum (and any impact assessment) accompanying the Commission's proposal contain an adequate justification regarding the proportionality of the proposal and a statement allowing appraisal of the compliance of the proposal with the principle of proportionality?

The proposal complies with the proportionality principle for the following reasons.

The objectives of the current proposal are best achieved by recasting the current Directive to the effect explained above. The proposal is mainly concerned with some essential components of the Directive: the structure of taxation and the relationship between the respective tax treatment of the various energy sources.

| |
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| The proposal is in all respects limited to what is necessary in order to achieve the objectives pursued. |
| 3.2 Based on the answers to the questions below and information available from any impact assessment, the explanatory memorandum or other sources, is the proposed action an appropriate way to achieve the intended objectives? |
| |
| (a) Is the initiative limited to those aspects that Member States cannot achieve satisfactorily on their own, and where the Union can do better? |
| Yes. In the absence of EU level action, Member States would find it very difficult to coordinate enough and quickly enough respond to the global needs and challenges. It should be presumed that national interest would prevail over the ones of the EU as a community of states. In the worst case scenario, the diverging directions of Member States actions could lead to compromising other Member States efforts or to deepen the fragmentation of the internal market. The revised EU framework for taxation of energy and energy products would not deprive the Member States of their competence to design and run their energy and fiscal policies as long as they respect the minimum rates and common basic definitions and treatment of energy and energy products. |
| (b) Is the form of Union action (choice of instrument) justified, as simple as possible, and coherent with the satisfactory achievement of, and ensuring compliance with the objectives pursued (e.g. choice between regulation, (framework) directive, recommendation, or alternative regulatory methods such as co-legislation, etc.)? |
| Proposed instrument: Directive. In this area already covered by an existing Directive, Member States should continue to retain an important margin of flexibility. Other means than a Directive amending Directive 2003/96/CE would thus be inadequate. |
| (c) Does the Union action leave as much scope for national decision as possible while achieving satisfactorily the objectives set? (e.g. is it possible to limit the European action to minimum standards or use a less stringent policy instrument or approach?) |
| Yes. Member States will still be given the flexibility necessary to define and implement policies appropriate to their national circumstances. Within the new framework, they can still design fiscal arrangements made in connection with the implementation of the directive. In this regard, Member States might decide not to increase the overall tax burden if they consider that the implementation of such a principle of tax neutrality could contribute to the restructuring and the modernisation of their tax systems. For example, it is left entire up to the Member States to decide if and how the additional revenue from energy taxation could be used to reduce labour costs (e.g. by lowering social contributions). The instrument proposed – a Directive – as already described above, provides the best trade-off between non-interventionist EU policy, providing framework for approximation and coordination rather than full harmonisation, thus being the right vehicle to achieving the Union objectives recapitulated under the Green Deal. A more stringent instrument would unnecessarily restrict the Member States room for manoeuvre when it comes to implementation of national interest-driven policies. A weaker one, would risk not improving the status quo. |
| (d) Does the initiative create financial or administrative cost for the Union, national governments, regional or local authorities, economic operators or citizens? Are these costs commensurate with the objective to be achieved? |
| Some regulatory costs (mostly managing authorisations, declarations and IT systems update) will |

arise for the traders in energy products newly introduced in the ETD's scope and for administrations as these products will be subject to some provisions of the excise general arrangements. However, these costs should be limited for hydrogen and solid biomass traders as these products will be allowed the same movement control simplifications as natural gas and coal respectively. The termination of excise duty exemptions for some fuels or sectors of activity (e.g. aviation and maritime) does not change the regulatory costs related to general arrangements as exempted fuels were anyway subject to holding and movement controls.

(e) While respecting the Union law, have special circumstances applying in individual Member States been taken into account?

Yes as part of the impact assessment the Commission analysis reflected, to the extent possible, the economic and industrial structures of individual Member States



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COMMISSION STAFF WORKING DOCUMENT
EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a Council Directive

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

{COM(2021) 563 final} - {SWD(2021) 640 final} - {SWD(2021) 641 final} -
{SEC(2021) 663 final}

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|---|
| Executive Summary Sheet |
| Impact assessment on the revision of Directive 2003/96/EC |
| A. Need for action |
| What is the problem and why is it a problem at EU level? |
| <p>In the context of the European Green Deal (EGD), the initiative for a revision of Directive 2003/96/EC (Energy Taxation Directive or ETD) is part of the ‘Fit for 55 Package’.</p> <p>The main problems addressed by the impact assessment are the fact that the ETD: i) is not in line with EU climate and energy objectives; ii) de facto favours fossil fuel use and iii) is no longer contributing to the proper functioning of the internal market.</p> <p>The main drivers of these problems are: i) the present level and structure of minimum rates (absence of an indexation mechanism, taxation of fuel based on volume instead of energy content and without taking into account their environmental performance), ii) the outdated coverage of energy products (in particular biofuels), and iii) the variety of tax differentiations, reductions and exemptions, which limit the effective coverage of the Directive.</p> |
| What should be achieved? |
| <p>The main objectives of the proposed policy options are:</p> <p>I. Contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal. This would align taxation of energy products and electricity with EU energy and climate policies and contribute to the EU efforts to reduce emissions while ensuring coherence with the ETS and avoiding inconsistencies and overlaps.</p> <p>II. Preserving and improving the EU internal market by updating the scope and the structure of rates as well as by rationalising the use of tax exemptions and reductions by Member States.</p> <p>III. Preserving the capacity of the ETD to generate revenues for the budgets of the Member States as well as the distributional effects are other elements to take into due account.</p> |
| What is the value added of action at the EU level (subsidiarity)? |
| <p>The problems identified can only be remedied by means of a revision of the ETD, in coordination with other EU policy measures. National approaches risk distorting the internal market and undermining the EGD objectives due to the non-harmonised structure and level of the national taxes. Only a harmonised framework can help to attain the EU levels of ambition in these areas while seeking to preserve both the competitiveness of the productive sectors and the equal taxation treatment among sectors and energy uses. The EU’s contribution to achieve higher climate ambitions globally will be more effective if the EU coordinates all the possible policy instruments, including taxation, in the context of an ambition plan, which encompasses also the extension of the ETS and other relevant policy actions in the “fit for 55 Package”.</p> |
| B. Solutions |
| What are the various options to achieve the objectives? Is there a preferred option or not? If not, why? |

The baseline (option 0) represents the existing 2030 climate and energy legislative framework, namely the previously agreed climate and energy targets of 40% GHG emission reduction by 2030, as well as the main policy tools to implement these.

Option 1 would index the minimum rates and partly broaden the tax basis while substantially keeping its structure. The intra-EU aviation and maritime sectors would be included in the scope with a zero minimum rate by removing the current tax exemptions.

Option 2 introduces a system of simplified rates. Minimum rates are indexed and based on energy content and a transitional period (10 years for option 2a and a shorter period until 2030 for option 2b). It focuses on energy content with an increased taxation level (mostly for heating fuels) and extension of the taxable base. Intra-EU navigation in aviation and maritime sectors would be included in the scope of the Directive with minimum rates which will be linearly increased during a transitional period of 10 years with respect to intra-EU activities. Option 2c introduces a new component in the rates that takes into account air pollutant emissions of the products on top of the features of option 2a.

Option 3 brings in a carbon content component for the sectors that are currently not covered by the ETS. As for option 2, also in this case, two transitional periods (10 years and 2030) are considered. The introduction of a pollution component is also analysed in this option.

Considering that the ETS system should be extended to cover the emissions of transport and buildings, in order to avoid double taxation, option 2a is considered the preferred option.

A well-calibrated extension of the ETS to road transport, maritime and inland shipping and buildings coupled with option 2 for ETD review could help to achieve the EU's ambitious climate objective of 55% emission reductions while allowing to attain the rest of the objectives with the ETD review.

What are different stakeholders' views? Who supports which option?

In a public consultation, a vast majority of businesses and public authorities consider relevant an energy tax based on energy content. Moreover, an overwhelming majority of all types of respondents are in favour of a revision of the ETD that introduces incentives for alternative energy sources that supports the transition towards climate neutrality by reducing the possibility of favouring fossil fuels via less tax reductions, exemptions and rebates. A vast majority of citizens and public society representatives support the removal of preferential tax treatment to specific sectors of activity and of the distinction between commercial and non-commercial uses.

C. Impacts of the preferred option

What are the benefits of the preferred option (if any, otherwise of main ones)?

The preferred option 2a is fully coherent with other initiatives of the 'Fit for 55' Package and relevant EU policies. The proposed policy option will contribute to the EGD objectives by reducing emissions in EU27. Compared to the baseline scenario, emissions in 2035 are estimated to decline as follows:

GHG: -1,6%; NOx: -1,7%; PM2.5: -2,5%; SO2: -1,6%

The introduction of the sector of aviation and maritime intra-EU transport in the scope of the Directive will contribute to greater coherence of transport taxation. The introduction of new minima and the broadening of the tax base will contribute to greater convergence of effective tax rates in the EU.

| |
|--|
| What are the costs of the preferred option (if any, otherwise of main ones)? |
| <p>Estimates indicate the following costs: i) Loss of employment by 0.2% at EU 27 level in 2025 compared to the baseline, ii) Increase in household heating and transport prices, and, iii) Cost increase for business due to reduced exemptions and increases in fossil fuel prices.</p> <p>Increased tax rates lead to an increase in consumer prices, both for motor and heating fuels. Under the preferred option, this increase is similar across heating and transport fuel prices, around 0,8.% and 1.2% respectively. The results indicate that the proposed tax changes may reduce adjusted disposable income (the disposable income net of indirect taxes) of households, often in a regressive way. However, when the extra tax revenues raised are transferred back to households in a lump-sum fashion, the whole tax change turns to be progressive, for these transfers determine a larger increase in disposable income for poorer households.</p> |
| What are the impacts on SMEs and competitiveness? |
| The proposed option will not have a specific impact on SME not on the competitiveness of the EU industry |
| Will there be significant impacts on national budgets and administrations? |
| <p>In the baseline, revenues in Member States are projected to decrease in the coming years by nearly 32% between 2020 and 2035 due to the expected evolution of the energy system with a decreasing dependency on fuels thanks to energy savings and a shift from fossil fuels as well if Member States do not increase their national rates. The preferred option2a would mitigate to a great extent this trend by increasing revenues.</p> <p>The revision of ETD aims at introducing improvements and simplification in the tax rates and taxable base. The envisaged changes however should not fundamentally alter the actual levy and administration of excise taxation on energy products and electricity.</p> |
| Will there be other significant impacts? |
| No |
| Proportionality? |
| The proposal is proportionate and necessary to achieve the objectives, as it addresses current limitations with the ETD while substantially keeping its structure. The proposed option 2a brings new minima, broadens the tax base, cares of the particular situation of vulnerable households and industry and provides for a transitional period of 10 years to allow a smooth transition. Furthermore, the initiative foresees regular reviews to ensure proportionality of the policy measures. |
| D. Follow up |
| When will the policy be reviewed? |
| Currently, article 29 of the ETD provides for a regular examination on the basis of a report and, where appropriate, a proposal from the Commission. A report will be prepared 5 years after the Directive implementation. |



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PART 1/3

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a Council Directive

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

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Glossary

| Term or acronym | Meaning or definition |
|-----------------------------|---|
| CHP | Combined heat and power generation |
| CJEU | Court of Justice of the European Union |
| CN | Combined Nomenclature |
| CORSIA | Carbon Offsetting and Reduction Scheme for International Aviation |
| DG TAXUD | Directorate-General for Taxation and the Customs Union |
| eAD | Electronic Administrative Document for excise goods which are moved under duty-suspension |
| EEA | European Economic Area |
| EGD | European Green Deal |
| EMCS | Excise Movement Control System |
| Energy Taxation Directive | Council Directive 2003/96/EC |
| ETD | Energy Taxation Directive |
| EU ETS | European Union Emissions Trading System |
| EUA | European Union Allowance |
| GHG | Greenhouse Gas (CO ₂ , N ₂ O, perfluorinated chemicals (PFCs)) |
| Horizontal Excise Directive | Council Directive 2008/118/EC |
| JRC | Joint Research Centre |
| LPG | Liquefied Petroleum Gas |
| Mineral Oils Directives | Directives 92/81/EEC and 92/82/EEC |
| NACE | European Classification of Economic Activities |
| NO _x | Nitrogen oxides |
| PM 2.5 | Tiny particles or droplets in the air that are two and one half microns or less in width. |
| RED / RED II | Renewable Energy Directive / Recast Renewable Energy Directive |
| REF | EU Reference Scenario |
| REFIT | The Commission's regulatory fitness and performance programme |

| | |
|------|-------------------------------------|
| SAAD | Simplified Administrative Document |
| SAF | Sustainable Aviation Fuels |
| SO2 | Sulphur dioxide |
| TFEU | Treaty on the Functioning of the EU |
| UCC | Union Customs Code |

1. INTRODUCTION: POLITICAL AND LEGAL CONTEXT

The world is facing a profound climate crisis and the challenges of this crisis requires a global response. To meet the objective of a climate-neutral European Union (EU) by 2050 in line with the Paris Agreement¹, the EU needs to increase its ambition for the coming decade and update its climate and energy policy framework. As laid down in the European Green Deal² (EGD), the Commission proposed a new EU target for 2030 of reducing greenhouse gas (GHG) emissions by at least 55% compared to levels in 1990 and the first proposal of a European Climate Law³. This new target is based on a comprehensive impact assessment⁴ and has been endorsed by the European Council⁵. To deliver on these GHG emissions reductions, the Commission will review and propose to revise where necessary all relevant policy instruments by June 2021.

In the Commission work programme for 2021, the revisions and initiatives linked to the EGD climate actions and in particular the 55 % net emissions reduction target are presented under the ‘Fit for 55 Package’. This package will cover in particular the review of sectorial legislation in the fields of climate, energy, transport, and taxation⁶.

The initiative for a revision of Directive 2003/96/EC (Energy Taxation Directive or ETD), which is the subject of this impact assessment, is part of that package to be adopted in June 2021. The other initiatives are subject to dedicated and in-depth impact assessments led by the Commission services, and are beyond the scope of this impact assessment. These other initiatives include new proposals and the review of existing acquis in the area of climate and energy policy:

- the EU Emissions Trading System (ETS)⁷ to potentially include the building, maritime and road transport sectors as well as to change the treatment of the aviation sector, which is already included in its scope;
- the Effort Sharing Regulation (ESR)⁸
- the Renewable Energy Directive (REDII)⁹;
- the ‘ReFuelEU Aviation’ initiative aimed at boosting the production and uptake of sustainable aviation fuels in the air transport sector;
- the ‘FuelEU Maritime’ initiative aimed at increasing the demand of renewable and low-carbon fuels in the maritime transport sector.
- the Energy Efficiency Directive to implement the ambition of the new 2030 climate target (EED)
- A new Carbon Border Adjustment Mechanism
- Reducing methane emissions in the energy sector

¹ https://unfccc.int/sites/default/files/english_paris_agreement.pdf

² COM(2019) 640 final, p.4

³ The Commission adopted the proposal COM (2020) 563 final, amending the initial Commission proposal (COM(2020) 80 final) on the European climate law to revise the EU emission reduction target to at least 55% by 2030.

⁴ COM(2020) 562 final

⁵ European Council Conclusions of December 2020, EUCO 22/20 CO EUR 17 CONCL 8

⁶ European Commission. (2020). Commission Work Programme 2021: Annex I outlines all the instruments to be proposed which includes among others the review of energy taxation.

⁷ Directive 2003/87/EC

⁸ Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement

⁹ Directive (EU) 2018/2001– This directive establishes an obligation on fuel suppliers to ensure a minimum mandatory share of renewable energy within the final consumption of energy in the transport sector by 2030.

- the Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF)¹⁰
- the Directive on deployment of alternative fuels infrastructure¹¹
- the Regulation setting CO₂ emission performance standards for new passenger cars and for new light commercial vehicles¹²

The EGD sets out a detailed vision to make Europe the first climate-neutral continent by 2050, safeguard biodiversity, establish a circular economy and eliminate pollution, while maintaining the competitiveness of industry and ensuring a just transition for the regions and workers affected. Delivering on the revised target with a coherent policy framework to support implementation across sectors will make industry and businesses ‘trailblazers’. This is expected to modernise the economy, and deliver innovation while ensuring security and resilience of energy supply and health benefits.

In this context, effective carbon pricing and the removal of incentives for fossil fuel consumption throughout the EU are very much needed to deliver the GHG emission reductions together with other regulatory measures. The review of the Energy Taxation Directive, as an integral part of the EGD, should focus on environmental and climate issues in order to support the transformation of the EU’s economy for a sustainable future. One major aspect is that all instruments of the EGD need to support and enhance the EU vision of achieving climate neutrality by 2050 in a coherent way. This means it is essential to ensure that taxation is aligned with climate and environmental objectives. In fact, taxation can enhance other key EU policies and help achieve these objectives by creating proper incentives to change behaviour, and to create the right environment for green innovation. The inclusion of enhanced taxation elements in the EGD supporting other policy instruments acknowledges the importance of the “polluter pays” principle, the internalisation of externalities and the role that taxation can play by providing the incentives to further steer behaviour of producers and consumers.

While the ETD is historically an instrument for Member States to collect tax revenues, the environmental objective of taxation has gained relevance in the present context. The European Green Deal has underlined that it is essential to ensure that taxation is aligned with climate objectives and that the review of the ETD focuses on environmental issues by putting, in particular, an end to fossil fuel incentives. Therefore, this review is designed to deliver a contribution to meeting the greenhouse gas reduction targets of the Climate Law and to be consistent with the other ‘Fit for 55’ initiatives. The review acknowledges that the main role in the decarbonisation of the EU economy corresponds in any case to the ETS and to the Effort Sharing Decision.

The Climate Law targets could theoretically be achieved without the contribution delivered by the proposed ETD revision. However, as it is considered that the ETD would have to be revised to address a number of shortcomings of the current Directive (e.g. related to the proper functioning of the internal market) and to be focused on environmental issues, it makes sense to consider revising the ETD in such a way as to make it consistent with other ‘Fit for 55’ proposals and deliver a meaningful contribution to the targets of the Climate Law. Without the contribution of the ETD, other initiatives would have to contribute more. This, for example, could result in a higher ETS price. The coordination of the two initiatives (ETD and ETS) can help to achieve the targets in 2030 and beyond in a more cost-efficient way.

¹⁰ Regulation (EU) 2018/841 of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework

¹¹ Directive 2014/94/EU of 22 October 2014 on the deployment of alternative fuels infrastructure

¹² Regulation (EU) 2019/631 of 17 April 2019 setting CO₂ emission performance standards for new passenger cars and for new light commercial vehicles

The ETD can support and complement the initiatives in the ‘Fit for 55 Package’ in contributing to the increased ambition of at least 55% reduction in GHG emissions by 2030 by ensuring that the taxation of motor and heating fuels reflects better the impact they have on the environment and on health. This can be achieved by removing disadvantages for clean technologies and introducing higher levels of taxation for inefficient and polluting fuels. The proposed policy measures in this impact assessment will contribute to the objectives of EU’s climate, environmental and energy policies by providing secure, affordable and clean energy for EU citizens and businesses. Furthermore, it will facilitate the transition away from fossil fuels towards cleaner energy to deliver on the EU’s Paris Agreement commitments for reducing GHG emissions.

Box 1: Overview of Directive 2003/96/EC and its rationale compared to the ETS

Fuel taxation has been part of the existing national taxation measures well before the existence of the EU Directive of 2003. At present, energy taxes, which in most Member States do not pursue an explicit and well defined CO₂ reduction objective, range from 3.5% to 9% of total national revenues.

Directive 2003/96/EC lays down the EU rules for the taxation of energy products used as motor or heating fuels and of electricity. Prior to its entry into force in 2003, the Union framework for energy taxation mainly covered mineral oils by means of Directives 92/81/EEC and 92/82/EEC (the so-called “Mineral Oils Directives”). The ETD replaced those Directives retaining their structure based on minimum levels of taxation expressed in terms of volume but widening the scope to avoid distortions between competing sources of energy (such as electricity). It set new minimum rates for the new products under the widened scope and increased the rates for the mineral oils previously covered.

The objective of this harmonisation of energy taxation was to avoid the harmful effects of energy tax competition between Member States. This harmonisation ultimately aimed at strengthening the internal market by tackling possible distortions of competition stemming from the relocation of consumers of energy (i.e. businesses) to Member States with more beneficial tax regimes.

The ETD also intended to allow Member States to use taxation policy in support of other policies. These include the environmental protection and the achievement of international climate related commitments (at the time of the adoption of the ETD, specifically the Kyoto Protocol), energy efficiency, consideration of transport policies and redirection of fiscal policy to combat unemployment.

Since its adoption in 2003, energy markets and technologies in the EU have experienced significant developments, and the EU’s international commitments, including the Paris Agreement, as well as the EU’s regulatory framework in the area of energy and climate change have evolved considerably.

In view of energy efficiency and environmental objectives, in 2011 the European Commission made a proposal¹³ aiming at restructuring the energy taxation to reflect both energy content and CO₂ emissions, as well as at rationalising the structure of possible exemptions and reductions. Following four years of unsuccessful negotiations in the Council in which Member States were unable to reach a unanimous agreement on the way forward, the European Commission decided to withdraw the proposal in 2015¹⁴.

The Commission services published an evaluation report of the ETD¹⁵ on 12 September 2019. In the light of this evaluation, the EU Finance Ministers adopted Council Conclusions at the ECOFIN meeting on 5 December 2019¹⁶. These conclusions underline that energy taxation can be an important part of the economic incentives that steer successful energy transition, driving low greenhouse gas emissions and energy savings investments while contributing to sustainable growth. Considering the importance of an updated energy taxation framework, the Council Conclusions invited the Commission to analyse and evaluate possible options with a view to publishing in due course a proposal for the revision of the Directive.

In particular, the conclusions support an update of the legal framework for energy taxation contributing to the wider economic and environmental EU policy objectives. They invite the Commission to give particular consideration to i) the scope of the directive, ii) the minimum rates and iii) the specific tax reductions and exemptions.

The Council also highlighted the importance of fully assessing the proposals in terms of their economic, social and environmental costs and benefits. The implications for competitiveness, connectivity, employment and sustainable economic growth, particularly for sectors most exposed to international competition should also be assessed.

The ETD sets minimum levels of fuel taxation according to the different products and uses for energy products used as motor or heating fuel- and electricity, including the sectors in the ETS and/or subject to other standard regulations (such as blending obligations or emission standards for vehicles).

While the ETD is a tax on output fuels, the ETS applies a charge to CO₂ emissions in some installations. Therefore, the coverage of the two Directives are independent and the two instruments are considered to be complementary. The economic sectors/energy uses can be subject to ETD and ETS at the same time. A certain overlap in the coverage of the two instruments would arise in case the ETD rate is increased to include a CO₂ component. In that case, for the sectors simultaneously covered by ETD and ETS, it could be considered that there is a double carbon price. As long as a sector/energy use is taxed with ETD for fuel consumption and charged by ETS for CO₂ emissions, no overlap or double taxation would occur between the two instruments.

Both instruments cover some uses of energy, such as power and heat generation and energy-intensive industries. Other areas are excluded by either one or both of them. Such, for example, include process emissions, which are covered by EU ETS and not by the ETD.

¹³ COM(2011)169

¹⁴ [Withdrawal of Commission proposals](#) (OJ C 80, 7.3.2015, p. 17–23)

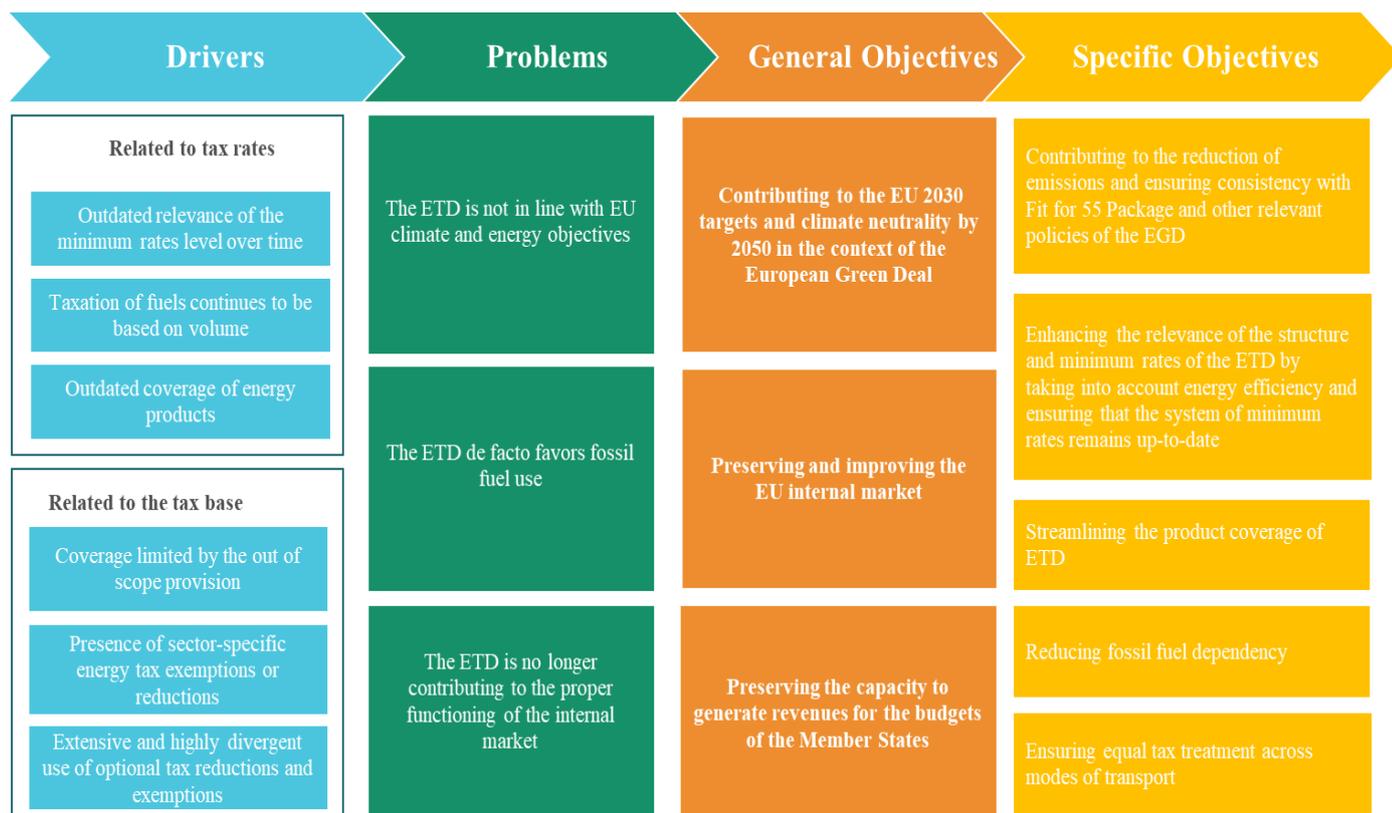
¹⁵ [Commission report: evaluation of the Energy Taxation Directive, SWD\(2019\) 329 final.](#)

¹⁶ [Energy taxation: Council calls for an updated framework contributing to a climate neutral EU.](#)

2. PROBLEM DEFINITION

This section will define and analyse the problems and their drivers and it will assess the expected evolution of these problems in the absence of any EU policy intervention. The section will also present the need for the review of the directive in line with the “Logic for Intervention” below. Figure 1 below presents a snapshot of the main problems, their drivers, and the objectives of the proposed initiative.

Figure 1: Logic for Intervention



2.1 What are the problems?

At the time of its adoption, the ETD represented a positive contribution to the EU legislative framework by establishing harmonised common rules at the EU level for the taxation of electricity and basically, all motor fuels and heating fuels in 2003. However, the ETD has remained unchanged despite the fact that technologies, energy markets and other EU legislation have evolved considerably over the past 15 years. Consequently, significant misalignment exists between the ETD and all these areas today. The overall conclusion of the evaluation report is therefore that the ETD does not ensure the equal tax treatment of energy sources based on their negative externalities. Such externalities include, for example, the emission of greenhouse gases and other air pollutants.

The ETD is not in line with EU climate and energy objectives: The Directive does not adequately promote greenhouse gas emission reductions, energy efficiency and the take-up of electricity and alternative fuels (hydrogen, synthetic fuels, e-fuels, advanced biofuels, etc.).

As a result, the ETD does not provide sufficient incentives for investments in clean technologies. There is a lack of alignment between the ETD and, among others, the Renewables Directive and the Energy Efficiency Directive.

The treatment of the business sector, in particular energy intensive business and manufacturing sectors, varies considerably under the ETD. Furthermore, the exemptions for the aviation and maritime sectors are incoherent with the push for climate change. For these reasons, the ETD is not in line with the objectives of the EGD, and hence, it cannot ensure at present consistency with the 'Fit for 55 Package'.

The ETD de facto favours fossil fuel use: Highly divergent national rates are applied in combination with a wide range of tax exemptions and reductions in order to pursue national industrial and economic policies. The wide range of exemptions and reductions are de facto forms of fossil fuel incentives, which are not in line with the objectives of the EGD. Furthermore, renewable fuels and energy products produced from biomass (see Box 2) are treated less favourable due to their lower energy content. Yet the same minimum tax rate is applied. All these differences increase the fragmentation of the internal market, provide an unequal fiscal treatment of the different fuels and distort the level playing field across the relevant sectors of the economy.

Box 2: What are biofuels, bioliquids and biogas?

These products are produced from biomass (such as plant or animal material) and definitions of these products in the REDII differentiate between biofuels as liquid fuels for transport, bioliquids as liquid fuel for energy purposes other transport, such as heating and biogas as gaseous fuels*. In the EU most biofuels today are blended with fossil transport fuels. Typically, ethanol is mixed with gasoline and biodiesel is mixed with gas oil. There are three main types of biofuels:

i) Non-Sustainable: These biofuels do not achieve significant reductions in greenhouse gases compared to fossil fuel alternatives and/or the cultivation of their feedstock results in land use conflict (food security, land with high biodiversity).

ii) Sustainable**: these biofuels achieve a certain reduction in greenhouse gases compared to fossil fuel alternatives and does not result in land use conflict.

iii) Advanced*** : Beyond complying with the sustainability and greenhouse gas saving criteria listed above, advanced fuels are produced from feedstock that ensure that they do not create additional demand for land while promoting the use of wastes and residues.

Bioliquids include e.g. vegetable oils and fats and are also subject to the above sustainability criteria. Biofuels and biogas for transport are also eligible to be treated as advanced.

* As defined by Article 2 (24), (28), (32) and (33) of Directive (EU) 2018/2001 of the European parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast; REDII)

**As defined by Article 29(2) to (7) of RED II excluding high indirect land-use change-risk biofuels as defined in Article 26(2) of that Directive.

*** As defined by Annex IX Part A of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)

The ETD is no longer contributing to the proper functioning of the internal market: The current ETD no longer achieves its primary objective in relation to the proper functioning of the internal market, as the minimum tax rates have lost their converging effect on national tax rates. In the absence of an indexation mechanism, their real value has eroded over time and they no longer have a converging effect on national rates as the vast majority of Member States tax most energy products and, in some cases electricity, considerably above the ETD minima. Highly divergent national rates are applied in combination with a wide range of tax exemptions and reductions in order to pursue national policies. The wide range of exemptions and reduction are de facto, forms support to fossil fuel consumption. These concern important sectors, such as aviation and maritime transport that are currently fully exempt from energy taxation, while land transport bears an important burden of energy taxation (except for leisure flights). All this increases the fragmentation of the internal market in particular distorts the level playing field across the involved sectors of the economy and creates unfair tax treatment.

In addition, there are some aspects of the ETD that lack clarity, relevance and coherence, which creates legal uncertainty. These include, among others, the definition of taxable products and uses that are out of the scope of the Directive and the interpretation of the exemption related to motor fuels used in air and water navigation.

The ETD has historically been an instrument for Member States to collect tax revenues. On average, ETD revenues represent around 5% of total tax revenues in the EU. From an economic perspective, indirect taxes can raise revenues in a less distortive way than direct taxation, because they have a less detrimental impact on growth. During the last decades the Commission has strongly encouraged Member States to make more use of indirect taxes as compared to direct taxes, especially labour taxation. Considering the projected evolution of the energy system under existing climate and energy policies, duly attention has to be given to the expected tax revenues evolution and their stability over time. In fact, a trade-off between environmental objectives and revenue stability may arise if the tax succeeds in internalising environmental costs thus contributing to reduce the taxable basis and namely fossil fuels use. While the aim of this review is not to increase revenues from the tax, it is one of the objectives to preserve the revenues raising potential for Member States (according to their policy choices in the area of taxation) at the same time that the tax ensures a reduction of negative externalities. The reduction of negative externalities and the preservation of revenues potential are not contradictory objectives. This can be achieved by means of the revision of the minimum rates and the broadening of the taxable base.

2.2 What are the problem drivers?

A) Related to the tax rates

A.1 Outdated relevance of the converging role of the minimum rates level over time

In the absence of an indexation mechanism, the real value of minimum rates has eroded over time. The 2019 Evaluation observes that the absence of an increase in minimum rates for more than a decade at EU level has eroded the tax-induced price signal that was supposed to encourage the convergence objective imbedded in the harmonisation and internal market logic of the Directive. As a result the national rates are generally well above the fixed minima and are very different at national level. As an example, the petrol real value of the minimum rate has decreased of around 2/3 since 2003 (CPI indexation).

As most Member States have increased their national level of taxation since then while others have not, there is risk of growing distortion of competition in the Single Market and an erosion of the tax base in high-taxing countries, notably for motor fuels that can be easily and legally transported across borders. This situation has eroded the convergence logic of the harmonisation Directive.

The minimum level of taxation for unleaded petrol already existed under the Mineral Oils Directives of 1992, with a rate fixed at EUR 287 per 1 000 litres. With the entry into force of the ETD, this minimum level of taxation was increased to EUR 359 per 1 000 litres. The ETD raised the minimum level of taxation of gas oil used as propellant from EUR 245 to EUR 302 per 1 000 litres in 2004, and to EUR 330 per 1 000 litres in 2010.

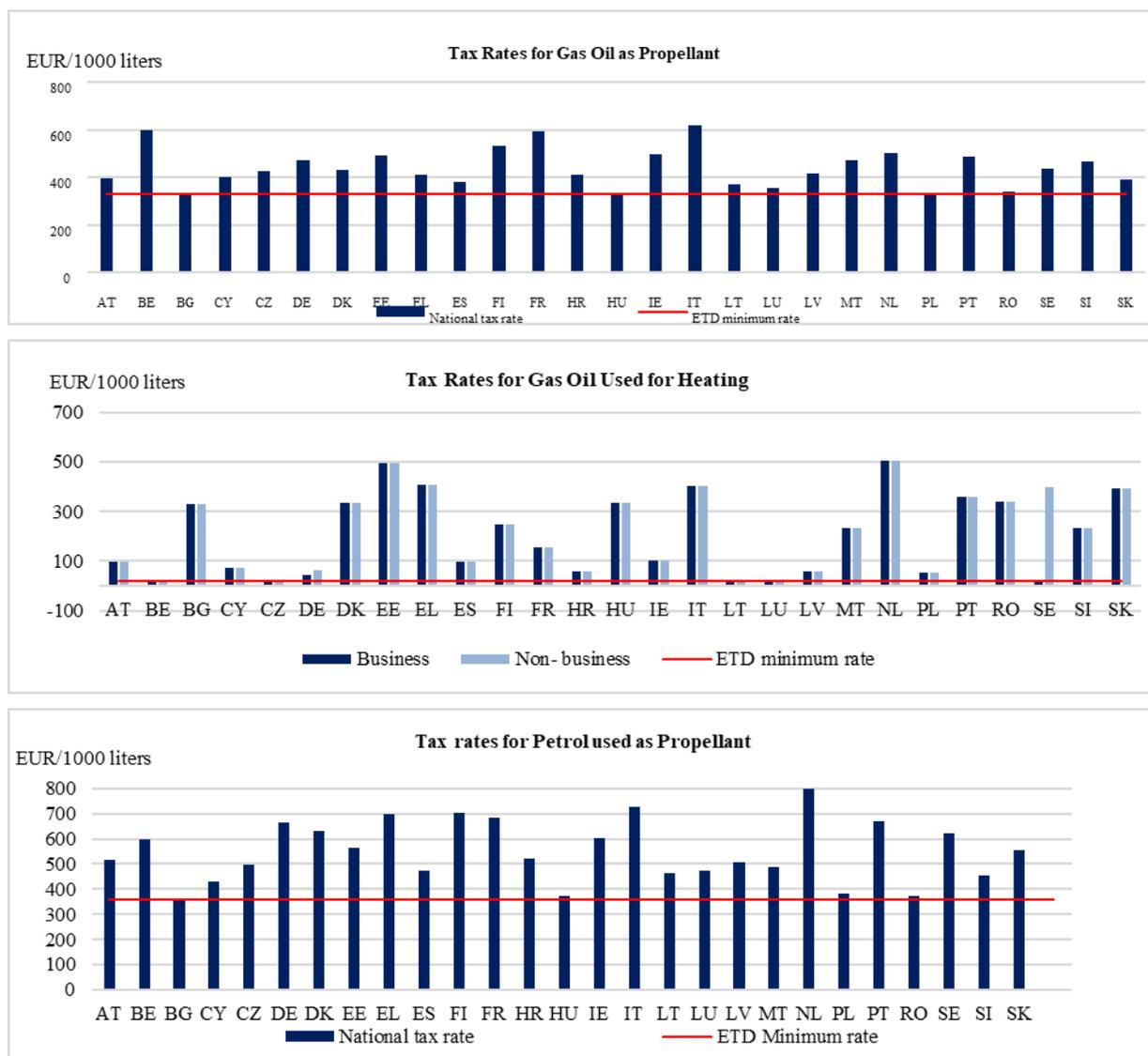
The implementation of the ETD had an initial one-off converging effect. The initial approximation of rates was strongest for the countries joining the EU after 2004. At the time of the ETD adoption, 14 out of the 15 EU Member States were already taxing unleaded petrol above the new minimum, while at the time of accession all but three of the 13 post-2004 Member States were below the minimum levels of taxation. For gas oil used as propellant, nine EU-15 Member States were taxing it above the new minimum against five of the post-2004 countries. Therefore, the minimum levels of taxation applicable to motor fuels under the ETD provided a safety net to avoid a “race to the bottom” in the taxation rates applied by the Member States.

The contribution of the current minimum levels applicable to petrol and gas oil, to the smooth functioning of the single market by approximating excise duty rates, is limited by the possibility of setting national rates above the minimum levels defined in the ETD, resulting in highly divergent national rates for transport fuels. Final prices across the EU ranged in 2018 from 1.10 EUR/litre to 1.68 EUR/litre. Most of the difference results from taxation as the variation of commodity prices remained between 0.53 to 0.66 EUR/litre in 2018^[1]. The variation of the tax component was significantly higher, ranging from 0.36 to 0.78 EUR/litre. These differences induced a phenomenon of consumers crossing borders in order to refuel their vehicles at lower prices (tank tourism) in bordering regions. This indicates local distortion of competition.

The 2019 evaluation (annex 6) shows the per capita releases for consumption of petrol and gas oil in each Member State. Significantly higher values in certain Member States might indicate the practice of tank tourism

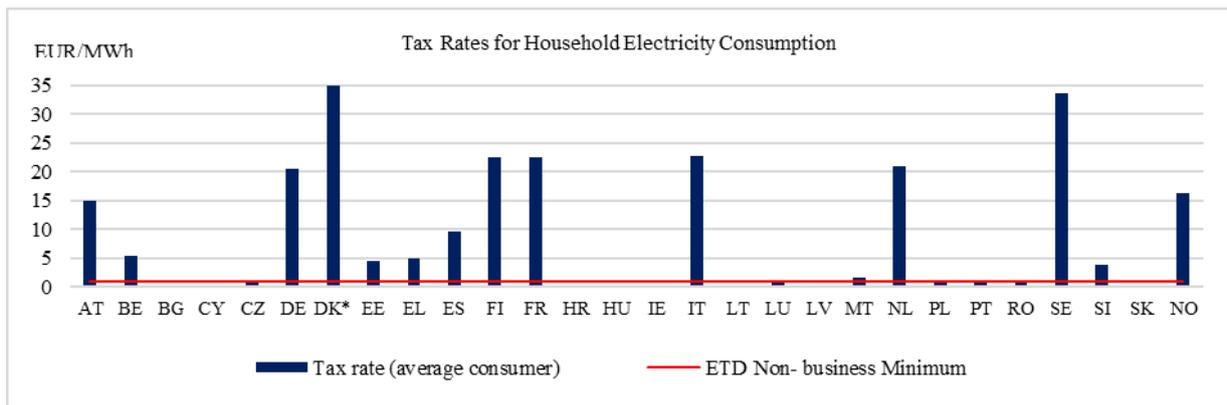
[1] [DG Energy – Weekly Oil Bulletin](#).

Figure 2: National Tax Rates and current ETD minimum rates in 2020)^{17 18}



¹⁷ Household tax rates: the ETD allows Member States to exempt the use of energy products and electricity used by households

¹⁸ Heating fuels: The ETD allows Member States to restrict the scope of “business-use”. Some Member States apply to higher non- business rate to certain commercial uses, such as services. For further explanation, please consult Annex 5.



Source: TEDB

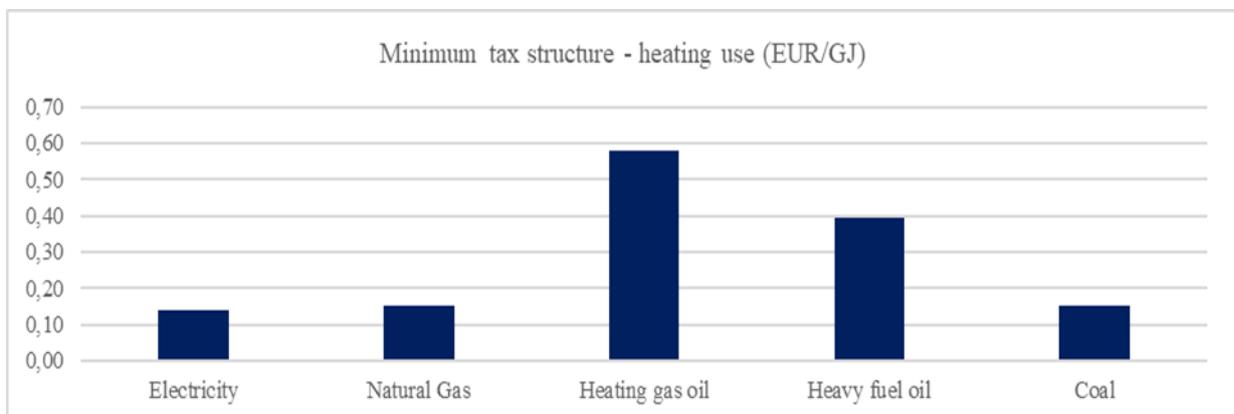
A.2 Taxation of fuels continues to be based on volume

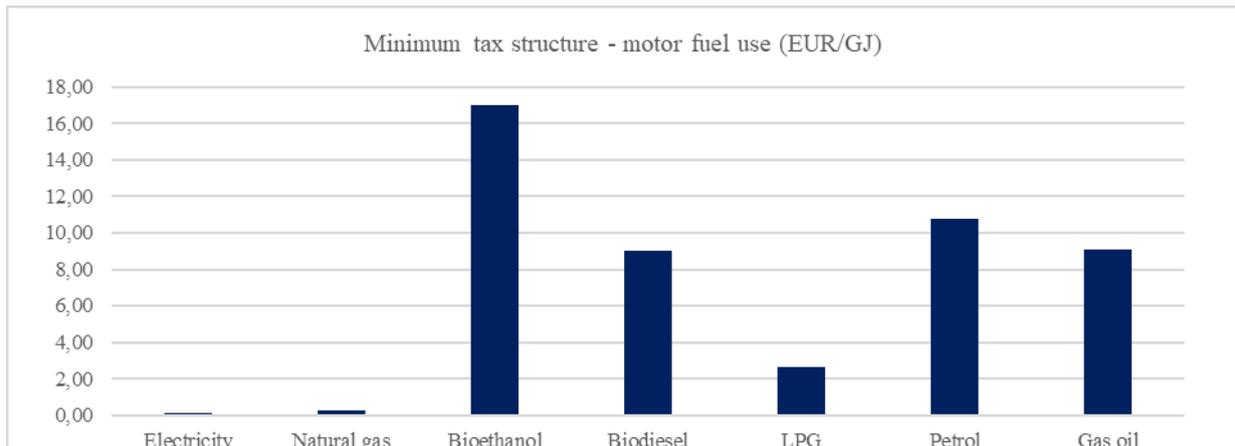
The **taxation of fuels according to volume** and not according to their energy content discriminates against renewable fuels in favour of conventional fossil fuels. The fiscal treatment of new energy products and technologies is unclear.

The lack of sustainability criteria and classification in the ETD to ensure that the use of biogas and liquid fuels produced from biomass in transport and such fuels used for heating is done in a way that guarantees real carbon savings and protects biodiversity, hampers the consistent tax treatment of these biomass fuels. The taxation of them under the ETD, like for almost all fuels, is based on volume and the applicable rate is the same as the rate applicable to the equivalent fossil fuel. The ETD, therefore, fails to take into account the lower energy content of the renewable fuels leading to a higher tax burden on the renewable fuel compared to the same volume of the competing fossil fuel. As a result, as biofuels used for transport is to be taxed at the national tax rate applicable to the equivalent fossil fuel – being fossil petrol or gas oil expressed in volume units – this means that the same distance travelled with biofuels is more heavily taxed.

Moreover, the taxation according to volume also results in unjustified differences of the taxation among different fossil fuels, such as petrol and diesel and among different products for heating use (see figures below).

Figure 3: Minimum tax structure - heating and motor fuel use (2003 minimum rates)



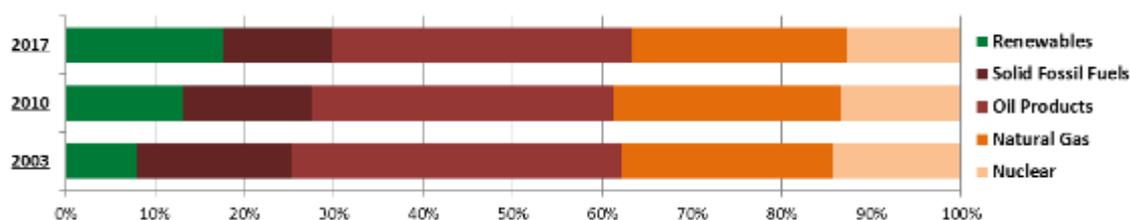


Source: Commission (JRC) calculations on Eurostat data

A.3 Outdated coverage of energy products

The ETD is outdated. The EU's energy mix is continuously evolving, as reflected also in the overall 'Fit for 55 Package', with the deployment of renewable energy and the decrease of the use of fossil fuels as a direct consequence of the policy choices made since the signature of the Kyoto protocol. The share of **renewable energy** in the EU's energy mix has increased almost three-fold since the ETD was adopted. Despite the growing market relevance of renewable fuels, their tax treatment under the ETD still relies on rules developed at a time when these fuels were niche alternatives without major market significance. It is a fact that the ETD does not provide clear provisions for a growing portion of the changing EU's energy mix. The relevance of the current ETD will further decrease as the ambition of climate policies increases. The 2030 climate and energy framework sets a target of at least 32% share for renewable energy¹⁹.

Figure 4: EU27 energy mix by type of fuel



Source: Eurostat [nrg_ind_ren]

The ETD was adopted long before the emergence of new technologies and uses that are predicted to become important building blocks on the path to the EU's decarbonised future. At the time of the adoption of the ETD, biofuels in transport were immature products, limited in variety and significance. However, over the last one and a half decades, second²⁰ and third²¹ generation biofuels emerged. The environmental performance of these successive generations of biofuels kept improving. Yet, the ETD does not differentiate between these types of biofuels.

¹⁹ [2030 Energy Strategy](#).

²⁰ For example, non- food biomass.

²¹ For example, biofuels derived from algae.

Alternative fuels, such as hydrogen²², e-fuels²³, synthetic fuels, bio-methane and renewable fuels of non-biological origin are gaining traction. However, the ETD does not ensure a tax treatment of these low-carbon alternatives, which is coherent with their potential to reduce GHG emissions, therefore constituting a disincentive for their higher penetration in the EU. The ETD does not even provide clear legal provisions for the taxation of some of these new products.

Because of all this, the current ETD is not properly suited to ensure the preferential treatment of these new energy products and their applications.

B) Related to the tax base

B.1 Coverage limited by the out of scope provision

Article 2 (4) (b) of the ETD lists certain energy products as well as uses of energy products and electricity for which the Directive itself shall not apply, apart from the application of the control and movement provisions laid down in Article 20. Such out of scope uses are as follows:

- i) any uses other and as motor fuel or as heating fuels,
- ii) the dual use of energy products (such as the use of energy products for chemical reduction, electrolytic, or metallurgical processes),
- iii) the use of electricity when it accounts for more than 50% of the cost of a product, and
- iv) mineralogical processes.

However, Member States remain free to subject these uses to non-harmonised taxation although in practice very few do so. The current ETD provides short definitions only for dual use and mineralogical processes, leaving sizeable room for interpretation and legal uncertainty.

According to a dedicated modelling exercise by DG Joint Research Centre of the European Commission (see Annex 10), 68% of the EU's industrial energy consumption falls under the out of scope provision and is therefore not subject to harmonised taxation. As most Member States opt not to apply non-harmonised taxation, most "Out of scope" energy use is untaxed.

The impact of the provision however varies significantly across industrial sectors and Member States. The estimated share of "Out of Scope" energy use is the highest in the following sectors:

- i) "Non- metallic minerals", including the production of building materials clay, sand and limestone (almost all of the sector's energy consumption falls under the Out of Scope provision). .
- ii) "Iron & Steel" (depending on a country's national definitions, over 90% of the sector's energy consumption can fall under the Out Of Scope provision)²⁴

²² For use both in dedicated combustion engines and in fuel cells for electric vehicles.

²³ Drop-in fuels produced from power-to-gas, power-to-liquid, to be used in internal combustion engines.

²⁴ There is currently no harmonised definition of metallurgical processes in place in the ETD, leading to diverging national implementation as attested by discussions among Member States and interpretations given by the CJEU in rulings on individual cases. Underlying results are based on a wider interpretation of metallurgical processes. Some Member States apply a narrower definition by considering parts of the industrial processes as heating, and therefore subject them to harmonized taxation. Others consider such processes covered by Article 2 (42) (b) of the ETD ("Out of Scope" energy use), which in most cases means that they are not taxed. A uniform

iii) “Non-ferrous metals”, including the production of aluminium, zinc and copper (over 80% of the sector’s energy consumption falls under Out of Scope)
(Other industrial sectors, such as “Food and beverage” and “Textile and leather” benefit less from the provision, leaving about three quarters of the energy consumption in these sectors in the scope of the ETD. (see more detailed results in section 3 of Annex 10).

Although the ETD sets the same definitions for all, differences across Member States arise depending on the prevalence of production processes in each country’s value chain. Some Member States process raw materials, with these processes being the most energy intensive part of the production, and export the product to other Member States. Consequently, the share of untaxed Out of Scope uses will be higher in the exporting country. In the “Chemicals” sector for example, the share of Out of Scope energy use varies from 12% to 66% across Member States.

B.2 Presence of sector-specific energy tax exemptions or reductions

The presence of sector-specific energy tax exemptions or reductions, notably for the transport sector (aviation, maritime, inland shipping and road haulage), for the agricultural/forestry/aquaculture sectors and for the energy-intensive industries and other business sectors, substantially weakens the incentives for investing in more energy-efficient and less polluting capital stock and production processes in these sectors. As a result alignment and consistency of the current ETD with the European Green Deal is weakened and does not allow to make these sector contribute to the decarbonisation effort.

At present, the ETD provides for an exemption of energy products supplied for **air navigation and navigation in Community waters**, other than for private pleasure purposes. Even if Member States may limit the scope of the exemptions to international and intra-Community transport by taxing these sectors domestically or after having entered into a bilateral agreement with another Member State to waive the exemption, the reality is that exemptions remain. These exemptions offer these sectors a favourable tax treatment in the transport sector as road transport is not exempted and the exemption of rail transport is optional. Moreover, the present situation substantially weakens the incentives for investing in more energy-efficient and less polluting crafts. The lack of proper differentiation between the different fuels in these sectors covered by the mandatory tax exemptions does not facilitate reducing the significant price difference between fossil fuels and sustainable fuels. Properly designed taxation measures could support the uptake of sustainable fuels and at the same time their production what could result in lower prices for these fuels.

Concerning, more particularly the aviation sector, it is worth considering that even after the drop caused by COVID-19 in 2020 and successive years, under the baseline scenario CO₂ emissions from aviation are still forecast to increase by 24% by 2030 and by a further 27% by 2050 compared to 2005 levels²⁵. This highlights the fact that, together with the increase in demand, the current exemption / structure does not encourage the switch to less polluting aircraft or fuels.

wider interpretation was applied to all Member States tailored to the uniform Eurostat data set, which provided the starting point of the modelling exercise.

²⁵ According to the October 2020 update of the European Commission EU Reference Scenario.

Existing market-based instruments, the EU ETS for intra-EEA aviation and since January 2021 the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA) only partially internalise climate externalities. For intra-EEA flights, climate change impacts are currently not fully internalised through the EU ETS as a significant proportion (44% in 2019) of total verified emissions are allocated for free to aircraft operators. This, however, is reassessed in the revision of the EU ETS, where a reduction of the number of the free allocations is among the policy options considered. As for extra-EEA flights, the price signal provided by CORSA clearly falls below the EU ETS carbon price and would only marginally reflect the climate external costs generated by extra-EEA flights. See Annex 7 for more details about the analysis for this sector.

While the problems of increasing GHG emissions and expensive decarbonisation supply measures equally apply to maritime and inland shipping, no market-based instruments are currently applied in this sector. Moreover, similarly to the case of the aviation sector, the exemption of the maritime and inland shipping gives a preferential energy tax treatment to the sector with respect to other modes of transport.

Lower minimum levels for products used as motor fuels are applicable in the **agriculture sector**²⁶ (which can moreover enjoy a level of taxation down to zero, for energy products as well as for electricity), and to **stationary motors and machinery for construction and public works**.

Energy intensive industries and other business sectors can, when in compliance with State aid regulations, also benefit from tax reductions potentially down to zero. This is possible under certain conditions, such as qualifying as an energy-intensive business (as defined by the ETD), and/or where agreements, tradable permit schemes or equivalent arrangements are implemented, as far as they lead to the achievement of environmental protection objectives or to improvements in energy efficiency. The national implementation of these provisions varies among Member States and across economic sectors.

B.3 Extensive and highly divergent use of optional tax differentiations, reductions and exemptions

The ETD leaves room for the Member States to implement total or partial exemptions or reductions in the level of taxation. The effective application of optional differentiations often reflects the individual interests of Member States. The extensive and highly divergent use of optional tax reductions and exemptions by Member States fragments the internal market and in particular distorts the level playing field across the respective sectors of the economy. There is a disconnection – and in some cases, a contradiction – between some optional tax exemptions and reductions allowed by the ETD and other EU instruments for energy and climate. The following list provides an overview of the main (possible) differentiations other than those already described in the previous section:

- possibility of differentiated rates of taxation above the minima (e.g. when linked to product quality, or depending on quantitative consumption levels for electricity and energy products used for heating purposes or between business and non-business use for heating fuels and electricity, etc.);
- possibility of lower rate for the commercial use, as opposed to non-commercial use, of gas oil used as propellant for the carriage of goods or of passengers;

²⁶ In this Impact Assessment report references to the agricultural sector also refers to the agricultural, forestry and aquaculture sectors in line with Article 8 (2) (a) and Article 15 (3) of the current ETD.

- tax exemption for energy products and electricity used to produce electricity, with a possibility, within defined limits, to introduce a taxation for reasons of environmental policy; and optional total or partial tax exemption or reduction for electricity from certain sources (including, among others, electricity from solar, wind, wave, tidal or geothermal origin);
- possibility of total or partial exemption or reduction in the level of taxation for energy products and electricity used for producing heat in combined heat and power generation and for electricity produced from combined heat and power generation (provided that the combined generators are environmentally friendly); optional total or partial tax exemption or reduction for natural gas and LPG used as propellants (moreover, for LPG, as well as for kerosene, used as heating fuels, the minimum level of taxation applicable is zero);
- country specific minimum levels²⁷, as well as additional derogations for specific policy considerations, when requested by a Member State, which granted by means of a Council Implementing Decision. Such measures are of a diverse nature, and include among others: specific rates for specific geographical areas, the tax treatment of electricity directly supplied to vessels at berth in a port (“shore-side electricity”) or to electricity supplied to electrical vehicles at charging stations and a tax exemption to operate machinery in humanitarian demining or for low-value solid fuel.

Beyond the discretionary application of tax differentiations, exemptions and reductions, the implementation of other provisions may also undermine the objective of harmonisation. Such include: legal uncertainty in the application of the control and movement provisions and the definition of the conditions establishing, in certain cases, chargeability and chargeable event. A divergent interpretation and implementation of these provisions may be an obstacle to the free movement of goods and investment capital.

As regards the control and movement provisions, an update of the list²⁸ of energy products to which those provisions apply may be needed. While several attempts to amend this list for various reasons including the fight against tax fraud have been made, this has not been successful to date and as a result national solutions have been implemented.

Concerning chargeability and chargeable event, particularly for storage of electricity, the current ETD was adopted long before several storage technologies (including chemical, electrical and mechanical solutions) emerged. Therefore, its provisions leave the possibility of divergent national implementation open. The ETD states that electricity is taxed at the time of supply but does not clearly define whether electricity is released for consumption when supplied to storage facilities. This could open the possibility of double taxation of electricity that is stored and re-sold. The lack of EU-wide harmonisation could create an insecure environment for business, and consequently might hinder investment in storage technologies.

²⁷ Particularly Article 9(2) of the ETD.

²⁸ See Article 20 of the ETD.

2.3 Effective Energy Tax Rates

This section complements the definition of the problems by means of synthetic indicators, which summarise the main findings presented above in terms of problems arising from the present level of rates and definitions of the taxable base. As mentioned above, much of the EU's energy consumption is not taxed at the nominal levels listed in the national legislations.

Effective rates do not result from a single problem driver identified in this Impact assessment, nor do they reflect the shortcomings resulting from a single problem driver. Effective rates are a combined result of the national tax rates applied jointly with the use of sectoral and other tax exemptions and reductions, the highly divergent national criteria attached to benefiting from these tax reliefs and eroded minimum rates that allow for large differences across national effective rates. Effective tax rates are best suited to serve as the basis for policymaking. In fact, effective tax rates are synthetic indicators, which present nominal rates adjusted for tax reliefs and thereby allow for cross country comparisons. Effective rates also illustrate the prevalence of fossil fuel incentives, counterproductive to the goals of the Fit-for-55 package and source of possible distortions -in the internal market.

Consequently, effective rates cannot be derived from a single problem driver. As they represent shortcomings stemming from various features of the current ETD, they also represent the underlying reasons for a number of elements of the new tax design.

A wide range of energy consumers benefit from various tax reliefs, in the form of rebates, refunds, differentiation and exemptions. This Impact Assessment delivers a systematic overview of tax reliefs in the EU27, quantifies tax reliefs in the transport, agriculture, households, services and industry sectors and computes set of effective tax rates. In addition, the criteria attached to tax reliefs are inventoried. (See Annex 5)

. The difference between nominal and effective rates show that the tax burden eventually born by consumers- can vary significantly. The tax effectively paid can be modified in two ways. Firstly, by altering nominal tax rates. In other words, increasing or decreasing the rates applied to energy products and uses. Secondly, by altering the taxable base. This can be achieved by changing the list of beneficiaries or eligibility criteria attached to tax reliefs. Changes in effective rates measure the impact of policy intervention affecting the taxable base, the nominal rate or both. Therefore, it is important to use duly computed effective tax rates to measure the impact of proposed policy changes. Effective tax rates, unlike their nominal counterparts, also allow for cross-country and cross sector comparison.

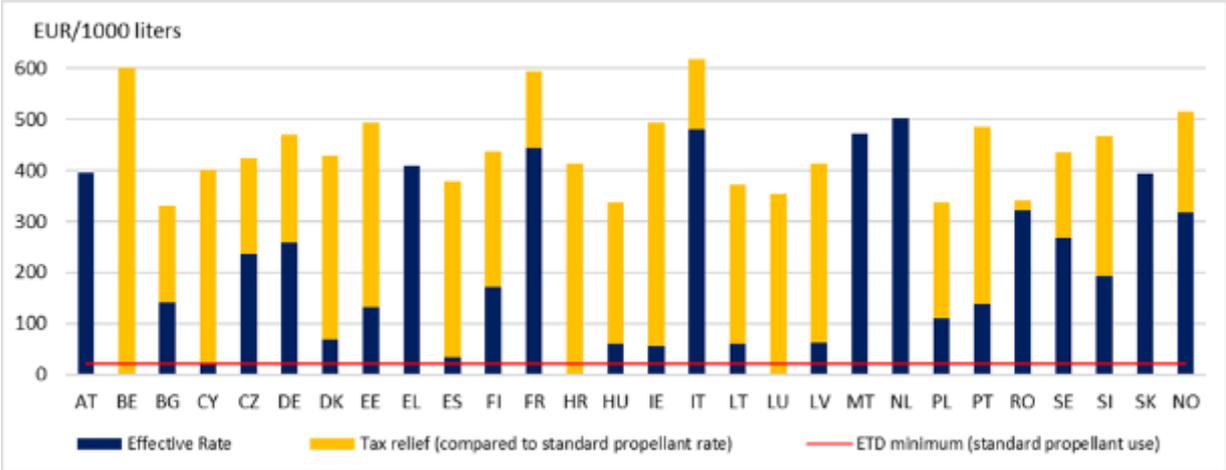
Therefore, the effective tax rates are also the best indicators to summarise the shortcomings of the current ETD and consequently the drivers for its revision. While nominal rates themselves provide no clear indication for the environment or internal market related problems of the EU's current energy tax design, effective rates can serve the purpose. They illustrate the ETD's shortfalls in terms of preserving the EU's internal market as well as contributing to the 2030 targets and climate neutrality by 2050 in the context of the European Green Deal. In fact, effective rates demonstrate harmful fossil fuel incentives in the form of sector and use specific tax reliefs and show the real differences in energy taxes paid by consumers across Member States. For example, only a combination of nominal rates and applicable tax reliefs provides an accurate picture of distortions of the internal market by illustrating the differences in taxes paid by industrial consumers in different Member States.

Findings presented in this Impact Assessment are based on answers given by 28 Finance Ministries to a dedicated survey conducted by the Commission in early 2020 (the 27 Member States and Norway). TAXUD Energy Metadata Survey (TEMS) allowed the collection of systematic information on tax reliefs and the national criteria attached to their application. TEMS also covered the taxation of various environmentally friendly technologies that are important drivers of the blocks energy transition. Amongst them, hydrogen, energy storage and renewables. In order to keep the reporting burden low for Member States, the survey was designed to be complemented by external data sources. Most notably, Taxes in Europe Data Base and Eurostat energy balances. CO2 taxes, in the Member States that apply such a tax, are accounted for in the computation of the effective tax rates²⁹.

As an example, the following graphs illustrate the effective tax rates for the most relevant energy product in agriculture, households and transport. They show the difference between nominal and effective tax rates, whereas tax reliefs are marked in yellow.

The ETD allows Member States to tax the use of gas oil in the **agriculture** sector³⁰ below the minimum, including full tax exemption. Some Member States make use of this provision (all yellow bars) while others apply the nominal rate (all blue bars). Yet others apply a refund or rebate (mixed bars) that decreases the effective rate compared to the nominal rate, while respecting the minimum. The result is a highly divergent taxation of gas oil, which accounts for over half of the sectors’ energy consumption. Tax reliefs for the use of gas oil may increase fuel use and represent fossil fuel incentives, hindering the achievement of the EU’s 2030 environmental goals as well as to reach climate neutrality by 2050.

Figure 5: Effective Rates for Gas Oil Use in Agriculture³¹. 2019/2020



Source: TEMS

The ETD also allows for the differentiation of **non-commercial and commercial use of gas oil in road transport**, with the latter covering the transport of goods and passengers. As of early 2020, ten Member States made use of this provision, mostly in the form of refunds that haulage operators can apply for. Tax reliefs for the use of commercial gas oil push the rates down towards the ETD minimum and therefore do not have a significant negative impact on

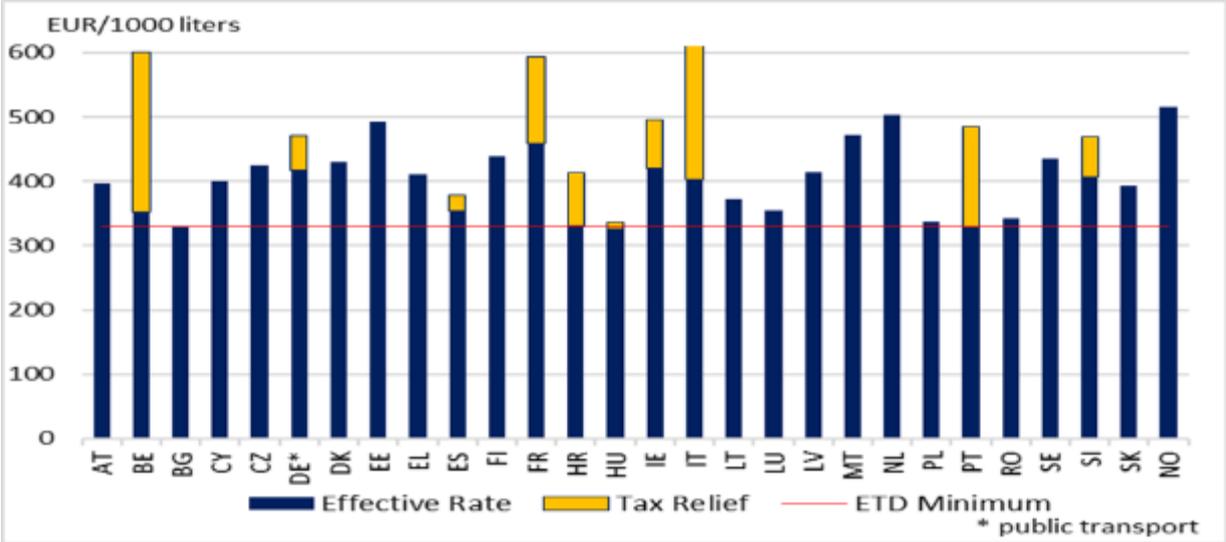
²⁹ At present only eight Member States (DK, FI, FR, IE, LU, PT, SE and SI) apply a carbon tax in combination with ETD rates mainly to non-ETS sectors.

³⁰ Used as motor or heating fuel

³¹ Weighted average of motor and heating use

the functioning of the internal market, yet they remain an incentive for fossil fuel consumption, incentivising the use of a highly polluting, mostly imported energy product.

Figure 6: Effective Rates for Commercial Gas Oil in Road Transport, 2019/2020

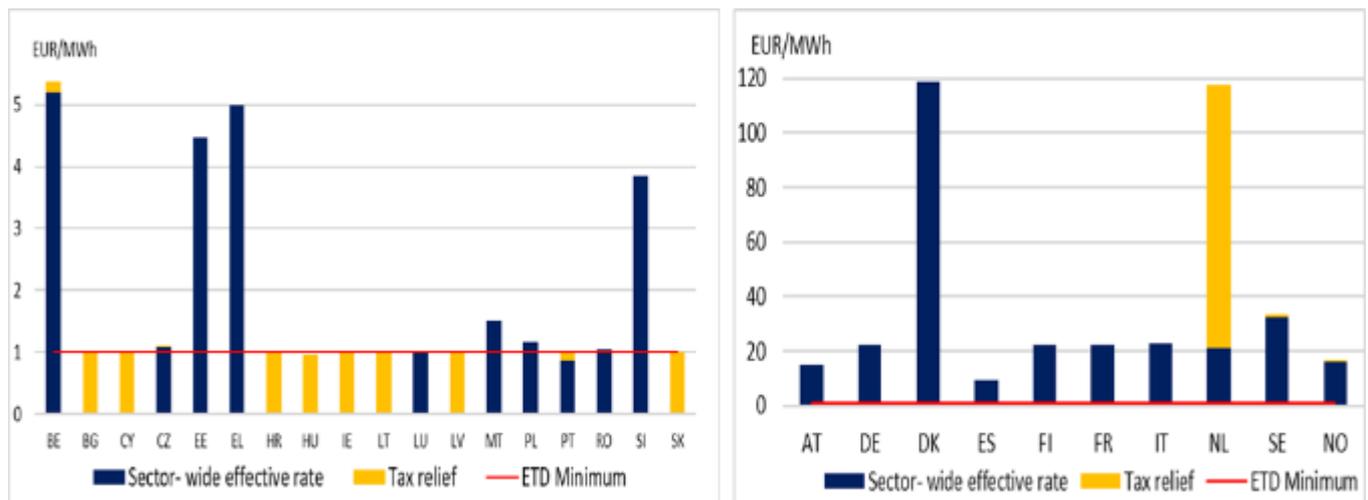


Source: TEMS

The ETD does not define minimum rates for households nor for industry. Instead, while setting separate minimum rates for the business and non-business use, these rates are the same for gas oil, heavy fuel oil, kerosene and LPG and only differ for electricity, natural gas and coal. Households fall in the “non-business” category. Yet, “non-business” nominal rates are often no indication of the actual rates paid by **households**. When nominal rates are combined with optional tax reliefs, the resulting effective rate for household electricity use is zero in eight Member States. Seven³² Member States exempt natural gas from excise duty. Others grant exemptions and reductions based on regional or social grounds, for example to vulnerable consumers. Tax reliefs for the household consumption of natural gas, coal and partly for electricity may increase fuel use and are fossil fuel incentives that constitute further challenges to realising the EU’s environmental and climate agenda.

³² Not all Member States that exempt the household use of electricity also exempt the household use of natural gas. For the exact lists, please see Annex 5 of this Impact Assessment.

Figure 7: Sector-wide effective rates of household electricity consumption³³ 2019/2020



Source: TEMS

2.4 How will the problem evolve?

The Evaluation of the ETD concluded that:

“The adoption of the ETD represented a positive contribution to the EU legislative framework in 2003 by updating and widening the scope of the harmonised common rules at the EU level for the taxation of energy products used as motor and heating fuel and of electricity.....

The ETD initially made an overall positive contribution towards its main objective of ensuring the proper functioning of the internal market, preventing double taxation or any distortion of trade and competition between energy sources and energy consumers and suppliers.

However, as technologies, national tax rates and energy markets evolved over the past 15 years, the ETD in its present form no longer makes the same positive contribution. Furthermore, the EU legislative framework and policy objectives developed significantly since the adoption of the ETD in 2003. As the ETD has not kept pace with such developments, there are some aspects of it, that now lack relevance and coherence. As a result the overall EU added value of the ETD has eroded significantly over time in particular due to the lack of indexation of the minimum rates and the extensive and highly divergent use of optional tax exemptions by Member States and because of the changing policy environment”

Therefore, considering the already obsolete nature of the Directive and the challenges the EU is facing in terms of climate change, the ETD will become more and more irrelevant in view of its objectives in case of no action. The present problems will evolve further and the ETD will become a patchwork of national legislations aimed at collecting revenues in a non-coordinated way with no effective harmonisation nor any environmental role. In such a situation, considering the evolving of the energy mix and the lack of effective harmonisation, the ability for Member State to effectively collect revenues could also be put under stress. As explained later on in this analysis, revenues for EU27 from this tax are expected to considerably drop in the medium term.

³³ The ETD minimum rate applies as the benchmark

3. WHY SHOULD THE EU ACT?

3.1 Legal basis

The legal basis of the Energy Taxation Directive is Article 113 of the Treaty on the Functioning of the European Union (TFEU), which permits the EU to lay down harmonised rules in order to ensure the proper functioning of the internal market. Additionally, appropriate provisions of fiscal nature intended, inter alia, to preserve and protect the environment can be adopted according to Article 192(2), first subparagraph, of the TFEU.

3.2 Subsidiarity: Necessity of EU action

The problems identified can only be remedied by means of a revision of the ETD, in coordination with other EU policy measures. Under the existing ETD, Member States can increase the rates of their taxes on energy products and electricity, decide not to make use of possible exemptions and reductions or introduce environmental and climate related objectives. However, such national approaches risk distorting the internal market and undermining the EGD objectives due to the non-harmonised structure and level of the national taxes:

- (1) The current minimum rates may limit the level of environmental ambition that Member States can pursue with taxes on energy, in particular because energy taxation may directly affect the costs for companies.
- (2) The harmonisation of energy taxation through the Energy Taxation Directive should contribute to reducing the harmful effects of energy tax competition between the Member States, stemming for example from the possible relocation of businesses to Member States with more beneficial tax regimes.
- (3) The EU Emissions Trading System (ETS) has proven to be an effective tool in reducing greenhouse gas emissions from installations covered by the scheme. A possible extension of the EU ETS to new sectors is envisaged in the EGD, but no decision of such a proposal has yet been taken at the time of the completion of this Impact Assessment Report. However, regardless of the scope of the EU ETS, the ETD needs to provide complementary policy actions, notably relating to transport, energy and other sectoral policies, to ensure that the EU incentives align and incentivise further investments in clean energy technologies and infrastructure or to overcome financing difficulties for low-income households. In that context, action at EU level can ensure the coherence between the application of the EU ETS and the taxation of energy products and electricity, as well as a common EU approach with respect to taxation of energy products including carbon taxes in the sectors not covered by the EU ETS.
- (4) Climate objectives can be put into practice in a number of ways and an effective EU-taxation framework can, while supporting other EU policy measures, prevent the creation of national solutions, which can in turn lead to internal market distortions and/or double taxation.

3.3 Subsidiarity: Added value of EU action

The contribution of taxation to the EGD climate and environmentally-related objectives can be ensured most adequately at the EU level. In fact, only a harmonised framework can help to attain the EU levels of ambition in these areas while seeking to preserve both the competitiveness of the productive sectors and the adequate level playing field among sectors

and energy uses. Similarly, the EU's contribution to achieve higher climate ambitions (globally international) will be most effective if the EU coordinates all the possible policy instruments, including taxation, in the context of an ambition plan, which encompasses also the extension of the ETS and other relevant policy actions.

4. OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1 General objectives

The **general objectives** of the review of the Directive are:

- I. **Contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal.** This would involve aligning taxation of energy products and electricity with EU energy, environment and climate policies thus contributing to the EU efforts to reduce emissions and other harmful effects due to the use of fossil fuels. The alignment of the ETD objectives with climate policies should be pursued while ensuring the coherence with the ETS system, thus avoiding inconsistencies and overlaps.
- II. **Preserving and improving the EU internal market** by updating the scope and the structure of rates as well as by rationalising the use of tax exemptions and reductions by Member States.
- III. **Preserving the capacity to generate revenues for the budgets of the Member States.** It should be underlined that one of the main objectives of taxation is to provide sufficient revenues for investment in public goods. However, it should be clarified that it is not an objective of the review of ETD to ensure at least the same level of revenues in the coming years. The objective is to ensure a framework that allows Member States to be able to generate the revenues they estimate necessary in full coherence with the EGD objectives and also be able, within the ETD framework, to design their tax systems to successfully support these objectives. The ETD revision should therefore duly consider the existing trade-off between a shrinking taxable base due to successful environmental objectives and the need to contribute to the financing of our social models.

In fulfilling the above-mentioned objectives, their implications for competitiveness, connectivity, employment and sustainable economic growth should be carefully considered.

The respondents to the open consultation undertaken by the Commission (see Annex 2) share the general objectives of the review. More than 90% of them agree that the ETD has to be revised in order to better ensure the smooth functioning of the internal market. An overwhelming majority of the respondents³⁴ agree that the ETD should be revised in order to support the transition towards climate neutrality and a strong majority³⁵ agreed that it has to be revised in order to better tackle environmental concerns, like air pollution.

4.2 Specific objectives

The specific objectives of the review of the Directive are:

- Contributing to the reduction of emissions and ensuring consistency with Fit for 55 Package and other relevant policies of the EGD

³⁴ 90% of businesses and more than 96% of other stakeholders

³⁵ 65% of businesses and more than 90% of other stakeholders

- Enhancing the relevance of the structure and minimum rates of the ETD by taking into account energy efficiency and ensuring that the system of minimum rates remains up-to-date
- Streamlining the product coverage of ETD
- Reducing fossil fuel dependency
- Ensuring equal tax treatment across modes of transport.

A strong majority of respondents to the public consultation agree that the ETD:

- should take into account energy content in the definition of rates (65% of citizens and more than 80% of other stakeholders),
- has to be revised in order to take into account the changed energy mix with higher share of renewables and electricity (more than 90%),
- should better promote energy saving/efficiency (more than 85%),
- de facto favours fossil fuels consumption (51% of businesses and more than 83% of other stakeholders) and should reduce the possibility of favouring fossil fuels via tax reductions, exemptions and rebates (65% of businesses and more than 85% of other stakeholders),
- is applied in a too diversified way across the Member States (85% of businesses and more than 95% of other stakeholders).

In contrast, only around 20% of the respondents to the public consultation agree that minimum tax rates of energy products and electricity should be indexed yearly.

5. WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1 What is the baseline from which options are assessed?

The baseline for this impact assessment represents the existing 2030 climate and energy legislative framework, namely the agreed climate and energy targets, as well as the main policy tools to implement these³⁶. It is aligned with the latest available version of the new EU REF Scenario³⁷. This includes primarily climate and energy legislation (ETS Directive, the Effort Sharing and LULUCF Regulations, the Energy Efficiency and Renewable Energy Directives), and notably reflects the European Commission's current assessment of Member States National Energy and Climate Plans (NECPs) as required in the "Clean Energy for All European Package".

This baseline (EU REF scenario) is expected to also be the baseline of the subsequent exercises under the 'Fit for 55 Package' this year. At EU27 level, the baseline achieves a 43.7% reduction in total GHG emissions (domestic and intra-EU maritime, inland shipping and aviation) in 2030, relative to a 32.6% reduction already achieved in 2020.

³⁶ Operationally the baseline is built using the Commission (JRC's) PIRAMID framework combining various data sources to produce a time series of input-output tables up to the year 2050 in five-year steps (see Annex 4). The baseline tables are projected by combining a base year dataset, external macroeconomic projections and results from energy models as constraints. For a number of sectors, especially energy intensive consumers, projections of economic output and energy use are aligned with detailed energy system models. In particular, for EU Member States, projections from the PRIMES model's December version of the EU REF scenario are used.

³⁷ Version from mid-December 2020, as captured in the PRIMES modelling

As part of the “Fit for 55 Package”, the Commission is reviewing this climate and energy framework to achieve the new GHG emission reduction target of at least 55% by 2030. However, this evolving policy framework is under consideration at the moment of the preparation of this impact assessment and is not part of the baseline scenario.

In addition to the above, the baseline should reflect as close as possible the actual energy taxation levels in Member States in implementing the current ETD. In order to more accurately address this requirement the baseline was updated and recalibrated with the set of effective tax rates applied by Member States, as presented in section 2.2.1, and the relevant technical discussion in Annex 5 (Effective Tax Rates by DG TAXUD) and Annex 10 (Out of Scope by DG JRC).

These effective rates were further improved to derive effective tax rates in the sectoral/fuel dimensions of the core model employed for the quantitative analysis of the impacts, namely the JRC-GEM-E3 model. This is particularly relevant for industrial sectors, for which effective tax rates must account for the volume of energy consumed out-of-scope of the Directive. The methodological approach to this further processing of the effective rates is discussed in detail under Annex 4 (Analytical Methods).

The baseline outlined above allows the analysis of this impact assessment to explore how the ETD revision will impact upon the EU economy both in aggregate and by Member State, as well as critically assess how the proposed changes can contribute to emission reductions in view of the EU’s increased climate ambition by 2030.

By focusing the analysis against the existing 2030 climate and energy legislative framework we can isolate the impact of the ETD alone and thereby its own contribution to reach 55% emission reductions by 2030. Alternative pathways to achieve 55% emission reductions by 2030 are not explored in this impact assessment, as these are analysed by other exercises under the ‘Fit for 55 Package’, including the extension of the ETS to transport and buildings performed by other Commission services.

For the purposes of the analysis, the revised ETD is assumed to enter into force in 2023. The JRC-GEM-E3 model runs in 5-year steps, meaning that starting from today an equilibrium is achieved at goods and services markets, and for factors of production through adjustments in prices. As a result, the first visible impact on tax rates of the revision can be seen from 2025 onwards. The methodology and data source used to calibrate effective rates that fed into the modelling of economic impacts is shown by table 17. (See Annex 5).

5.2 Description of the policy options

Option 1: “Minimalistic” Option

This option would *adjust the current minima* for all products in line with inflation since 2018 (starting year of indexation). Although the Directive was adopted in 2003, adjusting for inflation since then would result in a too significant increase in the minimum rates. Furthermore, the inflation rate since 2018 would reflect the relative stability of the energy markets and overall economic growth in the EU. The minimum rates will be indexed every year on the basis of the annual variation of the Harmonised Index of Consumer Prices (Eurostat). The HCPI is chosen over an energy price index to ensure smoother adjustment to the ETD rates. Energy prices are in general more volatile and subject to unpredictable changes, which limits their usefulness as a basis of indexation. In addition, employing energy prices as the primary the basis of indexation, would have led to an erroneous situation in

which any price change due to taxation would feed into the same index, which was used for the indexation itself.

In order to improve the legal certainty and to ensure a specific tax treatment, *some products* such as advanced biofuels and hydrogen would be included in the definition of energy products. The minimum rates for electricity would apply to these products.

Finally, this option would imply a stricter application of industrial tax reliefs, coupled –where applicable- to environmental performance, with no possibility for full exemptions or to go below the minima for energy intensive industries and other business sectors. The same limitation with exemptions and need to respect minima would also apply to the primary sector (agriculture, forestry and aquaculture).

Furthermore, the current mandatory exemptions for international aviation and maritime transport³⁸ would be removed and the two sectors would have a zero minimum rate. This would allow Member States to unilaterally tax these two sectors if they so wish without obliging them to do so.

Currently exempted households would reach the ETD minimum rates gradually (heating fuels and electricity), by means of an increase of the rates by 1/10 every year (to reach the minimum after ten years). The possibility for a full exemption would be limited only to vulnerable households.

Table 1: Proposed minimum tax rates under Option 1

| Motor fuels | | | |
|--|------------------|---------------------------|--|
| | Metric | Current ETD minima | Start of transitional period (2023) indexed |
| Petrol | EUR/ 1000 litres | 359,0 | 385,0 |
| Gas oil | EUR/ 1000 litres | 330,0 | 353,9 |
| Kerosene | EUR/ 1000 litres | 330,0 | 353,9 |
| Kerosene (aviation) | EUR/ 1000 litres | 0,0 | 0,0 |
| LPG | EUR/ 1000 kg | 125,0 | 134,0 |
| Natural gas | EUR/ GJ | 2,6 | 2,8 |
| Heating fuels plus fuels for agriculture and stationary motors | | | |
| | Metric | Current ETD minima | Start of transitional period (2023) - indexed |
| Gas oil | EUR/ 1000 litres | 21,00 | 22,52 |
| Heavy fuel oil | EUR/ 1000 kg | 15,00 | 16,08 |
| Coal and coke, business | EUR/ GJ | 0,15 | 0,16 |
| Coal and coke, non-business | EUR/ GJ | 0,30 | 0,32 |
| Kerosene business and non-business | EUR/1000 litres | 0,00 | 0,00 |
| Kerosene agriculture and stationary motors | EUR/1000 litres | 21,00 | 22,52 |
| LPG business and non-business | EUR/1000 kg | 0,00 | 0,00 |
| LPG for agriculture and stationary motors | EUR/1000 Kg | 41,00 | 43,96 |
| Natural gas business | EUR/ GJ | 0,15 | 0,16 |
| Natural gas non business, agriculture and stationary motors | EUR/ GJ | 0,30 | 0,32 |
| Non- renewable hydrogen | EUR/ GJ | n/a | 0,16 |
| Electricity, advanced biofuels, e-fuels and renewable hydrogen (all uses) | | | |
| | Metric | Current ETD | Start of transitional period (2023) -indexed |

³⁸ While the current ETD allows Member States to enter into bilateral agreements to waive the tax exemption for air or maritime transport between the two Member States concerned, no such bilateral agreement has ever been concluded. That is why an EU coordinated approach is needed. In November 2019, nine Member States signed a joint political declaration asking for EU coordination for aviation pricing.

| | | minima | |
|-------------------------------|----------|---------------|---------------------|
| Electricity business | EUR/ MWh | 0,50 | 0,54 |
| Electricity non business | EUR/ MWh | 1,00 | 1,07 |
| Advanced biofuels and e-fuels | EUR/GJ | n/a | Same as electricity |
| Renewable Hydrogen | EUR/GJ | n/a | Same as electricity |

Source: European Commission

Option 2a: “Energy content” Option: tax rates based on the energy content of the products and according to their environmental performance as well as a widened taxable base

This option would define the *minimum rates based on the energy content* (in gigajoules) of each product, rather than on the traditional volume basis, which is currently the case for most of the fuels and electricity in the Directive. This provides a better reference to compare different products and eliminates the current possible disadvantageous tax treatment of biofuels. Moreover, as different uses of electricity and hydrogen become more wide-spread, direct comparison of per unit tax rates might be useful. Whereas it is to be noted that the energy efficiency of appliances (for example heat pumps or electric vehicles) might play a bigger role than the fuel price. This ambitious change of measurement would clearly align the ETD with the objectives of the EGD.

As part of this option, the proposed new minima would be increased to reflect 2023 prices and would be automatically adjusted each year on the basis of the annual variation of the Harmonised Index of Consumer Prices (Eurostat) as in the first option.

Box 3: Proposed minimum rates

In 2023, the base value for one unit of energy content is set at 0.15 EUR/GJ, which corresponds to 0.5 EUR/MWh, the lowest minimum rate in the current Directive for electricity³⁹. Taking this value, this option proposes that the minimum rates would range from 0.15 EUR/ GJ to 10.75 EUR/GJ without taking inflation into account. These minima increase to 0.16 EUR/GJ to 11.53 EUR/GJ taking inflation into account (indexation), as in option 1⁴⁰.

The indexed rate for petrol in 2023 is set at 11.53 EUR/GJ to ensure consistency with the present minimum rate (indexed) expressed in volume (see table 2).

This option will determine that the level of taxation of petrol and of electricity are the two reference values to set all the other minimum rates. This will allow to differentiate rates to provide clear signals to consumers of better performing energy products and technologies.

The minimum rates applied to energy products for motor fuel use would be applied to the aviation sector. The maritime and inland shipping sector would be subject to the same minima as those for the primary sector. While both sectors are exposed to carbon leakage, the opportunity for tankering fuel outside the EU is significantly higher in the maritime sector⁴¹.

³⁹ As well as to the current minimum level of taxation for business use of some heating fuels (natural gas and coal and coke), excluding the zero rates (set for kerosene and LPG used as heating fuels).

⁴⁰ As in option 1, adjusting for inflation is from 2018. Adjusting for inflation since 2003 would result in substantial increase in the minimum rates, which could have too negative impacts on consumers of traditional fossil fuels.

⁴¹ https://ec.europa.eu/clima/sites/clima/files/transport/shipping/docs/ghg_maritime_report_en.pdf

The relatively low tax rate on the intra EU maritime sector would reduce the economic incentive to purchase fuel outside the EU⁴².

Furthermore, the current structure would be simplified by grouping energy products together based on their environmental performance into five *categories* for motor fuels and four categories for heating fuels (in terms of applicable rates). The same minimum rate would apply to each energy product within a category according to their use. The five categories are:

- (i) Traditional fossil fuels (including e.g. petrol, gasoil, kerosene) and non-sustainable biofuels, bioliquids and certain solid biomass
- (ii) Kerosene (for motor fuel in aviation)
- (iii) LPG, natural gas and non-renewable hydrogen
- (iv) Sustainable but not advanced biofuels, bioliquids and certain solid biomass
- (v) Electricity, advanced biofuels, e-fuels and renewable hydrogen

The highest minimum rate would apply to traditional fossil fuels due to their poorer environmental performance compared to other energy products. The minimum rates would decrease (except for kerosene for aviation) for each subsequent category with the lowest minimum rate applied to category (v).

Electricity will increasingly come from renewable sources. Increasing the share of electricity in Europe's energy system is at the centre of the EU's ambitious plan to completely decarbonise by 2050. This will mean a higher penetration of electricity in transport, heating and industry displacing fossil fuels. In line with this, the minimum level of taxation for electricity is proposed to be set at a lower level for all uses.

At the end of a *transition period*, the categories of energy products would be further reduced to three as category (ii) and (iii) would be merged with category (i) with the rest of the fossil fuels and non-sustainable biofuels.

Option 2 ranks the different fuels according to their environmental characteristics primarily without an explicit element that reflects carbon emissions – the latter addressed explicitly in Option 3.

The concept of 'environmental performance' and the correspondent ranking of applicable rates takes into account the specific energy characteristics of the different products, their treatment under the current ETD and in the Member States, the expected -or sought-after- evolution of the EU energy mix and more importantly, it mirrors the other proposals in the "Fit for 55 package" (in particular the ETS and RED II) to ensure coherence and contribute to the common objectives. The result is reflected in the differentiated rates expressed in energy content (EUR/GJ).

In line with the indications stemming from the EGD initiatives (see e.g. COM(2020) 562 final, Stepping up Europe's 2030 climate ambition, Investing in a climate-neutral future for the benefit of our people) **traditional less environmentally performant fossil fuels** would be taxed from the beginning with higher rates. The same would apply to **non-sustainable**

⁴² Including the use of off-shore bunkering platforms that could be located on the high seas outside the territorial waters of Member States

biofuels, bio liquids and certain solid biomass, following the “RED II” logic and definitions⁴³;

Kerosene used as motor fuel in aviation - which is mandatory exempted in the current ETD - would be taxed in line with the rates applied to transport, by means of a linear yearly increase, to reach in 10 years the minimum rate⁴⁴. The transitional period is justified by the need to ensure a smooth application of a new tax to the aviation sector, taking also into account the effects of the present crisis situation.

LPG and natural gas –which in the current ETD are mostly subject to low or 0 rates-, would have initial applicable rates slightly lower (precisely 2/3) than the (highest) fossil fuel rates, with a linear increase and alignment over a transitional period of 10 years. This takes into account their less polluting impact compared to other fossil fuels (see in this respect e.g. Commission Implementing Regulation (EU) 2018/2066 on the monitoring and reporting of greenhouse gas emissions) and that these fuels have been considered as a sort of ‘transitional’ fuels, i.e. capable to give a contribution to the green transition (in this regard see also the current Directive 2014/94/EU on the deployment of alternative fuels infrastructure -AFID- where both products are included in the definition of alternative fuels for transport).. Analogous considerations would apply to non-renewable hydrogen⁴⁵.

As regards **Renewable Energy Sources (RES)**, their expected overall share in 2030 is below what would be needed to cost-effectively and sustainably achieve 55% reduction in GHG. In this context, sustainable but not advanced biofuels, bioliquids and certain solid biomass, following the logic and definitions of RED II, would be adjusted at ½ of the traditional fossil fuel rate⁴⁶. Currently, Member States report in TEDB diversified fiscal treatments of biofuels, ranging from exemption, to reduction, to full rate. Moreover, fixing the rates at a new common basis would avoid reported State aid issues.

In the last group, for **electricity** a greater direct electrification of end-use sectors has been taken on board as a relevant objective for decarbonisation (as also highlighted in the above-mentioned COM(2020) 562 final and COM(2020) 299 final, Powering a climate-neutral economy: An EU Strategy for Energy System Integration). For **advanced biofuels, bioliquids and biogases** -once again following RED II logic and definitions-, (e-fuels and renewable hydrogen⁴⁷), it has been judged relevant to account for their potential role for decarbonisation, as well as, the fact that they are in pre-commercial phase and deserve support. This is why they deserve a better treatment with the lowest rate;

Member States may continue to set their national taxation rates above the new minima. However, Member States must ensure that the environmental performance and use of each product is reflected in their national tax rate by respecting the ranking between the different rates. This would ensure that better performing energy products and electricity would be taxed less than those with poorer environmental performances avoiding inconsistencies across Member States and the Directive losing its relevance.

⁴³ The RED II defines a series of sustainability and GHG emission criteria that bioliquids used in transport must comply with to be counted towards the overall 14% target and to be eligible for financial support by public authorities. Some of these criteria are the same as in the original RED, while others are new or reformulated. In particular, the RED II introduces sustainability for forestry feedstocks as well as GHG criteria for solid and gaseous biomass fuels.

⁴⁴ The same transitional period would apply to other fuels and electricity potentially used in aviation.

⁴⁵ As well as to non-sustainable biogas.

⁴⁶ Within this category, a linear increase over ten years to reach fossil fuel rates would only apply to sustainable food and feed crop biofuels, bioliquids and biogases, due to their peculiar origin.

⁴⁷ See also COM(2020) 301 final: A hydrogen strategy for a climate-neutral Europe

Member States will maintain the flexibility to determine the differences in rates and will not be required to adopt the same “scaling” that is proposed for the minima. By this, they will retain the flexibility to define their different rates within the “ranking” obligation.

Table 2: Proposed ETD minima under Option 2a in EUR/GJ

| Motor fuels | | | | |
|--|--|--|--|--|
| | Non-indexed | | Indexed | |
| | Start of transitional period (2023) – not indexed | Final rate after completion of transitional period (2023) – not indexed | Start of transitional period (2023)-indexed | Final rate after completion of transitional period (2023) - indexed |
| Petrol | 10,75 | 10,75 | 11,53 | 13,25 |
| Gasoil | 10,75 | 10,75 | 11,53 | 13,25 |
| Kerosene | 10,75 | 10,75 | 11,53 | 13,25 |
| Kerosene (aviation) | 0 | 10,75 | 0,00 | 13,25 |
| LPG | 7,17 | 10,75 | 7,68 | 13,25 |
| Natural gas | 7,17 | 10,75 | 7,68 | 13,25 |
| Non-sustainable Biofuels | 10,75 | 10,75 | 11,53 | 13,25 |
| Sustainable Biofuels (not advanced) | 5,38 | 5,38 | 5,76 | 6,63 |
| Non-renewable hydrogen | 7,17 | 10,75 | 7,68 | 13,25 |
| Heating fuels plus fuels for agriculture, stationary motors, maritime and inland shipping (including fishery) | | | | |
| | Non-indexed | | Indexed | |
| | Start of transitional period (2023) – not indexed | Final rate after completion of transitional period (2023) – not indexed | Start of transitional period (2023)-indexed | Final rate after completion of transitional period (2023) - indexed |
| Gas oil | 0,9 | 0,9 | 0,97 | 1,11 |
| Heavy fuel oil | 0,9 | 0,9 | 0,97 | 1,11 |
| Coal and coke | 0,9 | 0,9 | 0,97 | 1,11 |
| Kerosene | 0,9 | 0,9 | 0,97 | 1,11 |
| LPG | 0,6 | 0,9 | 0,64 | 1,11 |
| Natural gas | 0,6 | 0,9 | 0,64 | 1,11 |
| Non-sustainable biofuels, bioliquids and solid biomass fuels (wood and pellets) | 0,9 | 0,9 | 0,97 | 1,11 |
| Sustainable biofuels, bioliquids and solid biomass fuels ⁴⁸ (wood and pellets) | 0,45 | 0,45 | 0,48 | 0,55 |
| Non-renewable hydrogen | 0,6 | 0,9 | 0,64 | 1,11 |
| Electricity, advanced biofuels, e-fuels and renewable hydrogen (all uses) | | | | |
| | Non-indexed | | Indexed | |
| | Start of transitional period (2023) – not indexed | Final rate after completion of transitional period (2023) – not indexed | Start of transitional period (2023)-indexed | Final rate after completion of transitional period (2023) - indexed |
| Electricity | 0,15 | 0,15 | 0,16 | 0,18 |
| Advanced biofuels | 0,15 | 0,15 | 0,16 | 0,18 |
| Renewable hydrogen | 0,15 | 0,15 | 0,16 | 0,18 |

⁴⁸ For tax implementation and enforcement practicality reasons, solid biomass with an output under 5 MW (e.g. private individual for residential heating) is out of the scope.

Source: European Commission

Table 3: Current and proposed ETD minima for Option 2a in current units

| Motor fuels | | | | |
|--|------------------|---------------------------|---|--|
| | | Current ETD minima | Option 2a | |
| | | | Start of transitional period (2023) -indexed | Final rate after completion of transitional (2033) period - indexed |
| Petrol | EUR/ 1000 litres | 359,0 | 385,4 | 443,2 |
| Gasoil | EUR/ 1000 litres | 330,0 | 419,0 | 481,8 |
| Kerosene | EUR/ 1000 litres | 330,0 | 363,2 | 467,6 |
| Kerosene (aviation) | EUR/ 1000 litres | 0,0 | 0,0 | 467,6 |
| LPG | EUR/ 1000 kg | 125,0 | 162,5 | 280,2 |
| Natural gas | EUR/ GJ | 2,6 | 7,7 | 13,3 |
| Heating fuels | | | | |
| plus fuels for agriculture, stationary motors, maritime and inland shipping (including fishery) | | | | |
| | | Current ETD minima | Option 2a | |
| | | | Start of transitional period (2023) -indexed | Final rate after completion of transitional period (2033)- indexed |
| Gas oil | EUR/ 1000 litres | 21,0 | 35,1 | 40,3 |
| Heavy fuel oil | EUR/ 1000 kg | 15,0 | 36,7 | 42,2 |
| Coal and coke, business | EUR/ GJ | 0,2 | 1,0 | 1,1 |
| Coal and coke, non-business | EUR/ GJ | 0,3 | 1,0 | 1,1 |
| Kerosene business and non-business | EUR/1000 litres | 0,0 | 13,6 | 23,5 |
| Kerosene agriculture and stationary motors | EUR/1000 litres | 21,0 | 34,1 | 39,2 |
| LPG business and non-business | EUR/1000 kg | 0,0 | 13,6 | 23,5 |
| Natural gas business | EUR/ GJ | 0,2 | 0,6 | 1,1 |
| Natural gas non business, agriculture and stationary motors | EUR/ GJ | 0,3 | 0,6 | 1,1 |
| Electricity (all uses) | | | | |
| | | Current ETD minima | Option 2a | |
| | | | Start of transitional period (2023) -indexed | Final rate after completion of transitional period (2033) - indexed |
| Electricity business | EUR/ MWh | 0,50 | 0,58 | 0,67 |
| Electricity non business | EUR/ MWh | 1,00 | 0,58 | 0,67 |

Source: European Commission

In addition, this option would *extend the scope* of the Directive and *remove certain differentiations, reductions and exemptions*, therefore widening the tax base from the first year. The following would be the main areas of intervention:

- Intra-EU flights within the aviation⁴⁹ sector – the mandatory exemption would be removed for this fuel use (see box 4 below)
- Intra-EU maritime and inland shipping⁵⁰ sectors – the mandatory exemption of the maritime sector would be removed and the optional exemption of the inland shipping sector would no longer be possible. On the other hand, considering the increasing number of Member States requiring a derogation for the tax treatment of electricity directly supplied to vessels at berth in a port (“shore-side electricity” (SSE)), a possibility for a differentiated tax treatment (not below the minimum level) would be introduced (see box 4 below)
- Some of the “out of scope” processes, such as the use of energy products for mineralogical as well as metallurgical processes other than dual-use, will move to ‘in scope’
- Industrial tax reliefs – the application of tax reliefs will be more stringent and will be coupled –where applicable- to environmental performance. Full exemption will be no longer be possible and minima for energy intensive industry and other business sectors will be applied
- Lower minimum rates will be applicable on energy products and electricity used in the primary sector with no possibility to benefit from exemptions
- Heating fuels and electricity for households will no longer benefit from rates below the minima, however the possibility for full exemption limited to vulnerable households will be retained
- Solid biomass fuels covered by Combined Nomenclature codes 4401 and 4402 will be included in the scope.⁵¹
- No possibility of differentiation between commercial and non-commercial use of gas oil
- Combined heat and power generation (CHP). The taxation of the share of input to produce heat in CHP generation would be set at not less than the minimum rates for the product used. The taxation of the share of input to produce electricity would follow the general rule for electricity generation (i.e. optional exemption with the possibility for Member States to tax on the grounds of environmental policy)
- Article 9(2) of the ETD, which provides for lower minimum levels of taxation for gas oil used for heating purposes in three Member States, would be abolished

⁴⁹ The exclusion of international flights and possibly cargo flights from the scope is due to air services agreements concluded with certain third countries that do not allow for the taxation of fuels uplifted at EU airports by the carriers of these third countries.

⁵⁰ Refers to a voyage from one EU port to another EU port

⁵¹ For solid biomass used in installations certified equally or above 5 MW. This allows securing state revenue with the growing use of these products since 2003 and taking into account the impact of their combustion on air quality.

Box 4: Aviation, maritime and inland waterway transport

Design of the tax treatment

Under this policy option the use of fuel in aviation, maritime (both transport and fisheries) and inland waterway transport will be taxed at harmonised EU minimum rates as far as intra-EU activities are concerned. The tax on kerosene for aviation will be phased in over a transitional period of 10 years.

In case of aviation, intra-EU activity is defined as a flight from one EU airport to another EU airport whereas in case of maritime and inland waterway transport it is defined as a voyage from one EU port to another EU port. The concept of intra-EU operations would replace the present concept of navigation within EU waters for maritime. For aviation, the exclusion of international flights from the scope of the revised tax is due to legal reasons as air services agreements with some third countries do not allow the taxation of fuel uplifted by the carriers of these third countries at EU airports⁵². Additionally, the tax treatment of intra-EU cargo only flights calls for special attention due to the special privileges granted to some third country and the number of intra-EU cargo-only flights carried out by these carriers⁵³. While similar privileges are also granted to operators from certain third countries for passenger transport; however, for operational reasons (it is often uneconomical to use the same passenger plane for long-range and short-range flights) those privileges have hardly been used.

Taxing fuel for cargo-only flights could affect the competitiveness of EU carriers for two reasons. Firstly, US carriers have a significant market share of in the intra-EU cargo market as under the US-EU Open Skies agreement some US cargo carriers are allowed to fly intra-EU flights without restriction. Secondly, the current exemption of US carriers from the taxation of aviation fuel uplifted in the EU for use in international (including intra-EU) flights does not allow the taxation of fuel uplifted by US carriers in the EU. Therefore it would be proposed that fuel uplifted by cargo-only flights also in intra-EU would be exempted from fuel tax, with a possibility for Member States to tax it on domestic flights or by virtue of bilateral or multilateral agreements between them. This would provide for a certain flexibility, for example in case of renegotiation of air service agreements with third countries allowing the introduction of the fuel tax for this market segment as well.

The rates for the fossil fuel tax for aviation are based on energy content in line with those applied to the road transport sector. In the study referred to in Annex 7 on aviation, the impacts of various sub options of an intra-EU fuel tax, a ticket tax and a combination of a ticket tax and a fuel tax are analysed. In this study, also a legal analysis and various sensitivity analyses are carried out (e.g. on a possible slower recovery of the sector after the COVID-crisis, the introduction of a blending obligation as proposed in the 'ReFuelEU Aviation' initiative and the introduction of fuel tax covering some extra-EU flights to the UK and Morocco⁵⁴). For maritime and inland waterways, it is proposed to tax the fossil fuels as the

⁵² However, a fuel tax could in principle be applied to international flights to those third countries that do not have air services agreements with the EU or with the concerned Member States preventing the taxation of fuel uplifted. In any case, ticket taxes may be an appropriate instrument to be applied to those international flights that would be outside the scope of the fuel tax

⁵³ American carriers enjoy special provisions under the EU-US 'Open Skies' Air Transport Agreement permitting them to carry out hub operations within Europe using all-cargo aircraft permanently station in the EU

⁵⁴ These are third countries for which the implementation of fuel tax is not prohibited by air services agreements.

agriculture sector. The relatively low rate of the tax and the limitation to intra-EU shipping is designed to reduce the economic incentive to purchase fuel outside the EU⁵⁵.

The aviation and the shipping sectors are exposed to different degrees to possible carbon leakage due to tankering or bunkering (whereby fuel is bought outside EU jurisdiction to be used on subsequent intra-EU transport operations). Due to the limited size of the fuel tanks of aircrafts, the opportunities for fuel tankering in aviation are relatively limited⁵⁶ and depend on the distance to the third country concerned and the aircraft used. The risk of carbon leakage by tankering fuel outside the EU is much more significant in the maritime sector. Ships, in particular large ships, are able to undertake long voyages on a single bunkering and can carry additional fuel without significantly sacrificing their carrying capacity⁵⁷. Ships carrying out extra-EU transport operations can avoid uplifting fuel in EU ports as they can simply uplift more fuel in third countries and thereby avoid the EU fuel tax. . According to the modelling done for the impact assessment, intra-EU transport will represent approximately 16% of all fuel use in the waterborne transport sector in 2030⁵⁸.

On the other hand, to be entitled to tax-free bunkering in the EU, vessels would have to justify the need to have access to tax exempt fuel. As an ex-ante conditionality, eligibility for tax-free bunkering would have to be proved by producing the relevant customs documents indicating the next port of call that is located outside the EU. To further strengthen enforcement, ex-post verifications could be carried out based on, for example, the positioning system of the vessels as part of random checks. The rules will be different for fishing vessels in the case of which there are no customs documents to be examined⁵⁹.

Interaction with other EU initiatives to reduce GHG emissions

The taxation of traditional fossil fuels used in the aviation and maritime sectors complement a possible extension of the EU ETS to the maritime sector and the review of ETS for aviation including an increase of the level of auctioned allowances for aviation and the implementation of CORSIA as proposed in the revision of the EU ETS. Taken together, these initiatives would ensure that also these economic sectors contribute to the financing of the general budgets under the ETD, while under ETS revenues are reinvested into low-carbon technologies, and reinforce the carbon price signal and the economic attractiveness of mitigation measures such as the implementation of energy efficiency measures or the switch to renewable and low-carbon fuels. Both measures can be modelled in a similar way, as a carbon price or a fuel tax. It is worth noting, however, that the price signal resulting from the options considered for application of ETS and CORSIA to aviation emissions are expected to be lower than the impact of the proposed fuel tax in the aviation sector. On the contrary, in the maritime sector, the possible ETS extension would lead to a much stronger carbon price signal in comparison to the proposed fuel tax on bunker fuel.

The taxation of traditional fossil fuels used in these sectors is also coherent with the logic of the ‘ReFuelEU Aviation’ initiative aimed at boosting the production and uptake of sustainable aviation fuels in the air transport sector and the ‘FuelEU Maritime’ initiative aimed at

⁵⁵ Including the use of off-shore bunkering platforms that could be located on the high seas outside the territorial waters of Member States

⁵⁶ <https://www.eurocontrol.int/publication/fuel-tankering-european-skies-economic-benefits-and-environmental-impact>

The study estimated that full tankering could potentially be performed on 16.5% of the examined European flights, whereas partial tankering could be performed on further 4.5% of flights.

⁵⁷ https://ec.europa.eu/clima/sites/clima/files/transport/shipping/docs/ghg_maritime_report_en.pdf

⁵⁸ This includes both intra-EU maritime and inland waterways transport.

⁵⁹ As fishing vessels return to their home ports located in the EU, their activities will be considered intra-EU for the purpose of this Directive.

increasing the demand of renewable and low-carbon fuels in the maritime transport sector. As the sustainable and low carbon fuels promoted by these initiatives would be taxed at lower rates under the ETD, the gap between the total costs of traditional and sustainable fuels would narrow down over time and the cost of fuel switching would be reduced⁶⁰.

As regards the agriculture sector, the current ETD provides for differentiated and lower minima for motor fuels for certain uses, including agricultural, horticultural and piscicultural works, and forestry. The proposed rates are based on the envisaged need to align those minima and the ones for heating fuels in order to provide for a generally consistent treatment. Moreover, the proposed revision envisages the overall need to respect the applicable minima, leading to the removal of the -currently allowed- possible reduction down to zero for energy products and electricity used in the primary sector.

Finally, the option will **increase legal certainty** for all stakeholders:

- To address the risk of fraud and improve the legal certainty, an update or a revision of the list of energy products subject to control and movement provisions may prove necessary (e.g. for lubricating oils)
- Provisions regarding energy storage will ensure that the possible double taxation of electricity, which is stored for consumption at a later stage, is avoided.

This option includes a ***transitional period of ten years*** (2023-2033) for ***certain categories of products and uses*** to provide stakeholders with a clear price signal trend for the next years in order to adapt investments and technologies. Some relevant examples are:

- The tax on LPG, natural gas and non-renewable hydrogen for both motor and heating use would gradually reach the rate of fossil fuels
- Kerosene tax for the aviation sector will be gradually increased in a linear way to the corresponding minimum tax rates applicable to motor fuels used for road transport .
- A zero rate for advanced biofuels and e-fuels used in aviation will be applied for a limited period. This contributes to the uptake these types of fuels until their production is scaled up.
- The minimum rates for heating fuels for household use will be gradually increased during this period, as described in option 1.

Furthermore, proposing to introduce immediately the three categories with high rates for some traditional energy products could have negative impacts. This transitional period, among others, allows the development of electrification and advanced fuels, which are still in a pre-commercial phase.

⁶⁰ In due course, the costs of some sustainable fuels could even be lower than the costs of the fossil fuels. . The impact on the cost of sustainable fuels could not be modelled. Instead, the assumptions of the Refuel Aviation study on the costs of sustainable aviation fuels have been used for this study.

Figure 8: Simplified representation of changes in ETD indexed minima 2023-2030



Source: European Commission

Two thirds of the respondents to the public consultation from businesses and from public authorities as well as 45% of the respondents from civil society consider relevant an energy tax based on energy content. Moreover, more than 90% of all types of respondents consider that the ETD revision should introduce incentives for alternative energy sources (e.g. sustainable biofuels, clean hydrogen) and reduce the possibility of favouring fossil fuels via tax reductions, exemptions and rebates⁶¹

A vast majority of citizens and civil society respondents but only a small minority of businesses and public authorities indicated that no exceptions should be granted to agriculture, forestry and fishery.

Overall, the public consultation revealed some support to equalising the taxes for different transport modes so that they can compete on a level playing field.

About one third of businesses and more than half of the other stakeholders support the taxation of the intra-EU flights and of the maritime sector based on standard energy tax rules for motor fuels.

⁶¹ 65% of businesses support the reduction of the possibility to favour fossil fuels

While a vast majority of all types of respondents to the public consultation would prefer a legal obligation to use Shore Side Electricity when available, a differentiated tax treatment for SSE is supported by 40% of businesses.

Almost all citizens, more than 70% of civil society and public authorities and half of the businesses support the removal of the differentiation between commercial and non-commercial use of gas oil in road transport.

Two thirds of citizens and half of civil society respondents to the public consultation consider the Industry sector should not be exempted; however only a bit more than 10% of public authorities and of businesses agree with the removal of this exemption.

About half of the citizens and civil society respondents to the public consultation support the removal of tax exemption or reduction to Combined Heat Power but more than 85% of businesses and public authorities respondents disagree.

Option 2b: Energy content option with a shorter transitional period of 7 years

This option includes the same elements of option 2a but with a reduced transitional period until 2030. This impact assessment assumes a period of 7 years (2023-2030).

With the 2030 Climate Target Plan, the Commission proposes to raise the EU's ambition on reducing greenhouse gas emissions to at least 55% below 1990 levels by 2030. Taxation should also contribute to this objective. Reducing the transitional period to 2030 would ensure that the review of the ETD can deliver its objectives at the same time as the rest of the other initiatives of the “Fit for 55 Package”.

Accordingly, the option analyses a shorter transition period and the potential increased benefits by 2030, while taking into account the social and economic effects on users and consumers.

Option 2c: Energy content Option and pollution component

The option is based on option 2a with an additional explicit tax rate for air pollution. The calculation of this additional component is based on a low-end value of the external cost of air pollution due to the consumption of energy products. (See Annex 6 for further details).

This value would be incorporated in the minimum tax rates as set out in option 2a. While this pollution component would not be indexed, it would be revised at least every 5 years in order to take into account the evolution of technology in combustion and filtering systems as well as the evolution of air pollutant emissions in the EU.

It should be noted that the highest increase in the minima would correspond to coal and coke and to biomass (without differentiating between sustainable or non-sustainable) mainly used as fuels for stationary motors and/or heating in absolute and relative terms.

Table 4: Proposed ETD minima including the pollution component in EUR/GJ

| | Rate energy component option 2a at the start of transitional period (2023) – not indexed | Rate Air Pollution component | Full rate option 2c at the start of transitional period (2023) – not indexed |
|--|--|------------------------------|--|
| Motor fuels | | | |
| Petrol | 10,75 | 0,23 | 10,98 |
| Gasoil | 10,75 | 0,55 | 11,30 |
| Kerosene (aviation, by the end of the transitional period) | 10,75 | 0,05 | 10,80 |
| LPG | 7,17 | 0,19 | 7,36 |
| Bioethanol E100 | 5,38 | 0,35 | 5,73 |
| Biodiesel B100 | 5,38 | 0,83 | 6,21 |
| Heating fuels plus fuels for agriculture, stationary motors, maritime and inland shipping (including fishery) | | | |
| Gasoil | 0,90 | 0,37 | 1,27 |
| Heavy fuel oil | 0,90 | 0,37 | 1,27 |
| Coal and coke | 0,90 | 7,41 | 8,31 |
| Kerosene | 0,90 | 0,37 | 1,27 |
| LPG | 0,60 | 0,37 | 0,97 |
| Natural gas | 0,60 | 0,32 | 0,92 |
| Non-sustainable biofuels and bioliquids | 0,90 | (*) | 0,90 + (*) |
| Non-sustainable solid biomass fuels (wood and pellets) | 0,90 | 7,40 | 8,30 |
| Sustainable biofuels and bioliquids | 0,45 | (*) | 0,45 + (*) |
| Sustainable biomass fuels (wood and pellets), including consumers with an input under 20 MW ⁴⁸ | 0,45 | 7,40 | 7,85 |

(*) same as the equivalent fossil fuel; e.g. the rate of the air pollution component for biodiesel is 0,37 €/GJ

Source: European Commission

Option 3: “Carbon content” Option (3a, 3b and 3c)

This option introduces taxation based on carbon content of energy products, to the sectors which are currently not covered by the ETS⁶² (basically the transport and building sectors), in addition to the rates based on the energy content presented in option 2a and 2b. However, it should be recalled that the EGD has announced that the Commission will consider the possibility of extending the ETS to emissions from road transport, the maritime sector and buildings.

The introduction of this carbon content component in the ETD would be a form of explicit carbon pricing directly linked to the level of carbon emissions. This option provides an additional relative advantage to clean products, such as renewable hydrogen, advanced biofuels and electricity, as they have low or zero carbon content. The introduction of a carbon content also differentiates among various fossil fuels, such as less CO₂ intensive natural gas and more CO₂ intensive coal.

⁶² Aviation would therefore be exempt from the CO₂ component as intra-EEA aviation is covered by the ETS but maritime and inland shipping would not be exempt as long as these sectors are not covered by the ETS.

Since the EU harmonised carbon price is the ETS, the value for the carbon content should be linked to its price. This value would also have to be adjusted regularly to ensure it remains relevant and pegged to the evolution of the ETS over time.

The value of the carbon content component from the introduction of the reviewed rules in the ETD should reflect the level of the price of ETS at that moment. For the purposes of this impact assessment, the carbon content rates have been applied as follows: 30 EUR per tonne of CO₂ in 2020, 35 EUR in 2025, 40 EUR in 2030 and 45 EUR in 2035. These values approximate the present and expected future market price of the EU ETS similar to the other impact assessment of the “Fit for 55 Package”. These values take into account the fact that the effective cost in the EU ETS is lower if free allocation of allowances to many ETS sectors are also considered. These values will operate as a minimum rate to be added to the energy content component.

In option 3a a transitional period of 10 years is applied to the taxation of intra-EU aviation, as well as to heating fuels, whereas in option 3b a transitional period of seven years is considered. Finally, option 3c introduces a pollution component in an analogous way to option 2c. As option 2a and 2b, options 3a and 3b will also bring positive effects on air pollution emissions following the increase in taxation of the more air pollutant products with the additional introduction of the carbon content element.

Table 5: Tax rates with carbon content

| | Energy component rate (EUR/GJ) Not indexed | CO2 tax rate (EUR/tCO2) in 2030 | Fuel emission factor (tCO2/GJ) | Carbon component (EUR/GJ) | Total minimum rate (energy + carbon component) (EUR/GJ) Not indexed | Total minimum rate at start of end of transition period (energy + carbon component) (2033 EUR/GJ) |
|--|--|---------------------------------|--------------------------------|---------------------------|---|---|
| Motor fuels | | | | | | |
| Petrol | 10,75 | 40 | 0,07 | 2,80 | 13,55 | 16,05 |
| Gasoil | 10,75 | 40 | 0,07 | 2,80 | 13,55 | 16,05 |
| Kerosene (aviation) | 0 | 40 | 0,07 | 2,80 | 2,80 | 2,80 |
| LPG | 7,17 | 40 | 0,06 | 2,40 | 9,57 | 11,24 |
| Natural Gas | 7,17 | 40 | 0,06 | 2,40 | 9,57 | 11,24 |
| Sustainable biofuels | 5,38 | 40 | 0 | 0,00 | 5,38 | 6,63 |
| Non- Sustainable Biofuels | 10,75 | 40 | eq. fossil alternative | eq. fossil alternative | eq. fossil alternative | eq. fossil alternative |
| Heating fuels plus fuels for agriculture, stationary motors, maritime and inland shipping (including fishery) | | | | | | |
| Gasoil | 0,9 | 40 | 0,07 | 2,80 | 3,70 | 3,91 |
| Heavy fuel oil | 0,9 | 40 | 0,08 | 3,20 | 4,10 | 4,31 |
| Coal and cokes | 0,9 | 40 | 0,09 | 3,60 | 4,50 | 4,71 |
| Kerosene | 0,9 | 40 | 0,07 | 2,80 | 3,70 | 3,91 |
| LPG | 0,9 | 40 | 0,07 | 2,80 | 3,70 | 3,91 |
| Natural Gas | 0,9 | 40 | 0,06 | 2,40 | 3,30 | 3,51 |
| Non-sustainable biofuels, bioliquids and solid biomass fuels (wood and pellets) | 0,9 | 40 | 0 | 0,00 | 0,90 | 1,11 |
| Sustainable biofuels, bioliquids and solid biomass ⁴⁸ fuels (wood and pellets) | 0,45 | 40 | 0 | 0,00 | 0,45 | 0,55 |

| Electricity, advanced biofuels and renewable hydrogen (all uses) | | | | | | |
|--|------|----|---|------|------|------|
| Electricity | 0,15 | 40 | 0 | 0,00 | 0,15 | 0,18 |
| Advanced biofuels | 0,15 | 40 | 0 | 0,00 | 0,15 | 0,18 |
| Renewable hydrogen | 0,15 | 40 | 0 | 0,00 | 0,15 | 0,18 |

Source: European Commission

5.3 Options discarded at an early stage

Option with rates based on energy content but without changes in the taxable base

This option would have included the same definition of rates as under option 2 and the same definition of the taxable base as in option 1. While such an option would have a more limited impact on the productive sectors, this would be at the expense of the main objective of the ETD under the EGD, namely to reduce fossil fuel dependency. Moreover, this option would not solve the one of the main problems detected in the evaluation, namely the puzzle of different and uneven national implementations due to use of reductions and exemptions. Finally, an option mainly based on revised rates would impose a disproportional burden to the Member States whose national rates are currently lower without incentivising changes for the other Member States.

Option with tax differentiation according to the source of electricity

This option would have included the differentiation of taxation of electricity according to its source. Electricity of renewable origin would have been taxed at a lower or zero rate. Due consideration was given to this option. Ultimately, in line with the Better Regulation Guidelines, it was discarded on the basis that the option lacks technical feasibility as there is no EU-wide functioning guarantee of origin system in place. Differentiated tax treatment would need to rely on a robust certification system that is not given. While tax differentiation based on origin of electricity is not proposed to become mandatory under harmonised EU legislation, all options of this Impact Assessment retain the current possibility to apply such differentiation on the national level. It remains at the discretion of Member States to apply optional tax reliefs to renewable electricity in accordance with Article 15(1)(b) of the Directive.

6. WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

This section gives an overview of the main impacts of the options considered under the revision of the ETD by comparing them to the baseline – the latter described in detail under Section 6.1. The analysis is based primarily on the JRC-GEM-E3 model, supplemented with input from the EUROMOD and DG ECFIN's E-QUEST models, the specifications of which are discussed in Annex 4.

Various alternative modelling assumptions were explored with the JRC-GEM-E3 model. For the purposes of this analysis, the focus is on the results based on budget neutrality, where government budgets are held fixed to baseline values in relative to GDP. All additional revenue from the changes in ETD are provided as lump-sums to households⁶³. Moreover,

⁶³ Budget neutrality is a common assumption in many CGE modelling assessments of indirect taxation. While the main results presented focus on lump-sums to households, alternative model closures were explored in the JRC-GEM-E3 modelling most notably labour tax recycling. The results were consistent with the results received on alternative recycling scenarios explored under the E-QUEST model. More specifically CO₂ emissions and tax revenue show little differentiation by the choice of lump sum / labour tax recycling. At the same time labour tax

modeling with the JRC-GEM-E3 further assumes imperfect labour markets, namely wages are held fixed allowing for unemployment to adjust after the policy shock.

The JRC-GEM-E3 model, like all CGE models, can consider technological changes and appliances/equipment substitution only in an aggregated way. Therefore, product substitution is not fully captured in the results. In particular, the model does not capture the treatment of advanced biofuels and hydrogen. Not covering these products may imply that the impact of the proposed tax changes on climate variables is underestimated whereas the macro economic impact (as driven by changes in demand) could be overestimated.

Moreover, the model does not consider substitution between petrol and diesel, which may lead to an overestimation of additional tax revenue as a result of the tax changes. Nevertheless, the model allows for product substitution between aggregate fuels: oil, gas, coal and electricity. The results overall confirm that the outcome is in the expected direction, as a result the proposed policies.

Nevertheless, advanced biofuels, hydrogen and e-fuels are considered in the revision of Directive, as they may play a significant role in a decarbonised transport sector in the long run. Currently, the share of these fuels in transport is negligible, and it seems unlikely that the proposed revisions of the ETD alone would suffice to ensure a technological breakthrough in a time horizon of 10 years or less. In combination with other policies, however, the importance of these fuels in the fuel mix could increase over time. If this materialises over the next decade, the results of this impact assessment may -as noted before- overestimate the role of a reduction of activity (e.g. number of flights) as a response to higher energy taxation. Hence real-world GDP impacts could be lower than the ones presented in our assessment.

Concerning fossil fuels, the proposed Options 2 and 3 raise the minimum excise tax rate on diesel to the level of petrol. As a consequence, one might anticipate behavioural responses along four main channels. First, a shift from diesel to petrol. Second, a shift to electricity. Third enhanced energy efficiency (e.g. through modernisation of the vehicle fleet). And finally, activity reduction. The modelling does not capture the first channel, and this caveat may introduce a bias in the results in terms of air pollutant emissions. To a lesser extent, this could also affect estimates of tax revenue and emissions of CO₂, although the assumption of fixed diesel/petrol shares will overestimate the cost increase and the corresponding activity reduction, such that the sign of the overall bias is unclear a priori. Furthermore, for tax revenue estimates, the shift from diesel to petrol would not be particularly relevant, since the proposal includes an equalisation of tax rates across both fuels.

In the assessment of the impacts, coherence with other ‘Fit for 55’ proposals is ensured by placing the quantitative analysis of the different ETD options against the same baseline with all other proposals, namely the EU Reference Scenario (REF)⁶⁴. This ensures that the basic assumptions underlying all modeling scenarios are consistent with other proposals and that in the simulations performed only the impact of the proposed changes of the ETD is accounted for.

recycling, can mitigate the already limited GDP losses that arise under lump sum recycling. Moreover, using additional tax revenue to stimulate employment, in this case modelled as lower taxes on labour, and related social investments to support a smooth functioning of the labour market can limit up to nearly three quarters of the job losses experienced under lump sum recycling.

⁶⁴ Alternative pathways to achieve 55% emission reductions by 2030 such as the so called MIX scenario are not explored in this impact assessment’. The MIX scenario as stipulated in the Climate Target Plan includes the extension of ETS to transport and building sectors. As such, the MIX scenario would have been incompatible with the ETD Option 3.

In addition to the above, specifically for the proposal on extension of ETS to transport and buildings, coherence is safeguarded by ensuring that in the modeling of option 3, the CO2 component is not applied to any of the current ETS sectors. In this context, the analysis recognizes that the CO2 component of option 3 cannot coexist with ETS in any sector. Therefore, application of the carbon component in this option is strictly limited to sectors currently not covered by the ETS. This eliminates the potential for any overlap between the two. For all other options the proposed changes in fuel taxes can fully coexist (and in fact reinforce) the ETS.

The options considered include the main options discussed in Section 5 including variations as regards to transitional periods.

Table 6: Options considered in the modelling exercise

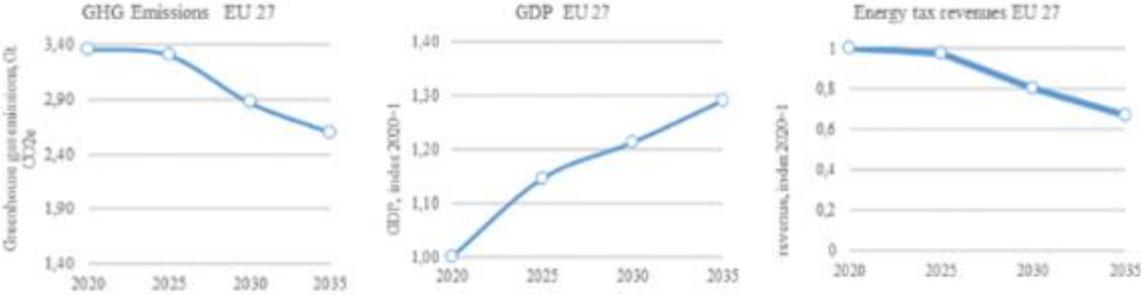
| Scenario | Specifications |
|------------------|--|
| Option 0 | Baseline scenario |
| Option 1 | “Minimalistic” Option |
| Option 2a | “Energy content” Option with 10 year transitional period |
| Option 2b | “Energy content” Option with 7 year transitional period |
| Option 2c | “Energy content” Option with 10 year transitional period and pollution |
| Option 3a | “Carbon content” Option with 10 year transitional period |
| Option 3b | “Carbon content” Option with 7 year transitional period |
| Option 3c | “Carbon content” Option with 10 year transitional period and pollution |

The discussion on impacts presented below provides results for all options and their variations.

6.1 Baseline

The baseline represents a projected evolution of the EU economy based on agreed energy and climate policies. As discussed in section 5.1, energy consumption and emissions are aligned with the aligned with the new EU REF, which includes the National Energy and Climate Plans of Member States.

Figure 9: Evolution of GHG emissions, GDP and energy tax revenues in the baseline with fixed nominal energy tax rates

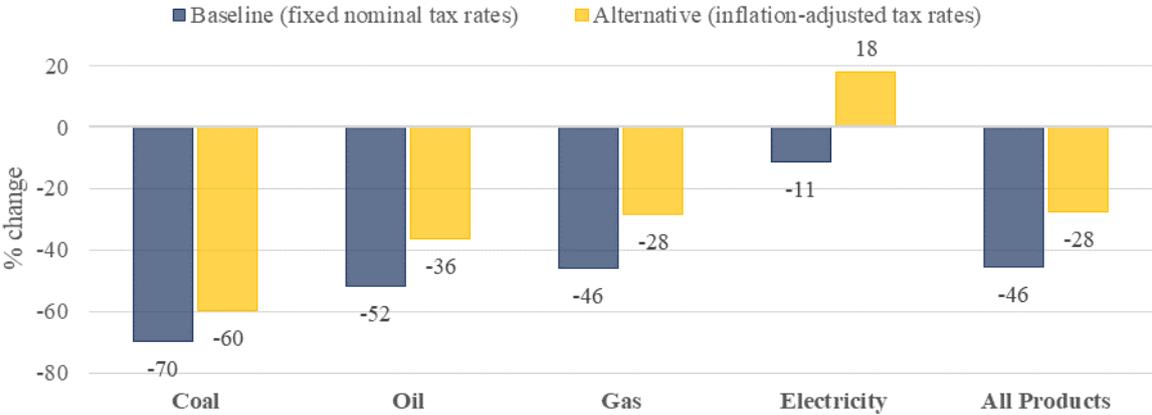


Source: JRC-GEM-E3

Despite a drop in economic activity in 2020 linked to the pandemic, the baseline projects sustained economic growth over the 2020-2035 period. Revenues from energy taxation, however, are projected to drop substantially in the baseline (c. -32% between 2020 and 2035). This is driven by two main factors, namely the projected evolution of the energy system under existing climate and energy policies and the assumption of fixed nominal excise tax rates. The decrease of tax revenues under the current climate and energy policies is noteworthy on its own, and merits attention in view of the relative stability that have characterized them over the last two decades. The baseline is based on stylized assumptions and does not consider possible increases in tax rates by Member States to react to a drop of revenues as they have done in the last twenty years to ensure a stability with the revenues.

The figure below provides more insight into this trend by breaking down tax revenues by energy products. The chart serves to illustrate two key effects: enhanced energy efficiency (all Products) and fuel shifting (stronger decrease in fossil fuel-related tax revenue while the dependency on electricity will go up) over the period 2020-2035. A simple calculation with a hypothetical alternative baseline (yellow bars), assuming fixed excise duty rates in real terms (inflation-adjusted), shows that revenues from energy excise duties would still drop significantly compared to 2015 levels even if rates applied in the Member States were to be adjusted upward to correct for inflation. Nearly two thirds of the projected drop in energy tax revenues can be attributed to the expected evolution of the energy system.

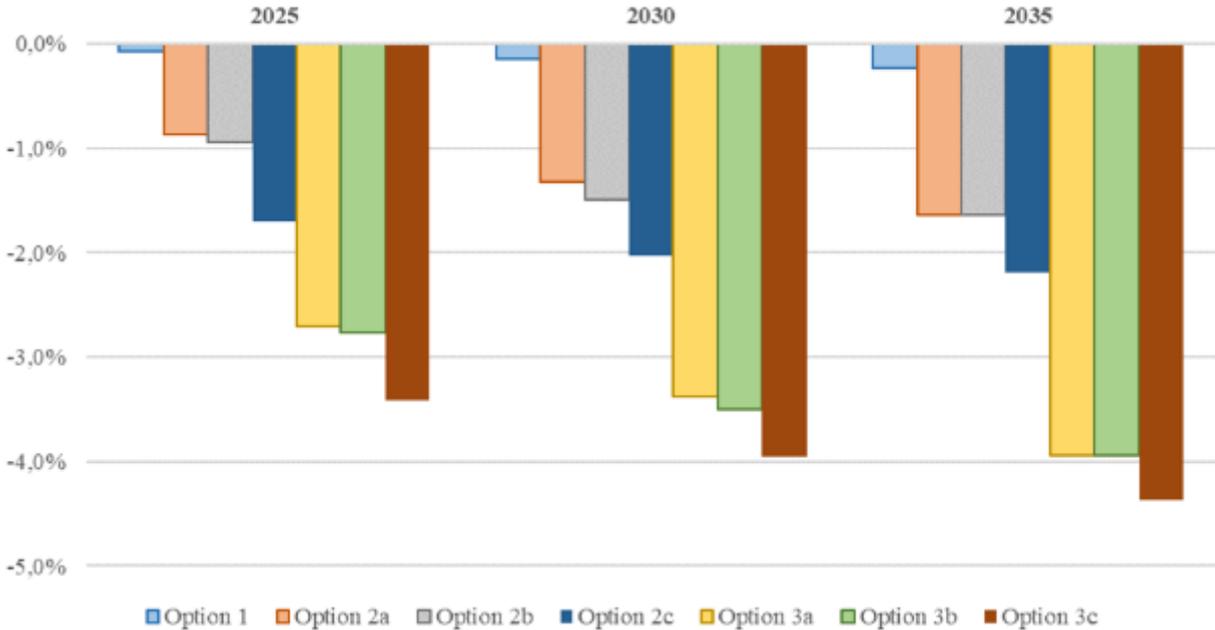
Figure 10: Comparison of change in tax revenue for EU 27 in 2035 relative to 2015 under alternative assumptions (fixed nominal rates and inflation adjusted)



Source: JRC-GEM-E3

6.2 Impact on environment: GHG and air pollutant emissions

Figure 11: Change in EU 27 GHG emissions (% change from baseline)



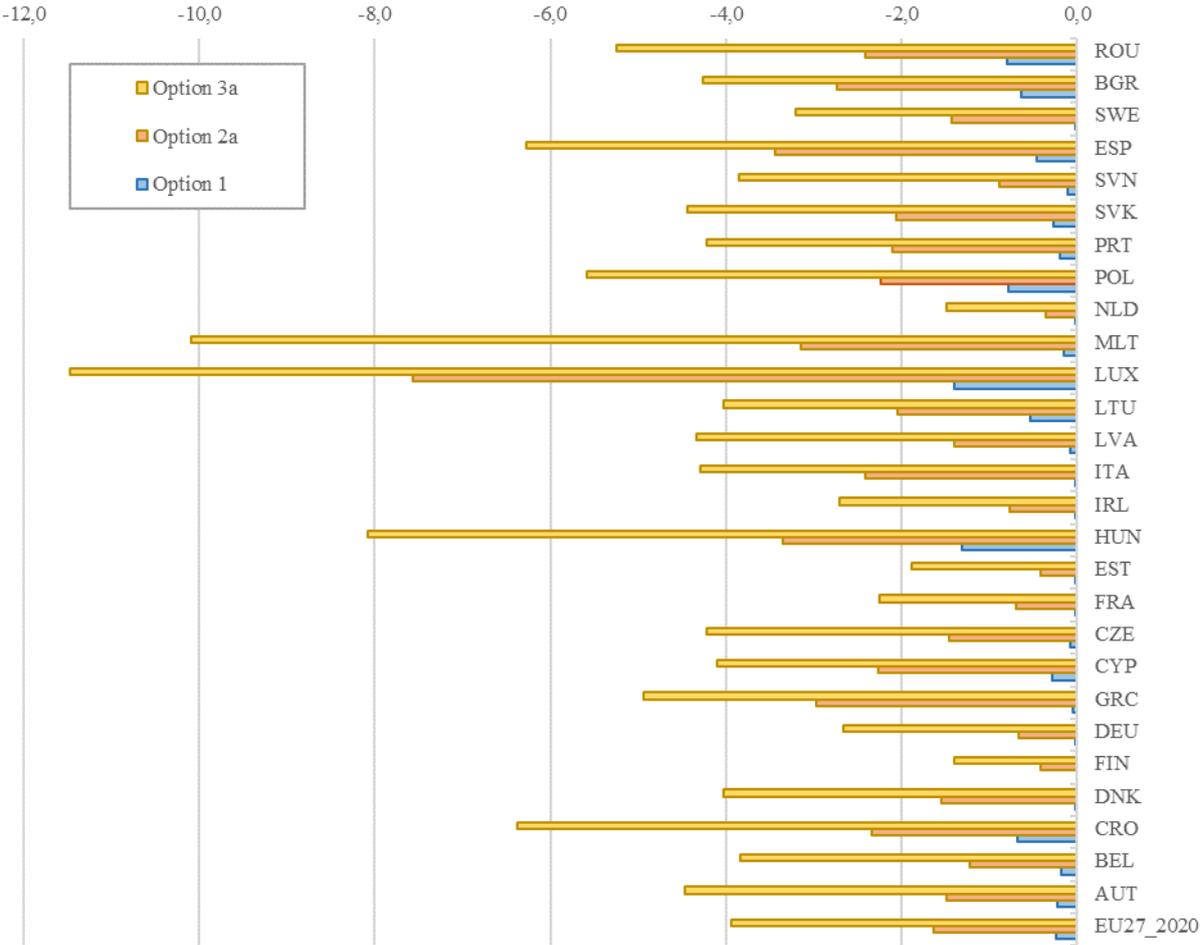
Source: JRC-GEM-E3

The proposed changes under the options considered clearly have the expected positive, albeit small in the case of option 1, impact on the reduction of GHG emissions. These results illustrate that the proposed tax reforms contribute to the objectives of the Green Deal. The results show that the scenarios will have a positive impact in this respect, due to the decrease in fossil fuel support, even when a CO₂ component is not yet introduced in the proposed tax design.

The limited impact of option 1 is mostly the result of the indexation of rates in volumes' terms and the limitation imposed on Member States to set rates below the minima. By the end of the transitional period (2035), of the central option (Options 2a and 2b) the impact on GHG emissions is estimated to be more than seven times higher than the impact of the minimalistic option. The impact on GHG emissions is noticeable under the central option, considering the increase and wide restructuring of the tax rates, along with the broadening of the taxable base in this scenario.

When a CO₂ component is introduced (Options 3a and 3b) the positive impact on GHG emission more than doubles the impact observed under option 2. This is obviously, because this option adds an explicit CO₂ price on top of option 2, which already includes a remarkable reduction of fossil fuel incentives. The relative contribution towards GHG reduction differs noticeably among Member States, largely depending on the starting point of their energy tax design.

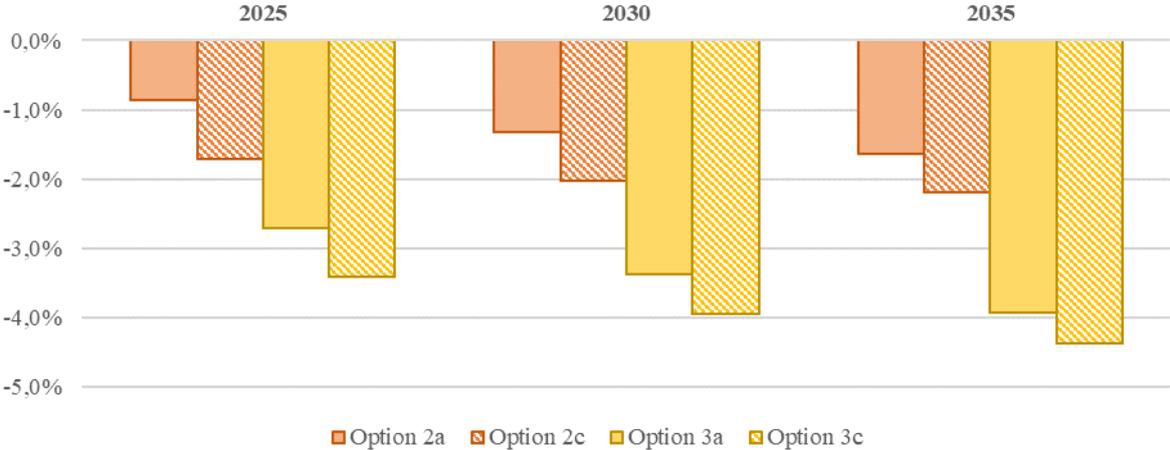
Figure 12: Change in GHG emissions by Member States compared to the baseline in 2035 (in percentage)



Source: JRC-GEM-E3

In the case of the minimalistic option (Option 1), the main driver of the impact is the increase in the minimum rates following their indexation, which will impact notably those Member States whose current national rates are fixed or close to the minima in the ETD. In the case of the central option (all variants of Option 2), the drivers of the impacts are deeper and more wide spread among Member States, considering, as mentioned earlier, the increase of the tax rates and wide broadening of the taxable base. In the case of the CO2 option (all variants of Option 3), the distributional impact among Member States is similar to the one observed under Option 2. Adding the air pollution component results in a stronger reduction in CO2 emissions as illustrated in Figure 13 below.

Figure 13: Change in EU 27 GHG emissions following the introduction of air pollution component compared to baseline

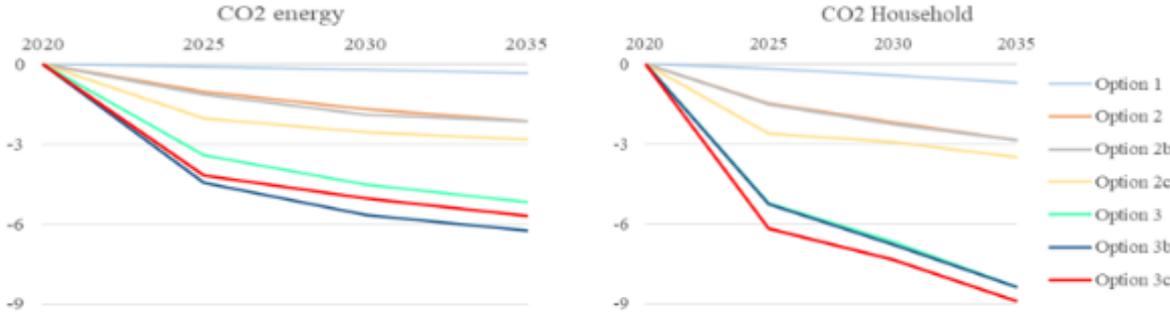


Source: JRC-GEM-E3

Comparing the CO2 emissions reduction by users, the figure below illustrates the contribution by households in relation to productive sectors. In all options, the main contribution to CO2 reduction appears to come from changes in demand by the household sector. However, under options 2 and 3 there is a noticeable increase in the effort made also by the productive sector. While households remain the biggest contributor, the increase in rates and wide broadening of the tax base under these options (Option 2 and 3) result relative greater contributions by the energy and process industries.

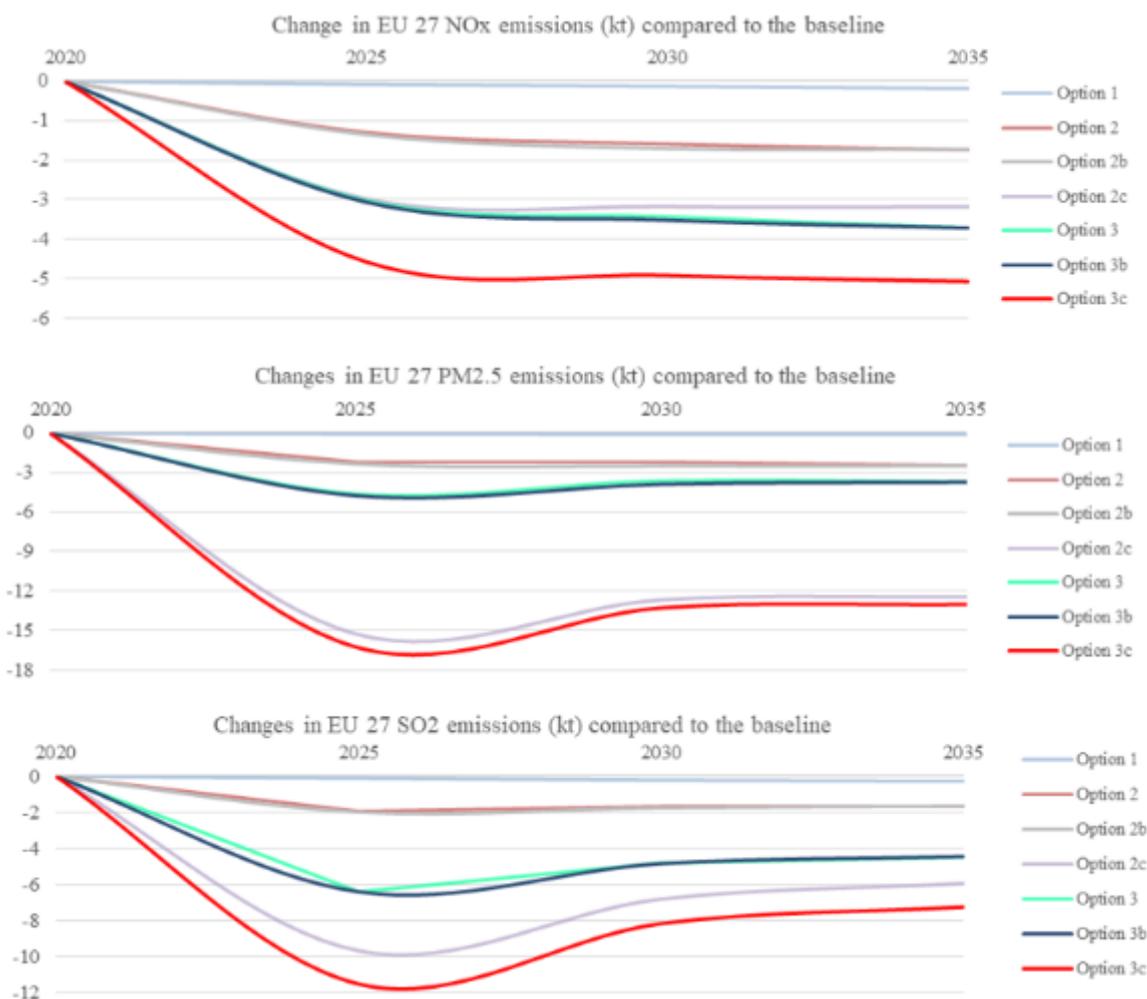
With the introduction of the air pollution component (Options 2c and 3c), CO2 emissions from energy in the EU27 aggregate are around 1% lower relative to Option 2 and 3 respectively. It is interesting to highlight that adding the air pollution component to Option 2 (i.e. **Option 2c**) results in a stronger carbon emissions reduction compared to when we add the air pollution component to Option 3, under Option 3c. This is explained by the fact that the inclusion of the carbon tax for the sectors outside the ETS already have a larger effect on the emissions of those gases. However, in absolute terms, the highest GHG (and air pollution) reduction compared to baseline is obtained under option 3c, which includes both the carbon content and the air pollutant component.

Figure 14: Changes in EU 27 CO2 emissions by users compared to baseline (in percentage)



Turning to impact on other pollutants, the analysis focused on the effects on NOx, PM 2.5 and SO2 emissions (aka here as “air pollution”). Figure 15 below illustrates the impact on the emissions of these gases by options until 2035. As indicated, only option 1 appears to have very negligible impact on the pollutant emissions. This is clearly due to the lack of significant changes in the levels and structure of tax rates along with a small impact on the taxable base. Option 2 has a noticeable impact on the reduction of all pollutants, even when a specific pollutant component is not added to the minimum tax rates. In fact, the increase and wide restructuring of the tax rates and broadening of the taxable base, clearly result in a behavioural change that reduces the use of more pollutant energy products. The introduction of a CO2 component (Option 3) has a relative limited additional impact on pollution reduction. As expected, when a pollution component is introduced (Options 2c and 3c) we observe a significant impact on pollution emission reductions – mostly noticed in 2025 if compared with 2035 in particular for PM 2.5 and SO2 emissions.

Figure 15: Changes in different pollutants compared to the baseline (in percentage)

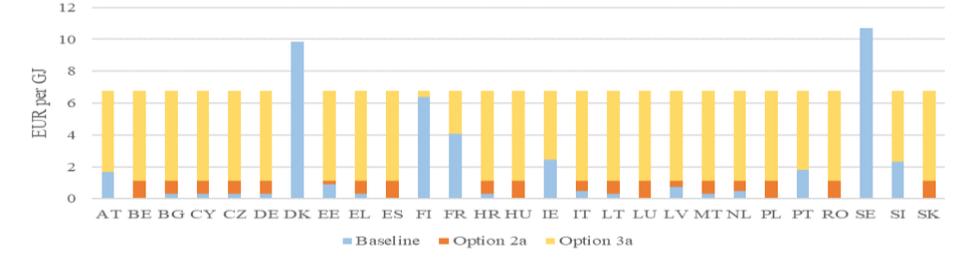


6.3 Impact on the internal market

The introduction of the new minima will contribute to greater convergence of tax rates across Member States. It should be noted again that all options are modelled on the hypothesis that only national rates that are below the new minima are increased to ensure alignment with the new minima. National rates that are already above the new and higher minima are kept at their present level. The following graphs illustrate the impacts of the proposed options on the effective tax rates applied to different users, uses and energy products (e.g. Households, Heating, Natural Gas). The baseline reflects how effective rates would look by 2035 in each Member State on the assumption that no change would be introduced, while the add-ons reflect the required increase to respect the new minima set by the revised ETD. The presented rates encompass both changes in rates and volumes of energy consumption. This was required by the need to illustrate the expected changes in effective rates in a comparative way across all Member States. Illustrating volumes separately would limit the possibility of cross-country comparisons.

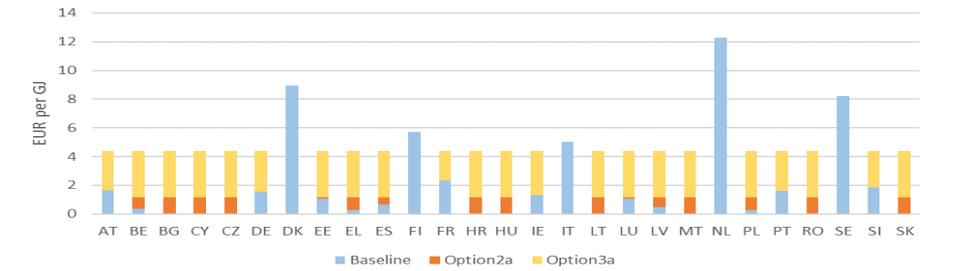
Starting with the effective tax rates applied to the **household sector for heating and transport**, it is evident that the “new” minima, both for option 2 and 3, would imply a strong convergence of rates as most of the effective national rates are at present below the new minima. This converging impact (to higher levels) is evident for coal and coke, as well as, for natural gas. Logically, the necessary increase due to the inclusion of a CO2 component would be higher than the increase observed for Option 2. Based on this analysis, it appears that, ceteris paribus eight Member States would by 2035 have effective rates higher than the new effective minima. As far as natural gas is concerned, eleven Member States are found by 2035 to have effective rates higher than the new effective minima for option 2. The following figures also show that a large number of Member States benefit from the present possibilities to tax below the minima and therefore apply a zero rate.

Figure 16: Tax rates by 2035 – Households, Heating, Coal and coke



Source: JRC

Figure 17: Tax rates by 2035 – Households, Heating, Natural gas

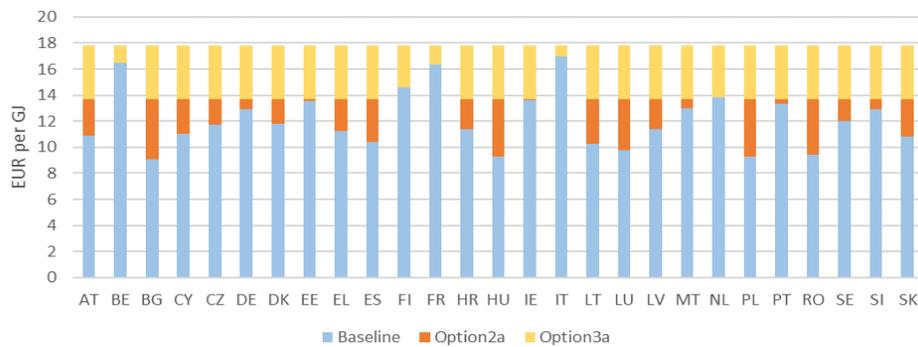


Source: JRC

In relation to fuels used by **households for transport use**, here again, the strong converging impact of options 2 and 3 is evident, both for gas oil and LPG. Considering the proposed minimum rates, the LPG product observes the highest converging value to higher level. In the case of gas oil five Member State are found, ceteris paribus, to have effective tax rates by 2035 higher than the new minima only for Option 2. Contrary to heating use, in this case the higher relative increase in rates is due to Options 2 features (especially energy content) and less to the CO2 component.

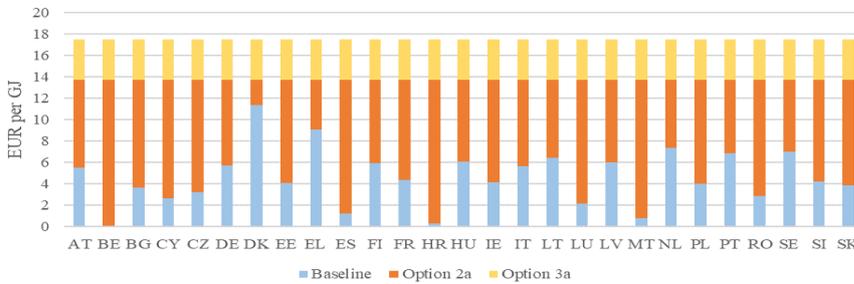
Overall, the increased taxation levels pushes to a convergence of national rates for all the situations as can be observed in the graphs.

Figure 18: Tax rates by 2035 – Households, Motor, Gasoil



Source: JRC

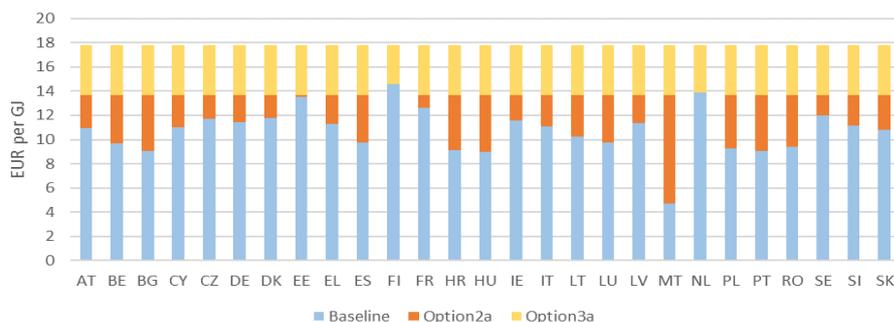
Figure 19: Tax rates by 2035 – Households, Motor, LPG



Source: JRC

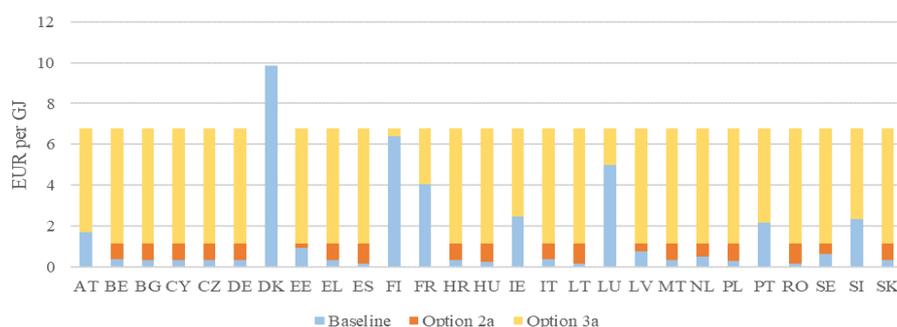
Turning to **manufacturing and commercial sectors**, in general the graphs below show that the proposed options 2 and 3 will also have an impact on the productive sectors albeit at a lower degree than the household sector. Here again, the converging impact is evident in all the situations presented. Overall, the graphs show that option 2 already has an important converging effect by increasing the taxation in almost all Member States.

Figure 20: Tax rates by 2035 – Commercial haulage, Gasoil



Source: JRC

Figure 21: Tax rates by 2035 – Industries other than ETS, Coal and coke



Source: JRC

6.4 Impact on energy tax revenues

As presented in section 6.1, revenues are projected to decrease substantially in the baseline mainly due to the expected evolution of the energy system with a decreasing dependency on fuels thanks to energy savings and a shift from fossil fuels as well as the assumption of fixed nominal rates. It is to be noted again that preserving the capacity to generate revenues for the budgets of the Member States, as it is the case now, is another element to take into due account. While it is not an objective of the review of ETD to ensure the same level of revenues in the coming years, there is some merit in providing insight into how different options fare in compensating to the revenue loss projected in the baseline.

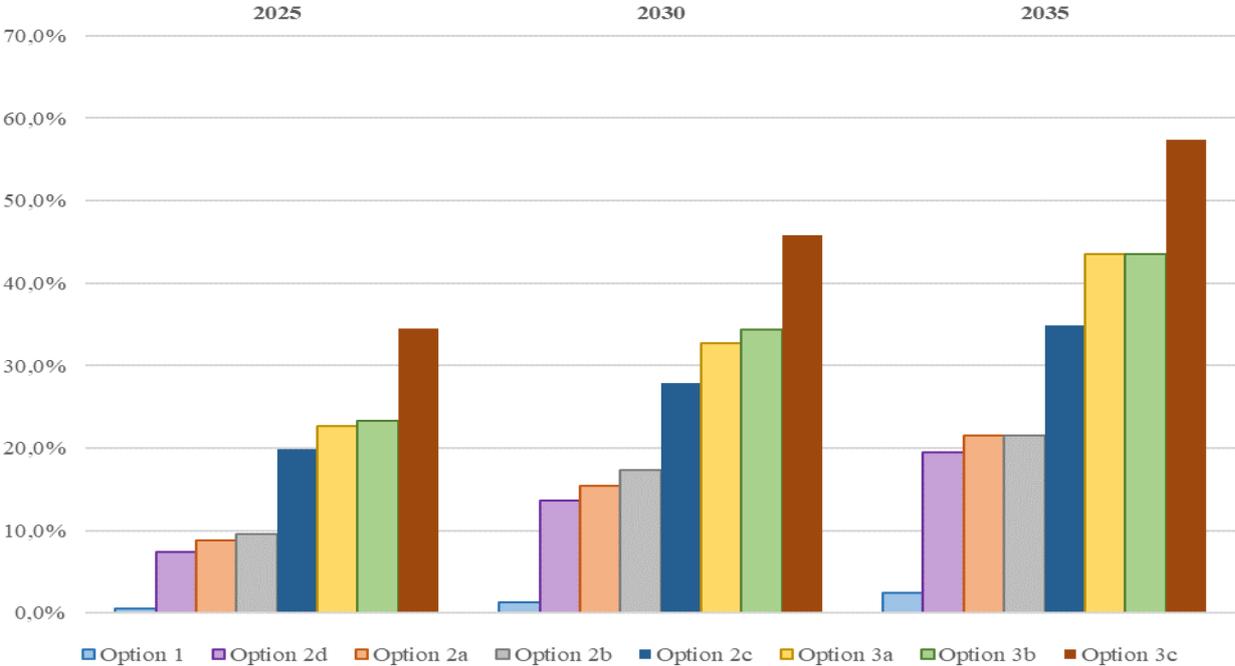
The estimated impact on revenues under each option (see figure 22) is based on the assumption that Member States will only increase their respective national rates, where needed, to reach the “new” minima in the Directive. In all options considered, the increase in minimum rates results in an increase in tax revenues compared to the baseline across the years.

With the indexation of minimum rates under Option 1, revenues only rise slightly compared to the baseline, as rates will only need to increase in those countries and sectors where the new nominal rates in the Directive will lead to crossing the current minimum threshold over time. Under Option 2, with the introduction of higher minima based on energy content and the broadening of the tax base (such as for energy-intensive industries, intra-EU aviation and maritime), effective rates and revenues increase notably compared to the baseline (c. +22% in 2035). In case of the options with a shorter transition period, the gains are observed earlier.

The carbon-content add-on to the energy content under Option 3 impacts rates and revenues strongly from 2025 onwards, as the value for the carbon content component will increase over time as explained in the description of the option. The difference with Option 2 also captures the elimination of the transition period on energy content for all consumers except

Households and the intra-EU aviation sector in Option 3, as well as the regular updates of the CO₂ component in line with the changes in the ETS price in the future.

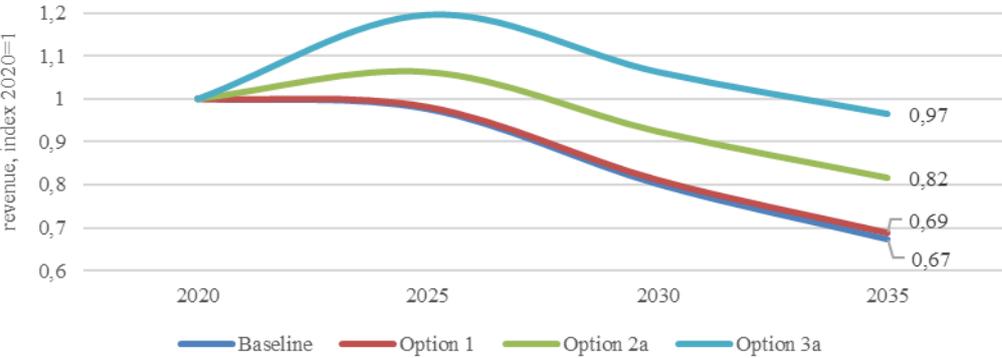
Figure 22: Evolution in EU27 of total tax revenues



Source: JRC-GEM-E3

As mentioned above, revenues will drop by 2035 in comparison to 2020 in the baseline. This reduction appears to be compensated in different degrees (partly or fully) under the different options. This is illustrated in figure 23 below.

Figure 23: Change in tax revenues between 2020 and 2035 for EU 27 (2020=1)



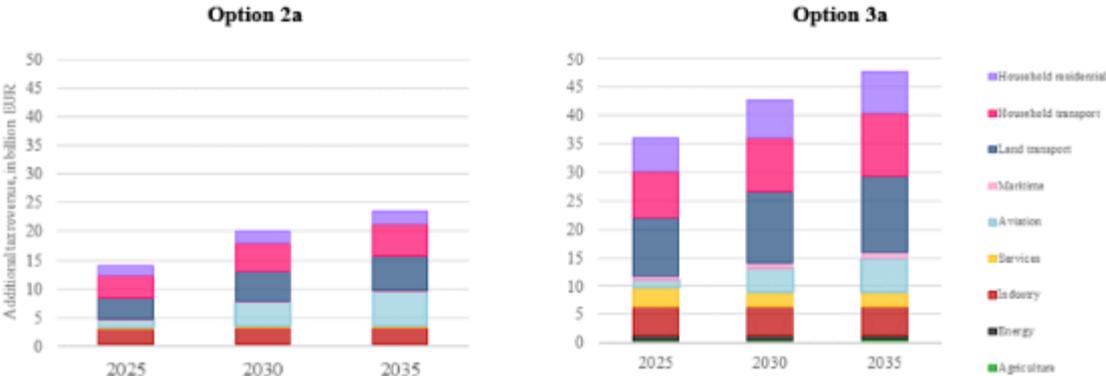
Source: JRC-GEM-E3

The increase in tax revenues under Options 2 and 3 comes mostly from transport fuels (oil products and biofuels), which already make the largest share of excise tax revenues. The

introduction of the carbon component raises revenues from fossil fuels due to their higher carbon content (see list of emission factors provided). The introduction of an air pollution component to the minimum rates significantly increases Member States' revenues from 2025 onwards, both under Options 2a and 3a, as no transition period is assumed.

Considering the impact by type of consumers in Figure 24 below, revenues increase primarily from land transport (transport sector) and private household transport under Options 2 and 3. The carbon component affects all sectors, each contributing more to tax revenues under Option 3 than Option 2 (with the relative increase depending on their carbon intensity).

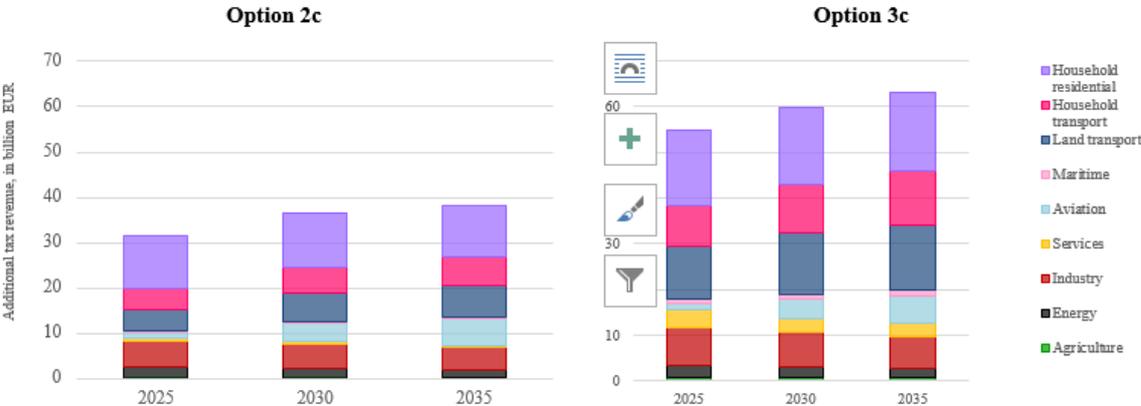
Figure 24: Additional revenue under Option 2a and 3a for EU 27



Source: JRC-GEM-E3

Introducing the air pollution component leads to significant increase in tax revenues of Option 2 and Option 3 compared to baseline. Additional tax revenues primarily come from households' use of fuels for heating purposes, already in a significant way from 2025, given that the pollution component increases in an extremely significant way the cost of coal and biomass. The household sector will bear a very substantial share of the increase in costs following the introduction of this option.

Figure 25: Additional revenue under Option 2c and 3c for EU 27

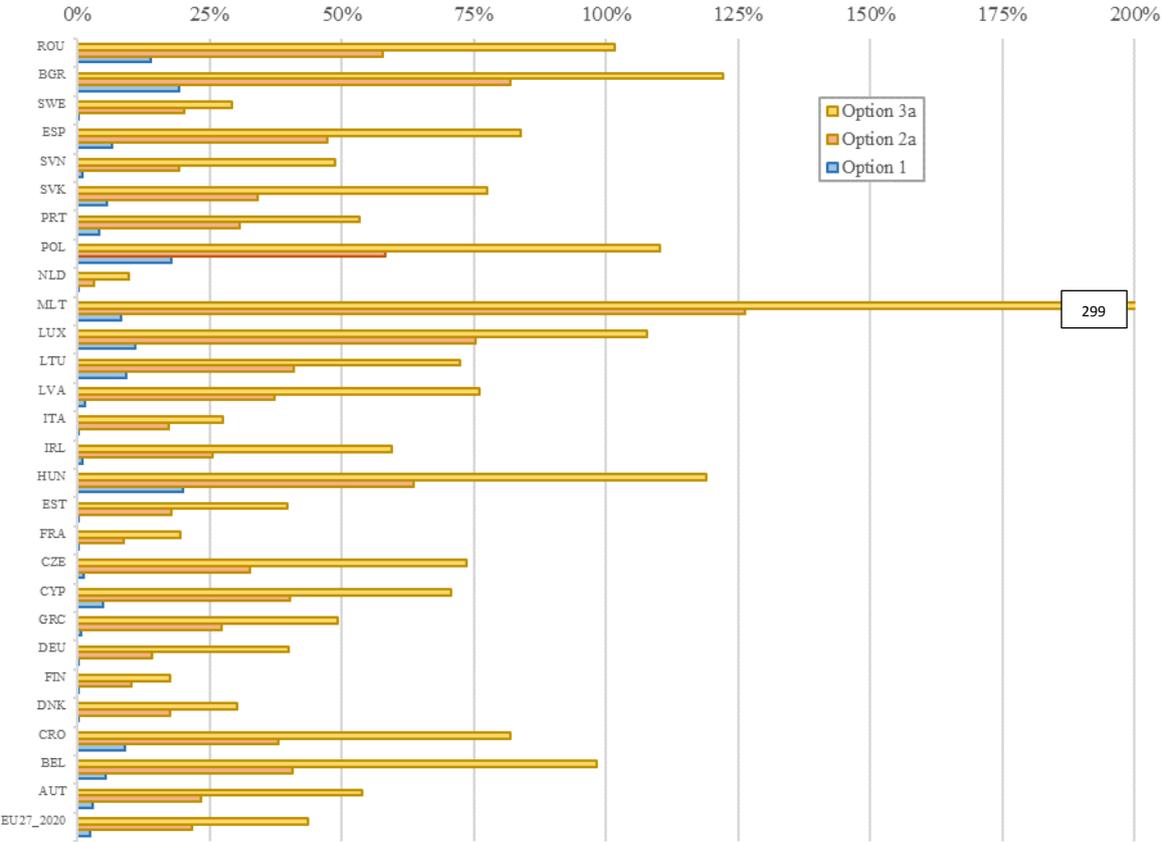


Source: JRC-GEM-E3

The impact on Member States (see Figure 26 below) depends on different factors such as i) the present level of national rates, ii) the national use of exemptions and reductions, iii) the

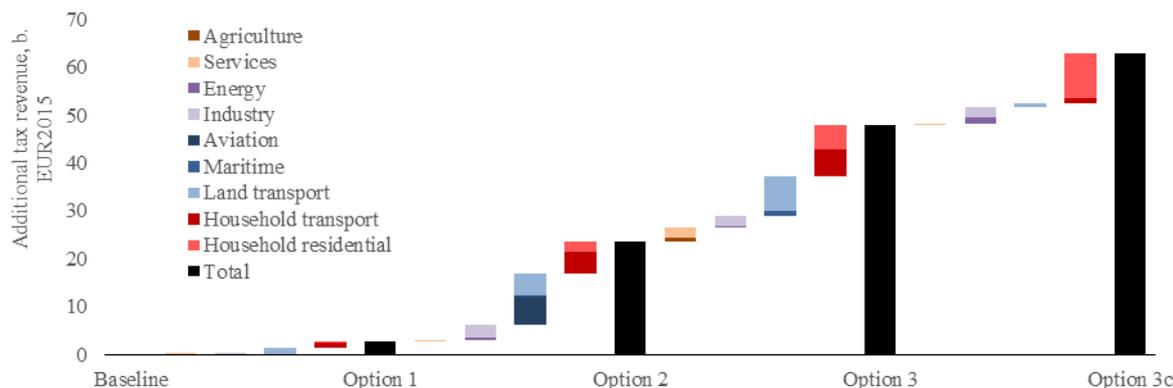
energy mix of the economy and iv) the sectorial impact of the proposed options. In general terms, Option 1 will mainly affect those Member States whose national rates are fixed at the lowest levels, whereas Options 2 and 3 will also have a relevant impact on Member States who make extensive use of possible exemptions and deductions. Moreover, the Member States who base their energy mix more on fossil fuels will also be more affected. The application of a transitional period aims at taking into account all these different national circumstances in view of a smooth transition.

Figure 26: Change in Member States’ tax revenues in 2035 relative to the baseline (in percentage)



Source: JRC-GEM-E3

Figure 27: Total additional tax revenues by users for EU27 in 2035



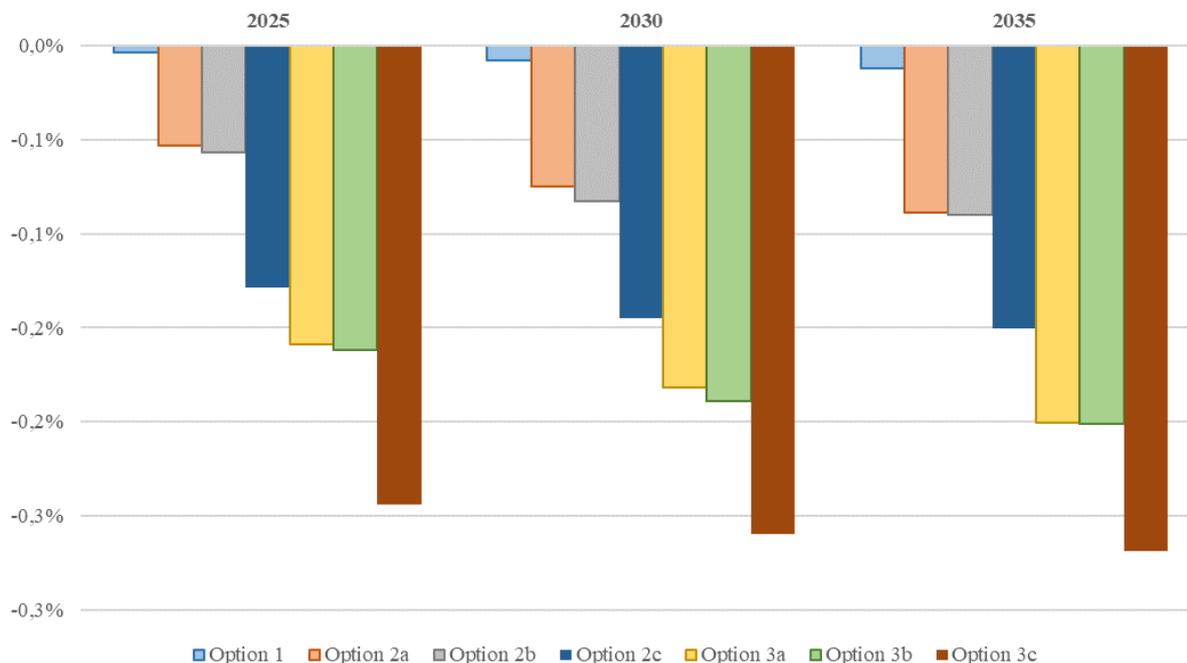
Source: JRC-GEM-E3

Figure 27 above illustrates the breakdown of total increase in revenues by users under the different options. Increases in minimum rates lead to an increase in tax revenues compared to the baseline across all options. With simple indexation under Option 1, revenues rise only slightly compared to the baseline, while under Option 2, with the introduction of higher minima based on energy content, and the broadening of the tax base effective rates, the tax revenues increase strongly compared to the baseline. Transport and aviation contribute most in this increase, followed by household transport and heating and industry. The addition of a pollution component has a higher impact upon households. This impact is evident and much more pronounced under Option 3c which includes also a CO2 component in the tax rates.

Annex 9 provides detailed data on the impact on Member States' revenues when the pollution component is introduced in Options 2 and 3. In both options, the introduction of a pollution component will impact more on lower income Member States. This is mainly the result of their national energy mix where the share of more pollutant products is higher.

6.5 Impact on GDP

Figure 28: Change in EU 27 GDP compared to the baseline (in percentage)



Source: JRC-GEM-E3

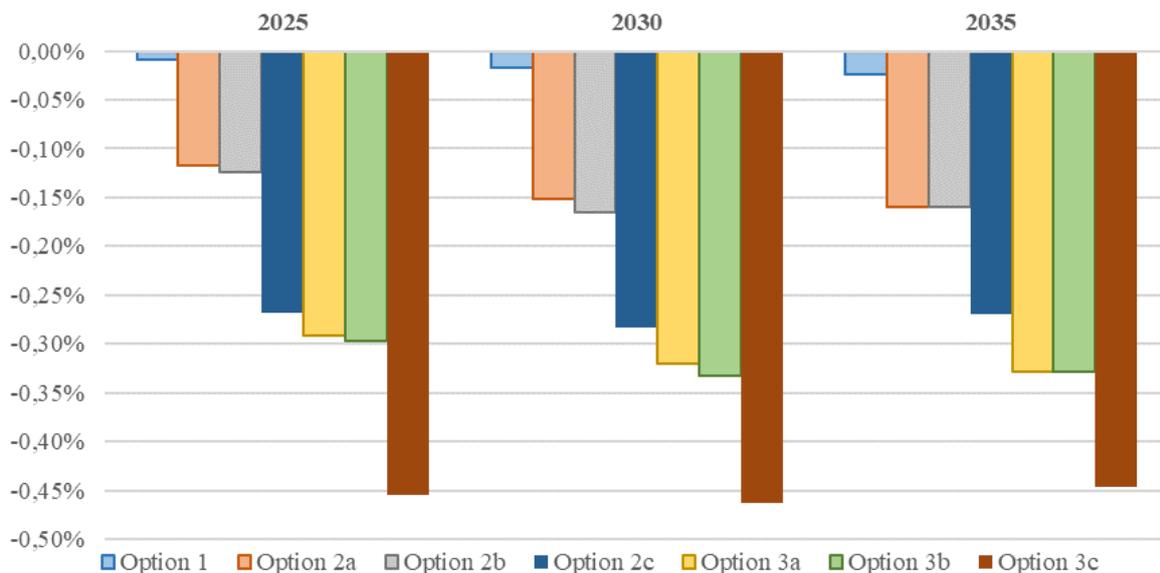
All options considered imply an increase in effective taxation in the economy, which in turn results in a minor decrease in GDP estimated at -0,09% under Option 2 relative to the baseline by 2035. This would indicate that the introduction of an increase in energy taxes achieve an important positive environmental impact with a very low impact on growth perspective.

This result should be seen in the context of the technology options that are included in the model and depend on a variety of factors, mainly on the fact that the increase in taxes is compensated through lump-sums to households.

Three underlying factors explain the differences among scenarios. First, under the minimalistic option the indexing of rates seems to be the main driver, resulting in price increases and thereby demand reduction. By contrast, under Options 2 and 3 the broadening of the taxable base affects the production sector by increasing input costs, which results in a decline in investment parallel to the even more pronounced demand decline. Introducing an air pollution component to the minimum rates leads to further reduction in GDP.

6.6 Impact on the labour market

Figure 29: Change in EU 27 employment compared to the baseline (in percentage)



Source: JRC-GEM-E3

Reflecting the minor negative impact on GDP, all the options considered will have a very small negative effect on the labour market at EU aggregate level. In fact, in the longer term the decrease in employment rate would range from -0.02% to -0.45%. These impacts are presented at a more disaggregated level below.

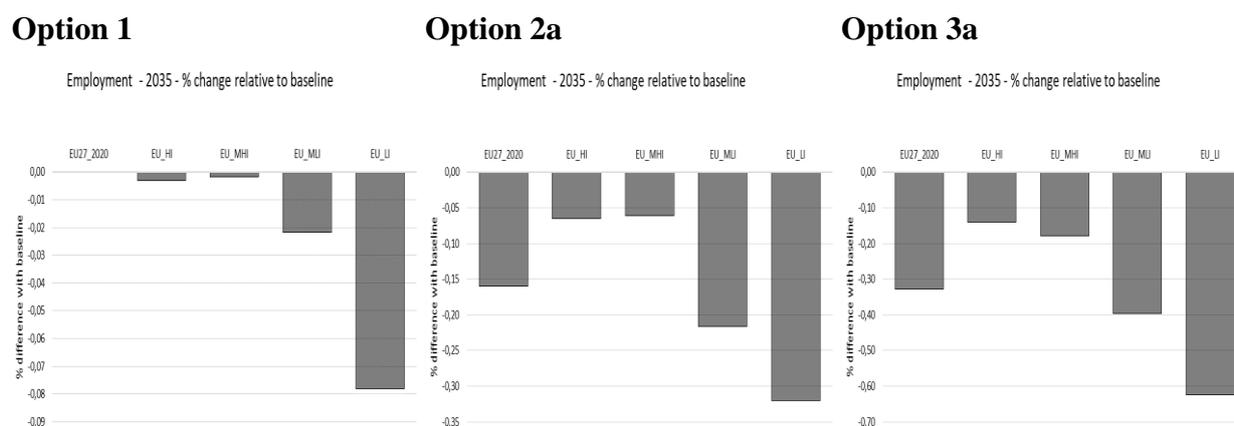
Similar to GDP, this result depends on the model assumptions of the functioning of the labour market and the recycling of additional tax revenues.

In sectoral terms the biggest impacts are as follows:

- Under Option 1 main impacts are realised in the energy sectors, namely coal, oil and gas production.
- Under Options 2 and 3 the biggest impacts are realised in the energy sectors and the energy intensive industries. Downstream sectors are also affected but to a lesser extent.

As regards differences between Member States, the higher impact on employment is found for low income Member States.

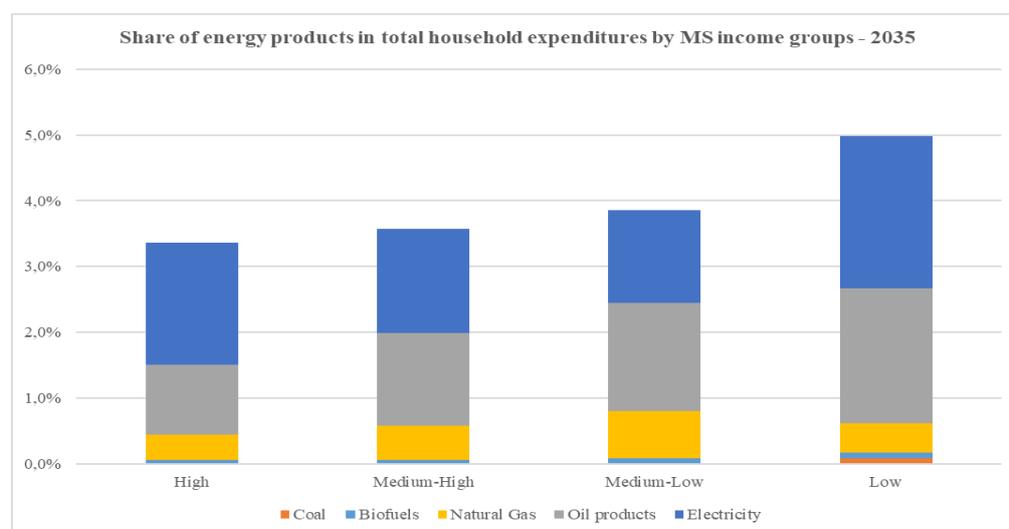
Figure 30 Changes in employment in 2035 by Member State group (% change from baseline)⁶⁵



Source: JRC-GEM-E3

The higher impact on low income Member States is due to both higher tax rates increase (relative to the baseline) and higher shares of energy products in overall consumption (see figure below).

Figure 31: Share of energy products in total household expenditure in the baseline in 2035 by EU Member State Group



Source: JRC-GEM-E3

Energy sectors (coal, oil and gas) are estimated to experience the highest impacts in terms of employment losses. These sectors, as well as forestry in Options where biomass products are subject to the air pollution component (Option 2c and 3c), are found to experience losses in employment higher than the average of all sectors in the EU 27. Energy intensive industries

⁶⁵ The classification of Member States by income is as follows:

- High includes AT, DK, FI, IE, LU, NL, SE
- Medium High includes BE, DE, FR
- Medium Low includes CY, CZ, ES, ET, IT, ML, PR, SI
- Low includes BG, EL, HU, LT, LV, PL, SK, RO, HR

(mostly ferrous, non-ferrous metals and non-metallic minerals), agriculture and the transport sector follow albeit with weaker losses.

Table 7: Changes in employment by sectors – EU 27, in 2035 (% change for baseline)

| | Option 1 | Option 2a | Option 2c | Option 3a | Option 3c |
|---------------------------|----------|-----------|-----------|-----------|-----------|
| Crops | 0,08 | -0,48 | -0,43 | -0,49 | -0,47 |
| Coal | -0,30 | -1,51 | -6,55 | -4,02 | -7,57 |
| Crude Oil | -1,21 | -3,96 | -5,43 | -8,57 | -9,98 |
| Oil | -0,55 | -2,03 | -2,54 | -4,20 | -4,76 |
| Gas | -0,71 | -3,83 | -3,43 | -11,87 | -11,42 |
| Electricity supply | -0,04 | 0,02 | 0,52 | 0,23 | 0,74 |
| Ferrous metals | -0,02 | -0,40 | -0,93 | -0,50 | -1,04 |
| Non ferrous metals | -0,01 | -0,39 | -0,47 | -0,40 | -0,48 |
| Chemical Products | -0,01 | -0,07 | -0,19 | -0,13 | -0,25 |
| Paper Products | -0,02 | -0,09 | -0,18 | -0,25 | -0,34 |
| Non metallic minerals | -0,04 | -0,25 | -0,41 | -0,40 | -0,57 |
| Electric Goods | 0,00 | 0,08 | 0,11 | 0,00 | 0,03 |
| Transport equipment | -0,02 | -0,06 | -0,05 | -0,20 | -0,20 |
| Other Equipment Goods | -0,01 | -0,02 | -0,06 | -0,12 | -0,16 |
| Consumer Goods Industries | -0,03 | -0,06 | -0,13 | -0,37 | -0,45 |
| Construction | -0,03 | -0,17 | -0,29 | -0,36 | -0,48 |
| Transport (Land)* | -0,10 | -0,50 | -0,68 | -0,92 | -1,11 |
| Market Services | -0,03 | -0,17 | -0,29 | -0,39 | -0,52 |
| Non Market Services | -0,02 | -0,11 | -0,17 | -0,21 | -0,27 |
| Livestock | 0,04 | 0,23 | 0,32 | 0,07 | 0,13 |
| Forestry | 0,02 | -1,33 | -8,00 | -1,01 | -7,73 |

* Water and air transport effects are presented in the devoted sections below

Source: JRC-GEM-E3

6.7 Macro economic impact under alternative revenue recycling settings

The E-QUEST model was employed to compare the Central Option from the ETD revision proposals to a baseline under different revenue recycling settings. Exploring revenue recycling implications under other options was deemed to not to provide significant value added to the analysis. While it would proportionally change the macroeconomic effects, assessing other options would have only marginal impact at the EU-level results without changing the ranking of the recycling measures.

The baseline calibration accounts for the effect of existing climate mitigation policy measures and the current ETD framework. To ensure consistency across the different model simulations in the Impact Assessment, the E-QUEST simulation inputs were calibrated to be in line with those implemented in the JRC-GEM-E3 simulation scenarios.

Six alternative scenarios for the recycling of the additional revenue were explored, namely, (i) reduction in lump-sum taxes, (ii) consumption tax cuts (VAT), (iii) personal income tax (PIT) cuts for low-income households only, (iv) social security contributions cuts for employers, (v) reduction in capital taxes (excluding fuel-intensive capital) and (vi) recycling via ‘clean’ subsidies to support the purchase of “clean” capital goods.

Overall, the simulated scenarios at the EU level result in slightly negative or close to zero GDP effects relative to the baseline. The ranking of GDP results by recycling instruments reflects the ranking of taxes by their distortive effects in the economy. Reducing lump-sum

taxes, which are the least distortive, shows a negative effect of about -0.07% relative to the baseline GDP. This is followed by social security contribution (SSC) and consumption tax (VAT) reductions by about 0.05% decline in GDP. Personal income tax cuts targeted at lower income groups with a higher marginal propensity to consume can also reduce the output losses to around 0.03% of baseline GDP. In the model labour supply, labour demand and wages are endogenous, therefore, this scenario works via stimulating low-skilled labour supply with higher net wages, lowering the compensation per (low-skilled) employees for firms and leading to higher overall employment. Taxes on capital are the most distortive taxes in the model, and recycling the additional revenue to reduce these has larger impact. The most beneficial scenario in terms of GDP effects is through the recycling of additional revenues into subsidies on the purchase of clean capital and capital tax reduction. Both recycling options can result in slightly positive GDP effects relative to the baseline. In terms of consumption, reducing VAT, cutting personal income taxes or providing green subsidies can mitigate the most the negative effects of the reform relative to the lump-sum tax recycling case. For investment, capital tax cuts and clean capital subsidies are the most beneficial recycling instruments. Targeted labour tax-cuts have the largest potential to increase employment as the slightly higher real wages stimulate labour supply.

Table 8. Macroeconomic effects of recycling measures, 2030

| Scenarios | Lump-sum | VAT | SSC | Low-skilled labour tax | Capital tax | Clean subsidy |
|--------------------|----------|-------|-------|------------------------|-------------|---------------|
| GDP | -0.07 | -0.04 | -0.05 | -0.03 | 0.01 | 0.06 |
| Investment | -0.07 | -0.03 | -0.05 | -0.04 | 0.42 | 0.35 |
| Consumption | -0.08 | -0.04 | -0.08 | -0.04 | -0.10 | -0.05 |
| Employment | -0.01 | 0.01 | 0.01 | 0.06 | 0.00 | 0.00 |

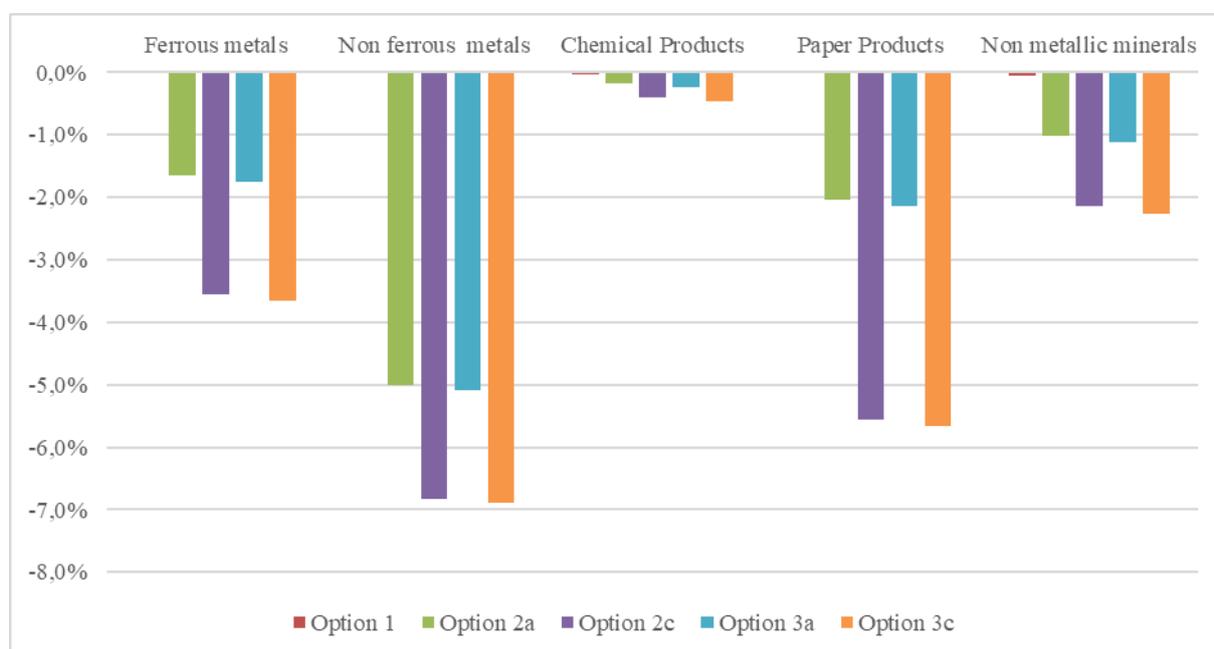
Note: percent deviations from baseline levels.

Source: E-QUEST simulations

6.8 Impact on industries that are more energy intensive

Industries in the EU that are more energy consuming will face an increase in their input costs under option 2 and option 3. Specifically, in option 2a and 3a these will be driven by the introduction of higher minima based on energy content and the broadening of the tax base, while the introduction of the pollution component in options 2c and 3c will bring in additional pressure as evidenced in the proportional reduction in GHG emissions in the figure below.

Figure 32: Change in EU27 industrial emissions of energy intensive industries (in percentage)

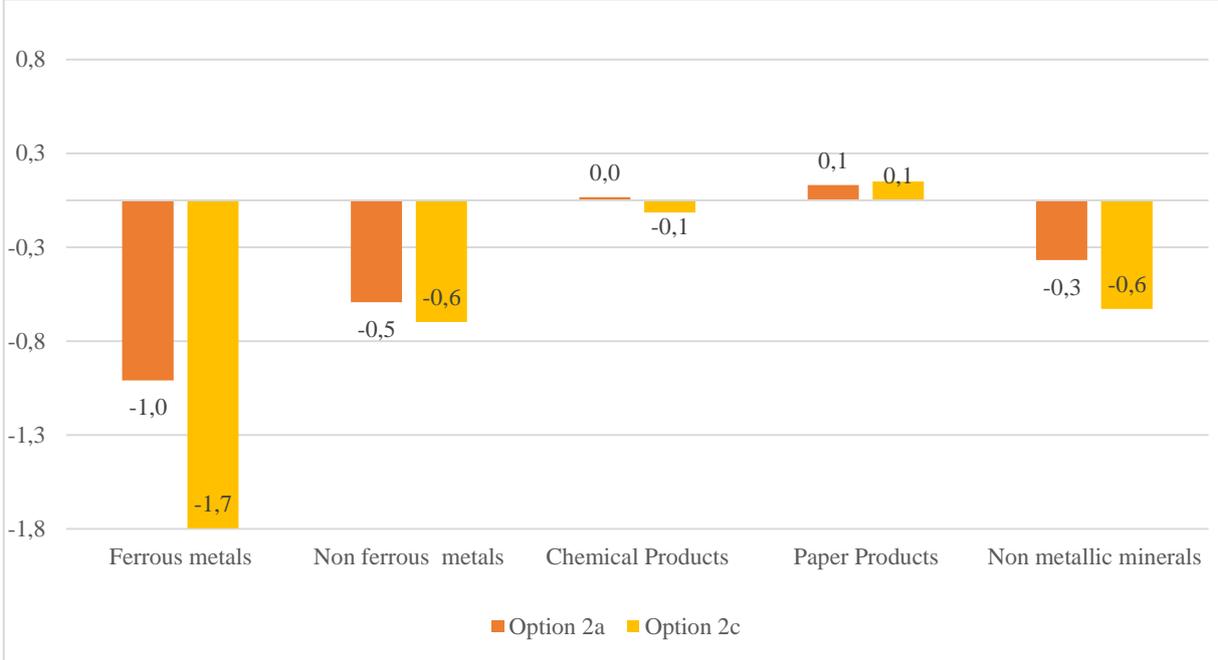


Source: JRC-GEM-E3

The increase in costs could impact on the energy intensive sectors' competitive position in international markets. The figure below illustrates the changes in exports for energy intensive industries relative to the baseline by different options. Within this group, the highest impact is observed in ferrous metals. Exports of chemicals and paper appear to be less affected. In fact

generally at the Member State level these two sectors benefit from less exemptions than other energy intensive industries in the current ETD (baseline), and are therefore less affected by the scope extensions under Options 2 and 3.

Figure 33 Exports of energy intensive industries – EU 27 in 2035, as % change from baseline



Source: JRC-GEM-E3

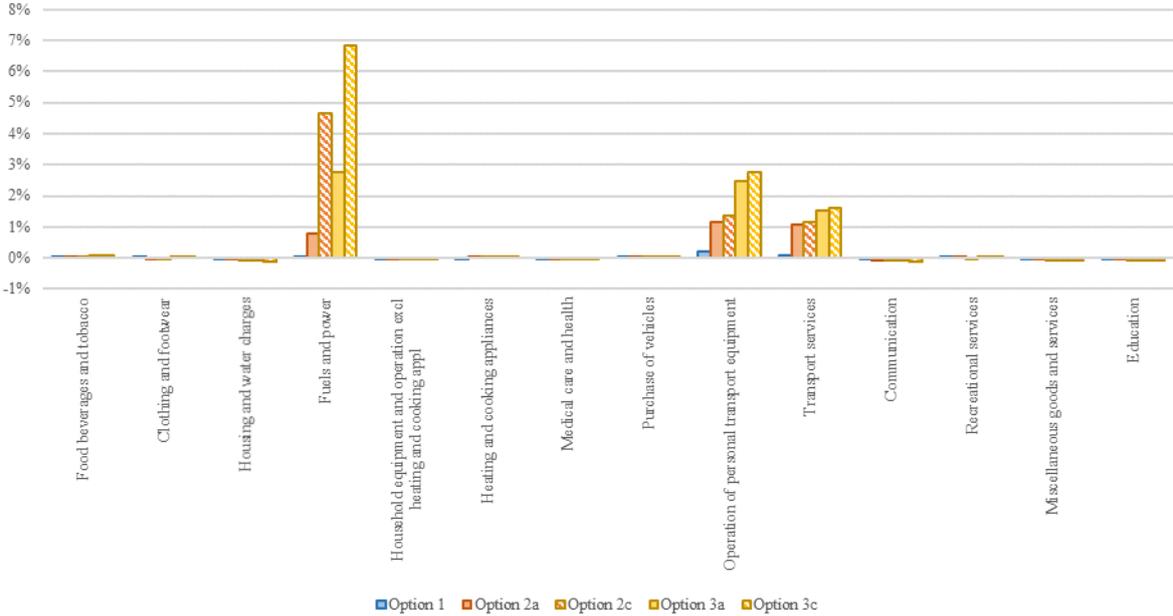
6.9 Distributional Impact

Households heating

Increased tax rates lead to an increase in consumer prices, both for motor and heating fuels. Option 1 minima have a very limited impacts on heating fuels, and a small impact on motor fuels. Under option 2a, this increase is similar across heating and transport fuel prices, around 0,8.% and 1.2% respectively. When a pollution component is added the heating fuel prices increases by around 5%. The addition of the carbon component in Option 3a leads to a 2.8% increase in the price of heating fuels compared to more than 2.5% increase in the case of motor fuels prices, due to the high emission factor of solid heating fuels.

The air pollution component mainly affects heating fuels for households (coal), and result in almost 5% increase in household prices for fuels and power compared to the baseline in Option 2 and nearly 7% increase for Option 3.

Figure 34: Change in EU27 household consumer prices between each Option and the baseline in 2035 (in percentage)



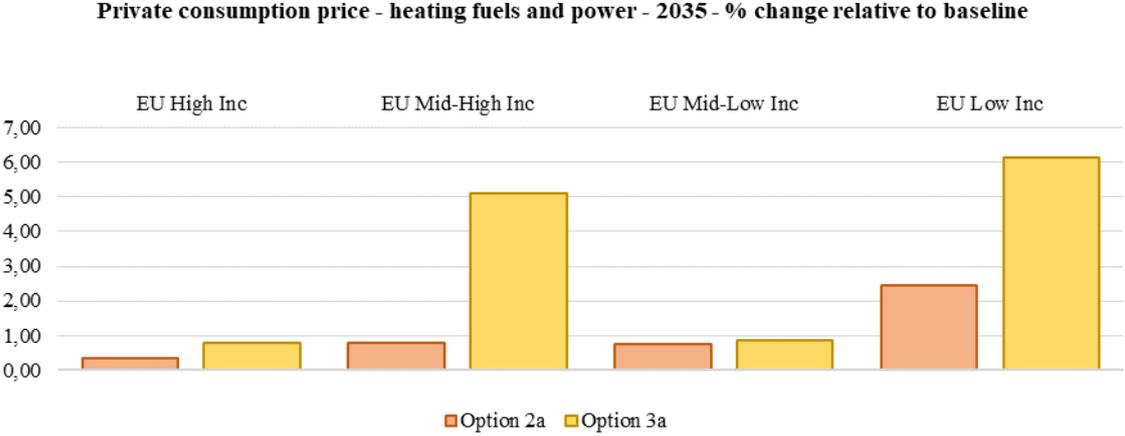
Source: JRC-GEM-E3

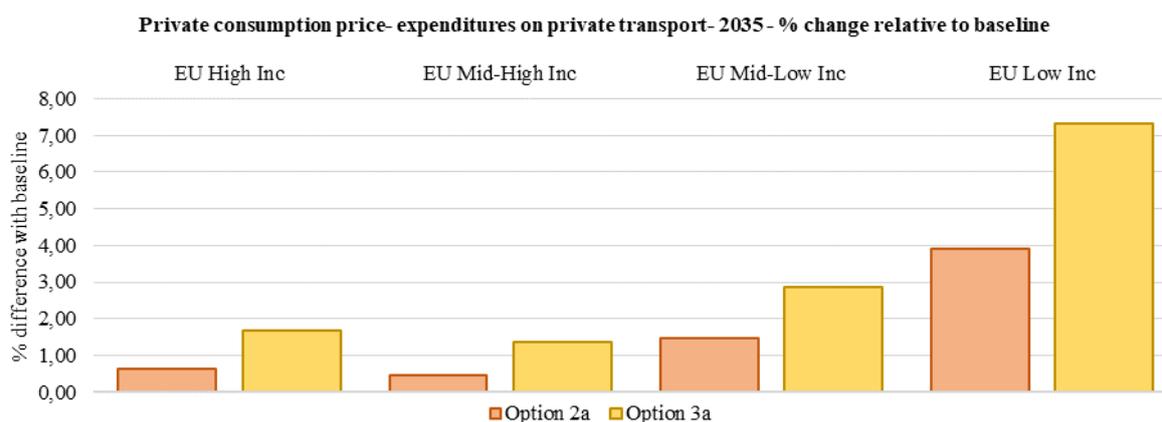
Member States with currently lower effective tax rates on households are relatively more affected by the increase in the minima based on energy content and the removal of exemptions. This generally corresponds to lower income Member States (plus Belgium).

Price increases for motor fuels from the inclusion of the carbon component (difference between Option 2 and 3) is relatively uniformly applied across Member States, as the carbon content of motor fuels vary relatively little across the EU27.

However, the increase in the price for heating fuels from the introduction of a CO2 tax is mostly felt by Member States with more carbon-intensive heating fuel mixes.

Figure 35: Change in private consumption prices (in percentage)





Source: JRC-GEM-E3

Impact on household incomes

Distributional impacts on household incomes by Member State⁶⁶ were analysed with the use of the Euromod micro simulation model, by effectively linking it with the JRC-GEM-E3 model thereby allowing the feeding of changes in key variables from the macro simulation to the micro model (see Annex 4 for details). By linking the two models in this way, the distributional analysis at the micro level was able to account for the economy-wide impact of the tax changes under consideration, capturing the effects of the policy option not only through its direct impact on the tax burden, but also through its broader implications on consumer prices and household incomes. The analysis of distributional impacts focused on options 1, 2a, 3a and 3c. Exploring other options was deemed not to provide significant value added to the analysis.

The results indicate that the considered ETD options reduce adjusted disposable income (the disposable income net of indirect taxes) of households, often in a regressive way, but that the distributive impact depends on the policy option and largely differs across countries.

In general, the four options considered show the following impacts on household incomes across the income distribution, for each of the three drivers (price and income effects, and a lump-sum compensation mechanism):

- A negative and regressive “price effect”. All the options considered drive a price rise in a number of consumption goods, including transport-related services as well as in fuels and powers. Although other prices are expected to drop, overall, a negative impact on household adjusted disposable income is observed from the changes in consumption prices driven by the energy tax reforms, ranging from 0% to 2%. This generally affects more heavily households at the bottom of the income distribution, for their income share of consumption is notably larger. The lowest income decile loses around 2% of disposable income in Lithuania and between 1.5-2% in Poland and Hungary (option 3c).

⁶⁶ The analysis is carried out for the 18 Member States, which are currently covered by EUROMOD’s Indirect Tax Tool (ITT) extension. These countries are: BE, CY, CZ, DK, FI, FR, DE, EL, ES, HU, IE, IT, LT, PL, PT, RO, SI and SK. More information on this project can be found in <https://EUROMOD-web.jrc.ec.europa.eu/about/extended-functionalities>.

- A negative and progressive “income effect”. All the options considered generally lead to a decrease of gross labour and capital income, which analogously to the “price effect”, reduces household adjusted disposable income. However, this effect penalizes more households in the second half of the income distribution. That is because poorer households rely less on market income than the richer ones. As a result, the income effect tends to compensate and, in some cases, completely reverses the regressivity of the price increase. The final effect of the energy tax changes considered, after allowing for the price and income effects, is generally displaying either a regressive or a flat impact across the income distribution. Overall, the effect on the first decile from the joint effect of price and income ranges from a loss of -0.002% (Germany, option 1) to -2.3% (Hungary, option 3c) with respect to baseline disposable income.
- A positive and progressive effect of the compensatory measure. When the extra tax revenues (from indirect taxation) raised through each tax change are transferred back to households in a lump-sum fashion, the whole reform turns to be progressive, for these transfers determine a larger increase in disposable income for poorer households. EUROMOD-based simulations show that using all additional revenues to finance a lump-sum benefit to all individuals could, in relative terms, provide a larger support to poorer households compared to the rich ones. Therefore, the regressive or flat impact of energy taxes can be mitigated or even eliminated by accompanying measures.

The impact of the considered ETD options, including compensatory measures, on households’ adjusted disposable income is generally of small magnitude. Over the whole spectrum of the income distribution, the impact ranges from about 4% to about -1.5% of the baseline disposable income. That is because the predicted impact of the energy tax reforms under analysis over labour and capital income is mostly negligible, and so is the impact on the consumer price index (though variations in the price of individual good categories, such as transport and fuel, can be significant).

Option 1 has the lowest estimated impact on household incomes, while the option with the air pollution component shows the strongest impact. In this latter scenario, Lithuanian, Romanian and Spanish households in the first decile experience the largest increase in adjusted disposable income (i.e. more than 3%); whereas Hungarian, Romanian and Polish households in the 10th decile, experience the strongest income reduction (i.e. about 1.5%). On the other hand, in the minimalistic option the largest increase in adjusted disposable income is experienced by Romanian first decile (i.e. about 0.45%); whereas the largest reduction is for Hungarian, Romanian and Polish households in the 10th decile (i.e. about 0.2 %). The range for the remaining scenarios is in between these extremes.

Within each option considered, results substantially vary across countries. This is due to the different impact that the same policy change produces on prices of the different consumption categories and income in each country. Country disparities are also explained by the different consumption patterns across the income distribution and income structure of households. Another factor is the relative change that the energy tax changes bring onto the existing systems in each country. A detailed discussion of distributional impacts by Member State is provided in Annex 9.

6.9 Impact on aviation, maritime transport and inland shipping

Aviation

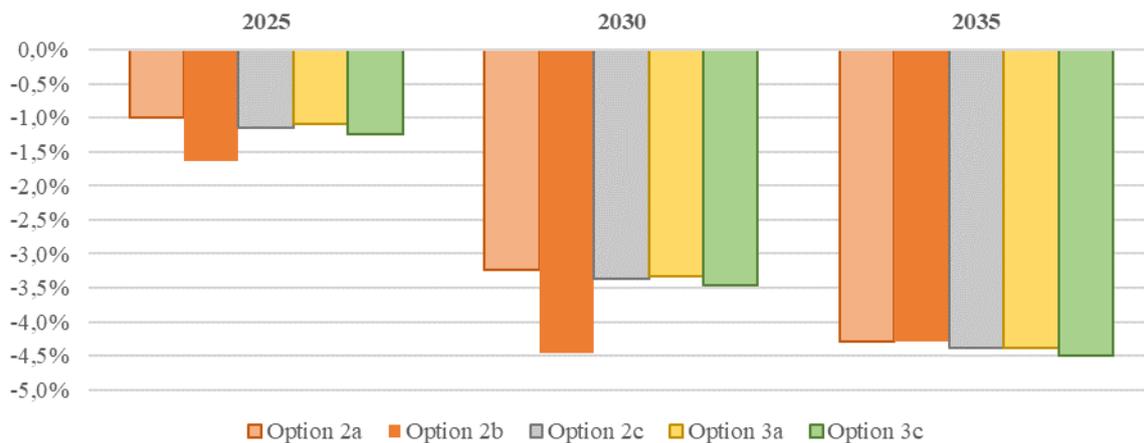
Impact on the aviation sector was analysed both through the JRC-GEM-E3 model and through a focused sectoral study - the results of which are presented in Annex 7. This focused study also performed detailed modelling of alternative scenarios for the revision of taxation in aviation. Modelling in the study was based on the combination of a dedicated sectoral model (AERO-MS) and a macro model (GINFORS). In line with the analysis so far, the discussion in this section also focuses on the results of the JRC-GEM-E3 model, but these are complemented with findings from the AERO-MS and GINFORS models to provide insight of the potential range of impacts under alternative assumptions. The results of all modelling exercises are largely comparable and any differences are explained by underlying technical specificities and assumptions of each model.

In view of the above, rates based on energy content in line with those applied to the road transport sector were introduced for the aviation sector under Option 2 with a 10 or 7 year transition period respectively (Options 2a and 2b). The resulting price increase reduces the total demand and output of the aviation sector. Based on the results of the JRC-GEM-E3 model the impact on output is found between -1.0% and -1.6% in 2025 and about -4,3% by 2035, as illustrated in **Figure 36**.⁶⁷ The results confirm the usefulness of introducing a longer transition period to allow the sector to adjust more smoothly to the proposed changes. Indeed option 2b results in a much stronger impact in 2030 relative to option 2a, with both converging by 2035. The sector being included in the ETS, is not eligible for the carbon content component under Option 3. The slight decrease in output compared to Option 2 is due to general equilibrium effects of a slightly more reduced total demand under Option 3.

The results obtained from of the sector specific AERO-MS model, as presented in detail in Annex 7, are largely in line with these estimates. For the case of a 10-year transition period (option 2a) AERO indicates a reduction in sector revenues of -1,1% in 2025, building up to -3,3% and -3,4% for 2030 and 2035 respectively.

Figure 36: Change in EU27 aviation output compared to baseline (in percentage)

⁶⁷ Intra-EU aviation is assumed to represent approximately 47% of all fuel use in the aviation in 2030.



Source: JRC-GEM-E3

Impact on employment as estimated by the GEM E3 model largely reflects changes in sectoral output. In the JRC GEM E3 model, substitution elasticities that govern the ease with which the aviation sector can shift from energy to other inputs in the production process play an important role in determining how output changes relate to employment changes in the context of the ETD. For the aviation sector, the assumption is that the potential to substitute energy for labour is relatively limited, and indeed lower than in other sectors in the economy. Higher energy costs could lead to increased energy efficiency, resulting in higher capital and lower energy input shares. As such, the results of the JRC-GEM-E3 model reflect a situation with a gradual introduction of the policy changes. The implied employment elasticity in this context is close unity. As illustrated in **Figure 37** sectoral employment declines under option 2a by -1,04% in 2025 building up to -3,25% in 2030 and -4,32% in 2035.

Figure 37 Change in EU27 employment compared to baseline (in percentage)



Source: JRC-GEM-E3

Estimated employment effects from the GINFORS-E model were found to be lower than the JRC-GEM-E3 estimates at -1,03% and 1,04% for 2030 and 2035 respectively. This difference can be interpreted as resulting from different assumptions in the GINFORS-E model about the degree to which the sector correctly anticipates the output changes due to the proposed revision of the Energy Taxation Directive. In the GINFORS-E model, the response of jobs to

output changes in the aviation sector is governed by the employment elasticity, which is calibrated to historical time series. Typically, historical fluctuations in output are stronger than changes in employment, due to labour market rigidities. As a result, the estimated employment elasticity is well below unity, such that employment changes in the aviation sector are less pronounced than output changes in the sector.

Maritime transport and inland shipping

Taxing energy use on intra-EU activity⁶⁸ (with a transitional application of the rates applied to the primary sector and to household) also leads to a decrease in sectoral output in maritime transport across all the options. Since maritime transport and inland shipping is taxed both on energy content and carbon content in Option 3, and the transitional period on energy content is dropped in this option, the sector experiences its largest drop in output in 2025 under Option 3.

Figure 38: Change in EU27 maritime transport and inland shipping output compared to baseline (in percentage)

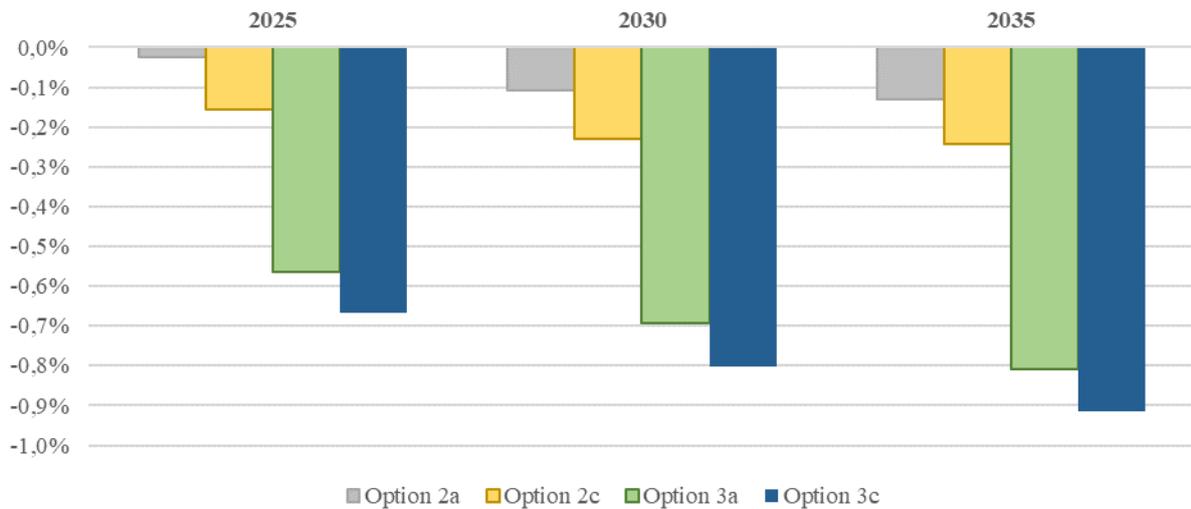


Source: JRC-GEM-E3

The changes in sectoral output are also reflected in equivalent changes in employment for maritime transport and inland shipping sector. As no transitional period is provided for in the energy content option, employment drops immediately from 2025 following the drop in output as illustrated in **Figure 39** bellow. In this context, sectoral employment declines under option 2a by -0,03% in 2025 building up to -0,13% in 2035. The introduction of carbon content (option 3a) leads to stronger employment losses by -0,56% in 2025 building up to -0,8% in 2035.

⁶⁸ Intra-EU transport is assumed to represent approximately 16% of all fuel use in the EU maritime and inland shipping in 2030.

Figure 39: Change in EU27 maritime transport and inland shipping employment compared to baseline (in percentage)



Source: JRC-GEM-E3

7. COMPARING THE POLICY OPTIONS

7.1 Comparison of the policy options against selected criteria

This chapter evaluates the policy options presented and analysed in Chapter 5 and 6 against a set of three key criteria: i) Effectiveness, ii) Efficiency and iii) Coherence.

i) Effectiveness

This criterion relates to the extent to which the policy options are able to effectively achieve the general and specific objectives as outlined in section 4.2.

- Contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal. The policy options are assessed in terms of their impact on energy efficiency, CO₂ and air pollution emissions of the various fuels as well as their contribution to reduce fossil fuel dependency (specific policy objectives 1, 3, 4 and 5).
- Preserving the integrity of the EU internal market and ensuring fair competition: All the options are assessed to check their contribution to remove possible distortions in the internal market. The latter include distortions between energy users in different Member States due to differences in national tax rates and national applications of exemptions and derogations and distortions between competitors using different energy products. This criterion therefore reflects specific policy objectives 2, 3 and 4.

ii) Efficiency

The efficiency criterion allows to compare options with respect to cost-effectiveness, In the present impact assessment this criterion can be understood to relate to two core elements as follows:

- Budgetary impacts. This criterion is considered because, while meeting the objectives of the ETD revision, the ability of Member States to use energy taxation for revenue raising purposes, remains a key function of this type of excise duties.
- Equity. This criterion reflects the constraint that even if overall an option leads to positive environmental and economic results, this might come at the cost of undesirable distributional side-effects, both at the level of different Member States and different income taxpayers.

The macro economic impacts of all the policy options in terms of GDP and employment, are negligible as emphasised in Chapter 6. Therefore, further discussion of this aspect is not needed for the purposes of this chapter.

iii) Coherence

This criterion relates to the coherence of ETD revision with other initiatives under the ‘Fit for 55’ Package (specific Options 1 and 3) and other relevant EU policies. All the policy options are assessed in terms of their complementarity and coherence with other initiatives in contributing to the increased ambition of reaching 55% reduction in GHG emissions by 2030 as related to 1990.

Table 8 below provides a comparison of the policy options against the selected key criteria: illustrated above.

Table 9: Comparison of the policy options in terms of selected assessment criteria

| Policy option | Baseline | Option 1 | Option 2a | Option 2b | Option 2c | Option 3a | Option 3b | Option 3c |
|--|----------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Effectiveness | | | | | | | |
| Contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal | | + | ++ | ++ | +++ | +++ | +++ | ++++ |
| Preserving the EU internal market and ensure fair competition | | + | ++ | ++ | ++ | ++ | ++ | ++ |
| | Efficiency | | | | | | | |
| Budgetary impacts | | + | ++ | ++ | ++ | ++ | ++ | +++ |
| Equity | | - | - | - | -- | - | - | -- |
| | Coherence | | | | | | | |
| Coherence with other initiatives of 'Fit for 55' Package and other relevant EU policies | | + | ++ | ++ | + | - | - | - |

Annotation: Options are compared against the baseline scenario

7.2 Effectiveness

7.2.1 Contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal

All the proposed options contribute to the environmental objective. The proposed tax reforms are in line with the objectives of the European Green Deal.

Three features of the proposed scenarios affect different outcomes: the level and structure of rates, the extent to which the taxable base is broadened (altogether contributing to the increase in effective rates) and the introduction of a CO₂ or pollution component. The first two options would have a positive impact in this respect, due to the increase in the taxation of fossil fuel and more air pollutant products, even when a CO₂ or/and an air pollution component is not yet introduced in the proposed tax design. The application of different transition periods (10 and 7 years) for Options 2 and 3 will not alter the expected outcome in 2035. The introduction of a pollution component positively affects the reduction of CO₂ emission, as a result of increased taxation.

Not surprisingly, Option 1 has more limited, albeit positive, impact on emissions. In fact, the impact of this option is mainly driven by demand's adjustments to price increases expressed in volumes' terms. The products' substitution impact is very limited. The current unfavorable tax treatment of biofuels is only removed in a very limited way, considering that rates are still fixed in volumes and the lower energy content of most biofuels would be still penalised.

The impact is higher under the central scenario (Option 2) considering the increasing in rates and the wide restructuring of the tax rates and the broadening of the taxable base in this scenario. In this case, the taxation of products according to energy content, the introduction of the taxation of biomass together with a more favourable tax treatment of sustainable biofuels and the much lower taxation of electricity and advanced biofuels contribute to the objective of energy efficiency while encouraging the shift towards the use of less polluting fuels. The broadening of the tax base, including the taxation of intra-EU aviation, maritime and inland shipping further stimulates the positive climate impact *via* the reduction of the favourable fossil fuel's provisions embedded in the present Directive.

By the end of the transitional period of the central option (2035), the impact on emissions is estimated to be more than three times higher than the impact of the minimalistic option.

On the other hand, as opposed to the options introducing CO₂ based taxation, Option 2 (different variants) would not reflect the natural advantage in terms of CO₂ neutrality.

Since policy Option 3 requires Member States to apply CO₂ taxation on top of existing rates, it is not surprising that it has the biggest effect on GHG emissions. The introduction of a CO₂ component would double the positive effects of option 2. In relative terms, CO₂ taxation reduces emissions more than energy-content based taxation. Biofuels differ when it comes to the question which of the two effects is more important. The Commission's impact assessment of the 2011 proposal suggested that, while correcting for the difference in energy content is very significant for ethanol, non-application of CO₂ taxation has more relevance for most types of biodiesel.⁶⁹

The options introducing a pollutant component would reflect the natural advantage in terms of air pollution neutrality. However, it should be noted that Option 2a do have a positive effect on reducing air pollution.

⁶⁹ Table 11, page 39 of document SEC(2011) 409

The relative contribution towards GHG reduction differs noticeably among Member States, largely depending on the starting point of the national energy tax design and on their present energy mix.

In the case of option 1, the main driver of the impact is the increase in the minimum rates following indexation, which will impact notably the Member States whose current national rates are fixed at the minima.

In the case of the central Option the drivers the impacts are deeper and more wide spread among Member States, considering, as mentioned earlier, the wide restructuring of both the tax rates and taxable base.

When we include air pollution in the proposed rates and considering that this component increases in a very substantial way the taxation of two products (coal and coke, and biomass), the impact on Member States is even more diverse and depends on the national energy mix). In general, lower income Member States are more affected by this option.

In all options, the main contribution to CO₂ reduction is due to the changes in demand by the household sector.

However, under Options 2 and 3 there is a noticeable increase in the effort made also by the productive sector. While the households remain the biggest contributor, the wide broadening of the tax base results in the energy and process industries contributing relatively more.

When a pollution element is introduced, this increases very much the household effort since coal and coke for heating is heavily impacted.

As far as the contribution of transport, heating and other sectors is concerned, both Options 1 and 2 can contribute to widespread the EU's efforts to reduce emissions. The taxation based on energy content (Option 2), energy content plus CO₂ (option 3), the introduction of the taxation of the intra-EU aviation and shipping, the increase of taxation for the primary sectors and the energy intensive industries as well as the increase of the taxation of heating fuels, will imply that all sectors of the economy will improve their contribution to the EU climate objective and to a more equal tax treatment.

Concerning the application of different transitional period of 10 or seven years, (Option 2b and 3b) it has to be noted that the 2035 expected outcome will not differ. The only difference is that the effects will be more concentrated in the first years with subsequent increase of costs for lower income Member States (Option 1) and for Member States with less stringent system of energy taxation (Option 2 and 3) in the short term.

Preserving the EU internal market and ensuring fair competition

First, all policy options assessed would improve the current situation, in the sense that they would ensure a more consistent treatment of energy products. This is as a result of indexing the minimum rates (Option 1) or indexing and aligning their tax treatment on an objective basis – either energy content or CO₂ emissions (option 2 and 3) and reducing exemptions and derogations (all options at different degrees).

However, option 1 has some shortcomings because it maintains the volumes' based taxation, does not revise the structure of rates according to “energy” criteria and considers a much more limited broadening of the tax base (only eliminating the possibility to fix the rates below the minima) as compared to the other options. In option 1, the value added in terms of internal market is mostly due to indexation of the minimum rates and to the impossibility to fix the rates below the minima.

Under Option 2 and 3, the introduction of energy content base taxation, the more homogenous treatment of different energy products as well as the wide restructuring of the taxable basis, will have the effect to induce a considerable convergence of the effective tax rates.

Option 2 and 3 meets the specific objective of tax neutrality between energy sources and, hence, improve the functioning of the internal market. Taxing on the basis of the energy content is also the most neutral way of generating revenue from energy consumption. Furthermore, it would also partly resolve the disincentive effect that taxation can currently generate for renewables, generally having lower energy content.

Proposed Option 2 does not provide a consistent price signal for CO₂ emissions in the non-trading sectors of the EU ETS.

Option 3 would meet the objective of introducing a CO₂ price signal in sector at present not covered by the ETS, and would therefore ensure consistency with the EU ETS.

As regards the distribution of burden between the ETS and non-ETS sectors, the option introducing a specific CO₂ based tax element can be considered beneficial as introduces a CO₂ tax element, which would be complementary to the EU ETS and thereby remove current differences. On the other hand, option 3 which proposes the introduction of an additional CO₂ tax on top of existing national rates, i.e. it would not take the differences in existing national rates into account for the purposes of complying with the new structure, which would tend to penalise those Member States which already have an elevated level of taxation in force.

As regards distortions of competition between Member States, all options show a positive effects. In fact, all options propose to widen the tax base, increase the tax rates and abolish the below de minima exemptions, and they represent a big step in reducing the competition distortions mentioned above. However, here again, options 2 and 3 introduce more elements (as the elimination of the distinction business and non-business, commercial and non-commercial,

All options proposed will have a convergence effects on effective tax rates. The most converging scenarios are Option 2 and 3. The application of different transitions period will not affect the 2035 outcome. The increase in convergence will be the most beneficial effect in terms of internal market outcome.

7.3 Efficiency

Budgetary impacts

For modelling purposes it is assumed that all additional revenue would be recycled back to the economy (in different ways) and that the overall effects are budget neutral. The scenarios presented in chapter 6 present the outcome when revenues are recycled through lump-sums to households, although alternative revenue recycling options were presented also in the analysis of the E-QUEST model.

Notwithstanding the above, the decision on how to use any potential additional revenue remains of course with Member States. This criterion therefore only assesses how the different policy options would affect the initial revenue that Member States could raise with energy taxation independently of their decision how to recycle it subsequently.

All options safeguard Member States' ability to raise revenues with energy taxation appropriately and will preserve the revenue raising capability of Member States by compensating for the decreasing energy tax revenues trends projected under the baseline. The decrease of energy tax revenues in the baseline is driven by multiple factors, including the assumption of fixed nominal rates, increasing energy efficiency and fuel shift under current climate policies.

Option 1 is clearly the weakest from the point of view of ability to increase revenues because it restricts the increase of the tax base only as a result of the impossibility to fix the rates below the minima. Option 2 in contrast, would imply a consistent increase of revenues following the wide broadening of the tax base.

A stronger increase in revenues is observed under option 2c, and options 3c which introduce a pollution component or/and a CO₂ taxes on top of existing rates for non-ETS sectors.

For the first option, the increase in revenues would mostly be demand driven, whereas for option 2 and 3, the contribution of the productive sectors will be more relevant following the elimination of many exemptions and reductions. The CO₂ component of option 3 would further increase tax revenues.

In reality, however, the budgetary impacts would very much depend on national budgetary choices (possible compensation methods) and also on the choices of Member States when fixing national rates and using the left flexibility.

Equity

As already observed, the relative contribution towards GHG reduction differs noticeably among Member States, largely depending on the starting point of the national energy tax design and on their present energy mix. Under Options 1, 2c and 3c, in general terms lower income Member States, which have lower national rates, will be the most affected.

Also the same holds for the increase in revenues and the impact on revenues differs among Member States. Option 1 will mainly affect those Member States whose national rates are fixed at the lowest levels, whereas Options 2 and 3 will also have a relevant impact on Member States who make extensive use of possible exemptions and deductions. Moreover, the Member States who base their energy mix more on fossil fuels will also be more affected. The application of a transitional period aims at taking into account all these different national circumstances in view of a smooth transition.

In all options, the main contribution to the expected changes appears to come from changes in demand by the household sector. However, under options 2 and 3 there is a noticeable increase in the effort made also by the productive sector. While households remain the biggest contributor, the increase in rates and wide broadening of the tax base under these options (option 2 and 3) result in a relative greater contributions by the energy and process industries. The analysis presented in Chapter 6 also shows that options 2c and 3c show the worst impact among taxpayers in terms of equity because the pollution component mostly hits households.

Increased tax rates lead to an increase in consumer prices, both for motor and heating fuels. Option 1 minima have a very limited impact on heating fuels, and a small impact on motor fuels. Under Option 2a, this increase is similar across heating and transport fuel prices. When a pollution component is added the heating fuel prices increase.

The air pollution component mainly affects heating fuels for households (coal), and result in almost five times increase in household prices for fuels and power compared to the baseline in Option 2 and more than nine times for Option 3.

Concerning the impact on income, the expected increase in consumer prices and the contemporary decline in disposable income will have a small negative distributional effects on household adjusted disposable income. The magnitude of the negative effect over adjusted disposable income is broadly comparable across countries.

7.4 Coherence

The initiative for the revision of the ETD forms part of the EGD and a wider package of initiatives that cover in particular the review of sectorial legislation in the fields of climate, energy, transport, and taxation. Different options fare differently in terms of coherence with other initiatives. Option 1 maintains a level of coherence albeit weak. Options 2a and 2b exhibit the highest level of coherence with other EU initiatives considering that they limit substantially fossil fuel dependency. The taxation of products according to energy content along with the more favourable tax treatment of sustainable biofuels and the much lower taxation of electricity and advanced biofuels contribute to the objective of energy efficiency while encouraging the shift towards the use of less polluting fuels.

As far as coherence with the ETS is concerned, the ETD focuses on setting tax minima for the consumption of energy products. The objective pursued in this context as discussed before is not only contributing to climate targets but also, generating revenues for Member States and minimising distortions on the internal market. The ETS, by contrast focuses exclusively on climate targets and is targeted at pricing CO₂ emitted at the production level of energy intensive installations. On the basis of this distinction the two policies are complementary and do not introduce double price mechanisms on energy products.

The introduction of the pollution component, under option 2c and 3c, would have an extremely high impact on taxation rates for sustainable biomass, which may play against reaching 2030 and 2050 target, while being coherent with commitments made with regards to pollution reduction in particular in the Zero Pollution Action Plan and under the Clean Air legislation. The addition of the CO₂ component under option 3 needs to be assessed in the context of the future with the ETS and in particular the extension to the transport and building sectors to avoid undesired overlaps that could have an excessive impact on stakeholders, therefore resulting in incoherence with other initiatives under the Fit for 55 Package.

8. THE PREFERRED POLICY OPTION

When proposing its updated 2030 greenhouse gas emissions reduction of at least 55%, the European Commission also described the actions across all sectors of the economy that would complement national efforts to achieve the increased ambition. A number of impact assessments have been prepared to support the envisaged revisions of key legislative instruments.

Against this background, this impact assessment has analysed the various options through which the revision of the Energy Taxation Directive could effectively and efficiently contribute to the delivery of the updated target as part of such a wider “Fit for 55” policy package while fulfilling the internal market objective avoiding revenues erosion.

Drawing conclusions about preferred options from this analysis requires tackling two methodological issues.

First, as often the case in impact assessment analysis, ranking options may not be straightforward as it may not be possible to compare options through a single metric and no option may clearly dominate the others across relevant criteria. Ranking then requires an implicit weighting of the different criteria that can only be justifiably established at the political level. In such cases, an impact assessment should wean out as many inferior options as possible while transparently provide the information required for political decision-making. This is what this report does for the introduction of the ETD, based on the objectives of the measure and intervention logic.

Secondly, when a policy package involves a high number of initiatives underpinned by individual impact assessments, the preference for any specific measure may be a function of the policy preferences expressed in other impact assessments. The same can also be true, for instance, for the intensity of any specific measure or the nature and level of a target.

Given the complex interdependence across policy tools and the interplay with the previous methodological issue, no simultaneous determination of a preferred policy package is thus possible. A sequential approach was therefore necessary.

First, the common economic assessment, underpinning the “Communication on Stepping up Europe’s 2030 climate ambition” looked at the feasibility of achieving a higher climate target and provided insights into the efforts that individual sectors would have to contribute. It could not, however, discuss precise sectoral ambitions or detailed policy tools. Rather, it looked at a range of possible pathways/scenarios to explore the delivery of the increased climate ambition. It noted particular benefits in deploying a broad mix of policy instruments, including strengthened carbon pricing and increased regulatory policy ambition.

An update of the pathway/scenario focusing on a combination of carbon pricing and medium intensification of regulatory measures in all sectors of the economy, while also reflecting the COVID-19 pandemic and the National Energy and Climate Plans, confirmed these findings.

Taking this pathway and the Communication on Stepping up Europe’s 2030 climate ambition as central reference, individual impact assessments for all “Fit for 55” initiatives were then developed with a view to provide the required evidence base for the final step of detailing an effective, efficient and coherent “Fit for 55” package.

At the aggregate level, these various impact assessments provide considerable reassurances about the policy indications adopted by the Commission in the Communication on Stepping up Europe’s 2030 climate ambition, notably with regard to reinforcing and expanding the role of pricing mechanisms, energy efficiency and renewable energy policies, and the instruments supporting sustainable mobility and transport - all while revising the Energy Taxation Directive.

Based on the above comparison as well as on the analysis of the specific policy options described in Chapter 6, Option 2 and 3 would fulfil the objectives in a desirable way.

Option 3 appears to comply with the climate objective as the option that helps to reduce a higher number of GHG and pollution emissions. Option 2 also contributes to the Climate and Energy objectives as well as to the rest of the objectives presented above. A well-calibrated extension of the ETS to road transport, maritime and inland shipping and buildings coupled with option 2 for ETD review could help to achieve the EU’s ambitious climate objective of 55% emission reductions while allowing attain the rest of the objectives with the ETD review.

Concerning the transitional period, both periods (10 years or 7 years) will have the same impact by 2035 in every option. However, the options with a transitional period of ten years

(option 2a and 3a) provide the best results compared to a shorter transitional period if we look at equity aspects.

When the pollution component is considered, the positive impact on emission reductions is outweighed by the negative distributional impact on households. Moreover, the treatment of biomass (in particular sustainable biomass) under the options including the air pollution component is not consistent with other EU policies. In this respect, it has to be underlined that the quality of wood together with the efficiency and state-of-the art of the bioenergy technology determine the air-pollution from biomass. For domestic use, modern appliances emit almost zero air pollutants and large-scale combined heat and power generated from biomass is more than 80% efficient in some European countries. Considering also that sustainable use of biomass is an important part of bioenergy for reaching carbon neutrality, and also for the RES energy mix, it might be considered whether regulatory measures would be better tailored to address the quality of wood and the use of bioenergy technology.

This being said, options 2a and 3a already have a sizable impact on air pollution reduction.

Therefore, considering that the ETS system should be extended to cover the emissions of transport and buildings, in order to avoid double taxation, option 2a would be the preferred option.

9. HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

Monitoring of taxation of energy consumption is regularly carried out at least once a year through the collection of information from Member States on the occasion of the meetings of the Indirect Tax Expert Group (ITEG). Moreover, twice yearly DG TAXUD together with the Member States update the information database on the applicable energy tax rates (Tax in Europe Database).

Moreover Article 29 of the ETD provides for a regular examination, on the basis of a report and, where appropriate, a proposal from the Commission, of the various provisions of the Directive and the minimum levels of taxation. This examination shall take into account the proper functioning of the internal market and the wider objectives of the Treaty. Once the ETD will be reviewed, this examination will have to focus in particular, on the following:

- i) how Member States have implemented the new framework for the taxation of energy products and electricity in their national systems,
- ii) how it has allowed them to better integrate environmental and energy efficiency considerations and
- iii) what is the economic impact taking into account the way in which Member States have used any additional revenues

Table 10: provides the objectives, progress indicators and data sources/measurement tools which would be used to inform against these indicators. The monitoring indicators are expected to be collected on a yearly basis. For evaluation purposes, annual statistics will be computed and compared between successive years.

Table 10: Monitoring and evaluation indicators

| | Indicators | Measurement tools/data sources |
|---|---|---|
| Ensuring that the system of minimum rates remains up-to-date and works as a “safety net” to prevent a possible race to the bottom by indexing the minimum rates to consumer prices. | <ul style="list-style-type: none"> – Applicable energy tax rates by Member States | <ul style="list-style-type: none"> – Tax in Europe Database |
| Ensuring that the structure of effective rates is in line with the energy efficiency by fixing rates on the basis of energy content and not on the basis of volume. | <ul style="list-style-type: none"> – Energy effective tax rates by Member States – Updated tax rates (effective) in the Excise Duty Tables | <ul style="list-style-type: none"> – Volumes of consumption in view of computing effective tax rates – Tax in Europe Database updated |
| Ensuring that the product coverage in the Directive follows the present EU energy mix, by updating and streamlining the list of covered products. | <ul style="list-style-type: none"> – Products coverage under the revised ETD | <ul style="list-style-type: none"> – Products coverage under the revised ETD – Sector statistics |
| Ensuring the consistency of the EU products coverage under ETD with the other EU policies, by duly considering the specificities of renewable and alternative energy products. | <ul style="list-style-type: none"> – Products coverage under the revised ETD – Evolution of the EU ETS carbon price | <ul style="list-style-type: none"> – Products coverage under the revised ETD – Sector statistics – Statistics on EU ETS carbon price |
| Reducing fossil fuel dependency, by broadening the taxable basis (out of scope and optional exemptions and derogations) | <ul style="list-style-type: none"> – Application of the revised ETD by Member States – Applicable energy tax rates by Member States in line with new minima | <ul style="list-style-type: none"> – Feedback from industry and public authorities – Tax in Europe Database |
| Contributing to the reduction of CO2 emissions, by taking into consideration energy efficiency and the environmental specific impact of different products. | <ul style="list-style-type: none"> – Level of emissions in the EU | <ul style="list-style-type: none"> – Climate statistics – Sector statistics |
| Ensuring a more equal energy taxation treatment across the different modes of transport, by eliminating the mandatory exceptions for the aviation, maritime and inland waterways sector’ intra-EU traffic. | <ul style="list-style-type: none"> – Application of the revised ETD by Member States – Applicable energy tax rates by Member States in line with new minima | <ul style="list-style-type: none"> – Feedback from industry and public authorities – Tax in Europa Database |

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PART 2/3

SENSITIVE*
UNTIL ADOPTION

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a Council Directive

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

{COM(2021) 563 final} - {SWD(2021) 640 final} - {SWD(2021) 642 final} -
{SEC(2021) 663 final}

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ANNEX 1: PROCEDURAL INFORMATION

1. Lead DG, Decide Planning/CWP references

The lead DG is the Directorate-General for Taxation and Customs Union. The Decide reference of this initiative is PLAN/2020/6493.

The Commission Work Programme for 2021 provides, under heading European Green Deal, the “Fit for 55 Package”, which includes the initiative for a revised legislation on energy taxation (legislative proposal, including impact assessment, planned for Q2 2021).

2. Organisation and timing

The Inter-service Steering Group was set up by the Secretariat-General to assist in the preparation of the initiative. The representatives of the following Directorates General participated in the ISSG work: Legal Service, CLIMA, TRADE, JRC, COMP, GROW, ECFIN, ENER, MOVE, BUDG, ENV, AGRI, RTD, MARE, TAXUD.

A total of three Inter-Service Steering Group meetings took place, with the last being on 2 February 2021.

In addition to the Inter-Service Steering Group, DG TAXUD held numerous informal Interservice meetings and technical expert group meetings to gather information, views, policy orientation and technical input from competent DGs on the treatment of energy products and electricity and the way in which the ETD can complement other policies. Representatives from the following Directorates General have been involved: ENER, CLIMA, MOVE, RTD, ENV and JRC. The last meeting took place on 06 November 2020.

3. Consultation of the RSB

An informal upstream meeting with Regulatory Scrutiny Board took place on 15 September 2020. On 19 February 2021, DG TAXUD submitted the draft Impact Assessment to the Regulatory Scrutiny Board and the Board meeting took place on 17 March 2021. The opinion of the Board, as issued on 19 March 2021, was positive with reservations.

The Board’s recommendations have been addressed as presented below.

(1) The report should better explain how the objectives of the ETD have evolved to include environmental and climate policy objectives. It should better explain the coherence of the ETD with other initiatives in the ‘Fit for 55’ package, and in particular the ETS. It should further develop how these instruments interplay and what the optimal combination of the instruments and their ambition levels should be. It should explain how the ETD will contribute to reaching the agreed targets in the most cost-efficient way. It should clarify to what extent the success of the other ‘Fit for 55’ initiatives will be dependent on this one, and vice-versa.

These recommendations have been addressed in Chapters 1 (both in the text and in the box) 2.1, 6 and 7.4.

In chapter 1, explanation on the role of ETD in the context of the “Fit 55” package and the coherence with the ETS system have been added. In particular it has been underlined the different role and the complementarity of the two instruments in contributing to the overall “Fit 55” objective. The review acknowledges that the main role in the decarbonisation of the

EU economy corresponds in any case to the ETS and to the Effort Sharing Decision. At the same time, it explains that without the contribution of the ETD, other initiatives would have to contribute more. This, for example, could result in a higher ETS price. The coordination of the two initiatives (ETD and ETS) can help to achieve the targets in 2030 and beyond in a more cost-efficient way.

Moreover, Chapter 1 and 2.1 now address the double role of ETD as a revenue raising instrument as well as an environmental instrument, underlining the relevance of the two roles and also that the proposed review overcomes a possible trade-off, by simultaneously adjusting rates and broadening the taxable basis, thus increasing the effective tax rates.

Chapter 6 explains the coherence of the quantitative analysis with the FIT 55 in terms of baseline (EU Reference Scenario) and the considerations on the inclusion of the extension of the ETS system to transport and buildings.

Chapter 7.4 explicitly refers to the coherence with the existence and possible extension of ETS.

(2) The report should nuance its finding that the current minimum tax rates no longer serve their purpose to prevent a race to the bottom. For several energy products, many countries are still at or close to the minimum rates. The report could better explain that avoiding a race to the bottom is not sufficient to harmonise rates, unless the minimum rates are set at a sufficiently high level, which is currently not the case.

Sections 2.1 and 2.2 have been revised in order to focus on the converging role of minimum rates in the internal market. These sections show that, in the absence of an indexation mechanism, the real value of rates has eroded over time and they no longer have a converging effect on national rates as the vast majority of Member States tax most energy products and, in some cases electricity, considerably above the ETD minima. Highly divergent national rates are applied in combination with a wide range of tax exemptions and reductions in order to safeguard the competitiveness of EU industries as well as to pursue other national policies. The chapter on effective tax rates summarises the dispersion of these national situations.

(3) The report should clarify the Directive's role in generating energy tax revenues. It should consider introducing an objective on tax collection, as a basis for the analysis of tax revenues in the comparison of options.

Chapters 2 and 4 have been modified in order to clarify the role of the Directive in preserving revenues generation. The need of preserving the capacity to generate revenues for the budgets of the Member States is now defined as one of the general objectives of the review and is included in the intervention logic. The intervention logic has been modified and no more presents operational objectives, but just general objectives and specific objectives. Section 6 has been expanded to include more analysis on the impact on revenues.

(4) The report should better explain the rationale for some proposed minimum rates. It should clarify the evidence behind the concept of 'environmental performance' that determines the minimum rates. In this context, it should better justify the proposed rates for the primary sector, aviation and maritime transport. It should specify how it proposes to tax cargo-only flights within the EU and sustainable airline fuel. The report should better explain how the indexation of minimum rates to inflation would affect effective taxation. It should discuss whether there are plausible alternative combinations of key policy design measures (in terms of minimum rates, scope extension or removal of differentiations, reductions and exemptions) under the preferred option(s) that might become politically relevant and, if so why such variants were not assessed.

Explanation on the rationale for minimum rate as well as clarifications of the concept of “environmental performance” have been introduced in Chapter 5.2 both for different categories of products and uses. In box 4 the rationale for the proposed rates for the aviation and maritime sectors as well as the exemption of cargo flights and the taxation of biofuels have been addressed. The rationale of the choice of the indexation criterion is also explained and the tables presenting the new minima illustrate how (expected) inflation affects the level of rates. In Chapter 5.3 it has been included an alternative consisting in a mix of option 1 (definition of the taxable basis) and 2 (definition of rates) and it is explained why this option has been discarded.

(5) The report should reinforce its analysis of impacts on employment, international competitiveness and air pollution. It should expand the economic impact analysis for energy intensive and transport sectors (in particular air transport), including on their international competitiveness. It should differentiate between the equity effects on households and Member States. The report should better explain regulatory costs and benefits. In particular, it should clarify the consequences of the initiative on administrative costs. The report should expand on the distribution across affected groups.

In Chapter 6, the section on the labour market impacts has been extended to include information both on the Member States impact on employment and on sectorial impact. In the same chapter under sections devoted to the aviation and maritime information on the impact of the proposed options on employment were also presented. A new section 6.8 analysing the impact of the proposed options on more energy intensive industries has been included. The section on distributional impact has been extended to provide more detailed analysis and differentiate between the equity effects on households and Member States. Supplementary detailed results and analysis of distributional impacts across households by Member States for the main options considered was also included in Annex 9. On administrative cost supplementary information was included in Annex 3.

(6) The report should strengthen its analysis on why the options that also tax air pollution perform worse than the preferred option(s). The comparison of options should better recognise the benefits of reduced air pollution, and balance them against negative distributional effects. The analysis could consider transition periods for the introduction of such a tax, take into account the local character of some emissions, and reflect the effects on technical innovation.

The analysis of the reasons why a pollution component should be discarded has been strengthened in section 8 by adding technical considerations on biomass emissions linked to the quality of burnt products and the biotechnologies developments. In the comparisons of the options the benefits of reduced air pollution is better recognised.

The Board notes the estimated costs and benefits of the preferred option(s) in this initiative, as summarised in the attached quantification tables.

The table has been checked

4. Evidence, sources and quality

The evidence for the impact assessment report was gathered through various activities and from different sources:

- TEDB (Taxes in Europe Database)
- TEMS -TAXUD Energy Metadata Survey (Effective Tax Rates)
- DG JRC: Quantification of the industrial energy consumption within the scope of article 2 of the Energy Taxation Directive) (Annex 10)
- DG JRC and DG ECFIN (macro and micro economic modelling for the Impact Assessment
- Validation by external validators (from academia and other international organizations) of JRC's study on out-of-scope provisions and of data collected via TEMS
- Study on aviation
- Replies from citizens, stakeholders and public authorities to the published Inception Impact Assessment and to the Open Public Consultation (OPC)
- Desk research
- Cost assessment of air pollution:
- EMEP/EEA air pollutant emission inventory guidebooks 2019
- EEA Air quality in Europe — 2019 report
- EEA European Union emission inventory report 1990-2017 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)

ANNEX 2: STAKEHOLDER CONSULTATION

1. Consultation activities carried out

Stakeholders were consulted via the Inception Impact Assessment feedback mechanism and via a Public Consultation.

2. Inception Impact Assessment Feedback

The large majority of the 182 replies comes from the business sector, in particular from the energy intensive industries, other business (producers and distributors of energy products and electricity), businesses associations and transport sector. Three Member States two municipalities (Lille and Stockholm), a few public bodies and NGOs and three citizens sent comments.

Member States all underline the need to respect the current rules of unanimity and generally stress the importance of EU competitiveness. One MS seems open to consider negative externalities for the taxation of energy products, whereas another strongly addresses the problem of connectivity in case of maritime taxation. The third MS encourages to tax energy based on energy content and CO₂ and to withdraw the exemption for the aviation sector.

In general, the energy intensive sector, as well as the business associations and producers of traditional energy products, overall claim for maintaining the current legislative framework in the context of the internal market objectives, the role of ETS for climate objectives and the preservation of the EU international competitiveness. They also stress the need to extend and render mandatory the current exemption framework. Moreover, they ask to stop to apply the state aid rules in the context of the exemption.

The aviation and maritime businesses strongly plead in favour of maintaining the current exemption, because of their need to devote resources to investments for alternative fuels (and not taxation), the need to respect international agreements and the possibility to escape a tax by tankering abroad. They also stress the need of a favourable tax treatment of alternative source of energy.

The producers and distributors of electricity and alternative fuels broadly support the analysis presented in the Evaluation and the Inception Impact Assessment and the use of energy taxation as an environmental tool. There is an overall request to tax energy products on the basis of energy content, CO₂ and other polluting emissions. Moreover, they underline the need to favourably treat electricity output, while taxing the polluting sources of electricity and to restructure the products' coverage of the Directive. Some organisations warn for unintended effects of decarbonisation on the security of supply and demand lower rate for natural gas as a transition energy product.

The NGOs present the usual arguments in favour of an environmental based approach and the use of ordinary legislative initiative.

3. Public Consultation - Stakeholder participation

3.1 Respondents

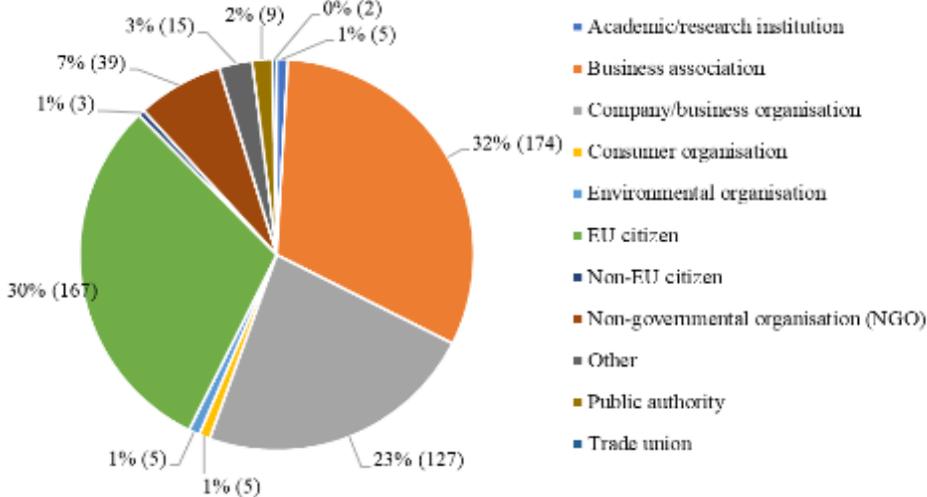
The public consultation was open for 12 weeks from 22 July 2020 to 14 October 2020.

In total, 563 responses were received, together with 129 position papers. During the data cleaning process, 12 blank submissions were found and removed from the dataset. Therefore,

551 responses from 25 Member States and 5 third countries were considered throughout the remainder of the analysis.

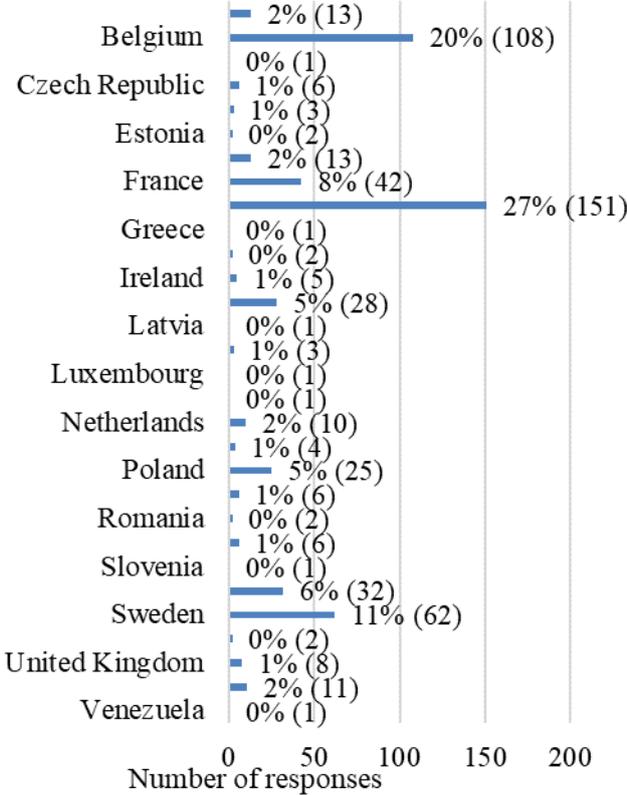
Figure 1 and Figure 2 summarise the respondent types and their geographical location.

Figure 1: Total number and percentage (%) of responses by stakeholder type (N = 551), values = % (n)



Source: Public consultation questionnaire responses

Figure 2: Public consultation survey – respondent geographical location



Source: Public consultation questionnaire responses

Stakeholders providing a response on behalf of the companies and business organisations were asked about the size of their organisation: 30% were from large companies, 16% were from medium, 23% from small, and 31% from micro-organisations. Of the nine public authorities that responded, three were local, four are regional, and two are national.

3.2 Context

As shown in the tables below, an overwhelming majority of respondents agree with the general EU objectives of fighting climate change and pollution and with the application of these objectives to the revision of the ETD. However the support to the revision of the ETD for better tackling environmental concerns, like air pollution, is lower from businesses (even though still majority) but is also present in position papers.

Table 1: Do you agree with the following statements about the EU Energy Taxation Directive (ETD)?

| Stakeholder type | <i>EU’s plans to increase climate ambition for 2030</i> | | <i>EU’s economy and society becoming climate-neutral by 2050</i> | | <i>EU’s Green Deal zero-pollution ambition for a toxic-free environment</i> | |
|--|---|-----------------|--|-----------------|---|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| Companies & business associations | 86.6% | 13.4% | 96.8% | 3.2% | 90.7% | 9.3% |
| EU & Non-EU citizens | 95.9% | 4.1% | 95.8% | 4.2% | 98.8% | 1.2% |
| Public authorities | 100.0% | 0.0% | 100.0% | 0.0% | 100.0% | 0.0% |
| Civil society (all other stakeholders) | 97.0% | 3.0% | 98.5% | 1.5% | 100.0% | 0.0% |

Source: Public consultation questionnaire responses

Table 2: Do you agree with the following statements about the EU Energy Taxation Directive (ETD)?

| Stakeholder type | The ETD should be revised in order to support the transition towards climate neutrality | | The ETD has to be revised in order to better tackle environmental concerns, like air pollution | | The ETD has to be revised in order to better ensure the smooth functioning of the internal market | | The ETD has to be revised in order to take into account the changed energy mix with higher share of renewables and electricity | | The ETD should better promote energy saving/efficiency | |
|-----------------------------------|---|-----------------|--|-----------------|---|-----------------|--|-----------------|--|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| Companies & business associations | 90.0% | 10.0% | 65.9% | 34.1% | 85.3% | 14.7% | 89.4% | 10.6% | 86.7% | 13.3% |

| Stakeholder type | The ETD should be revised in order to support the transition towards climate neutrality | | The ETD has to be revised in order to better tackle environmental concerns, like air pollution | | The ETD has to be revised in order to better ensure the smooth functioning of the internal market | | The ETD has to be revised in order to take into account the changed energy mix with higher share of renewables and electricity | | The ETD should better promote energy saving/efficiency | |
|--|---|-----------------|--|-----------------|---|-----------------|--|-----------------|--|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| EU & Non-EU citizens | 96.4% | 3.6% | 95.7% | 4.3% | 89.9% | 10.1% | 94.9% | 5.1% | 97.0% | 3.0% |
| Public authorities | 100.0% | 0.0% | 100.0% | 0.0% | 100.0% | 0.0% | 100.0% | 0.0% | 87.5% | 12.5% |
| Civil society (all other stakeholders) | 98.5% | 1.5% | 89.1% | 10.9% | 94.6% | 5.4% | 100.0% | 0.0% | 98.4% | 1.6% |

Source: Public consultation questionnaire responses

Respondents were asked about their **priorities for the ETD** and the responses are shown in table 12, which shows that the highest levels of agreement were for the ETD revision taking into account greenhouse gas emissions in the definition of rates, followed by introducing incentives for alternative energy sources such as clean hydrogen and sustainable biofuels. Overall, people disagreed with the following options: the ETD should not tax the energy use in sectors of activity which are at risk of carbon leakage, and the ETD revision should support the objective of minimising the use of whole trees and food and feed crops for energy production, whether produced in the EU or imported.

270 respondents gave details about other priorities that they considered important in the associated open text question. The two commonest priorities were to “take into account greenhouse gas emissions in the definition of rates” (31), and to “reduce the possibility of favouring fossil fuels via tax reductions” (21). A further 24 respondents wanted to avoid the possibility of double taxation. All these opinions were also expressed in position papers. The latter also mentioned that the ETD should contribute to a stable and attractive investment environment with long-term investments in low carbon technologies and products. Some papers insisted on the necessity to take into account individual Member State requirements (e.g., peripheral EU countries) and promoted to promote EU internal competition via differential tax systems across Member States. Others preferred a homogeneous energy taxation in Europe.

Table 3: Which of the following priorities are important for the EU Energy Taxation Directive (ETD)?

| Stakeholder type | The ETD should ensure adequate amounts of tax revenues | | The ETD should not tax the energy use in sectors or companies which are at risk of carbon leakage | | The ETD revision should reduce the possibility of favouring fossil fuels via tax reductions, exemptions and rebates | | The tax system should ensure compensations for low income households when implementing energy taxation | | The ETD revision should take into account energy content in the definition of rates | |
|-----------------------------------|--|-----------------|---|-----------------|---|-----------------|--|-----------------|---|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| Companies & business associations | 51.6% | 48.4% | 70.2% | 29.8% | 65.8% | 34.2% | 63.6% | 36.4% | 80.9% | 19.1% |
| EU & Non-EU citizens | 86.5% | 13.5% | 15.3% | 84.7% | 95.2% | 4.8% | 91.6% | 8.4% | 65.3% | 34.7% |
| Public | 66.7% | 33.3% | 33.3% | 66.7% | 88.9% | 11.1% | 42.9% | 57.1% | 87.5% | 12.5% |

| Stakeholder type | The ETD should ensure adequate amounts of tax revenues | | The ETD should not tax the energy use in sectors or companies which are at risk of carbon leakage | | The ETD revision should reduce the possibility of favouring fossil fuels via tax reductions, exemptions and rebates | | The tax system should ensure compensations for low income households when implementing energy taxation | | The ETD revision should take into account energy content in the definition of rates | |
|--|--|-----------------|---|-----------------|---|-----------------|--|-----------------|---|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| authorities | | | | | | | | | | |
| Civil society (all other stakeholders) | 76.5% | 23.5% | 18.9% | 81.1% | 85.0% | 15.0% | 85.5% | 14.5% | 80.4% | 19.6% |

Source: Public consultation questionnaire responses

Respondents' views on the extent to which they agree with statements regarding **environmental and efficiency goals and functioning of the internal market** are presented below. By far the statement gaining the most agreement, was “the ETD can play a significant role in supporting production of energy from renewable sources”. Option “the ETD should particularly support self-consumption and small producers of electricity coming from renewables” also has high agreement. However, respondents broadly disagreed with all other options.

Table 4: To what extent do you agree with the following statements taking into account environmental and efficiency goals and the functioning of the internal market?

| Stakeholder type | <i>The relevant provisions of the Energy Taxation Directive (ETD) are sufficiently comprehensive also in relation to the new technologies (e.g. production of hydrogen, biofuels, synthetic fuels, e-fuels, etc.)</i> | | <i>The provisions related to the tax exemption for energy products used to produce energy products and the uses of energy products and electricity considered out of scope (e.g. industrial processes such as chemical reduction, electrolytic, metallurgic)</i> | | <i>The mandatory exemption for energy products for electricity production, which can be waived for reasons of environmental policy, is sufficiently clear and comprehensive</i> | |
|--|---|-----------------|--|-----------------|---|-----------------|
| | <i>Agree</i> | <i>Disagree</i> | <i>Agree</i> | <i>Disagree</i> | <i>Agree</i> | <i>Disagree</i> |
| Companies & business associations | 17% | 83% | 48% | 52% | 41% | 59% |
| EU & Non-EU citizens | 11% | 89% | 12% | 88% | 9% | 91% |
| Public authorities | 0% | 100% | 40% | 60% | 60% | 40% |
| Civil society (all other stakeholders) | 6% | 94% | 18% | 82% | 15% | 85% |

| Stakeholder type | <i>The ETD can play a significant role in supporting production of energy from renewable sources</i> | | <i>The ETD should particularly support self-consumption and small producers of electricity coming from renewables</i> | | <i>The possibility of granting tax exemptions or reductions related to combined heat and power generation (CHP) should be restricted</i> | |
|-----------------------------------|--|-----------------|---|-----------------|--|-----------------|
| | <i>Agree</i> | <i>Disagree</i> | <i>Agree</i> | <i>Disagree</i> | <i>Agree</i> | <i>Disagree</i> |
| Companies & business associations | 92% | 8% | 71% | 29% | 14% | 86% |
| EU & Non-EU citizens | 91% | 9% | 80% | 20% | 55% | 45% |
| Public authorities | 100% | 0% | 71% | 29% | 0% | 100% |

| | <i>The ETD can play a significant role in supporting production of energy from renewable sources</i> | | <i>The ETD should particularly support self-consumption and small producers of electricity coming from renewables</i> | | <i>The possibility of granting tax exemptions or reductions related to combined heat and power generation (CHP) should be restricted</i> | |
|--|--|-----------------|---|-----------------|--|-----------------|
| Stakeholder type | <i>Agree</i> | <i>Disagree</i> | <i>Agree</i> | <i>Disagree</i> | <i>Agree</i> | <i>Disagree</i> |
| Civil society (all other stakeholders) | 97% | 3% | 88% | 13% | 41% | 59% |

Source: Public consultation questionnaire responses

3.3 Social impact

Respondents' views on the accompanying measures considered to be the **most relevant social policies** are summarised in table 14. The three most relevant options are the same for all stakeholders, except for public authorities, where a tax-free threshold for heating and electricity taxes is considered the most relevant (although the number of public authority respondents is low). The order of relevance differs slightly: citizens and civic society both considered lower taxation for public transport most relevant, with social welfare programmes for poor households second. Companies and business associations think that reduction of other taxes are most relevant and lower taxation for public transport is second.

A further 127 respondents gave details of other measures they believe relevant, and the argument made by the most (29) is that social measures should be linked to energy efficiency measures. The second most popular argument is "Carbon Fee & Dividend" (17). Among these respondents, a group of Swedish citizens (9) refers to the position of the Swedish Klimatsvaret, summarising it as "equal distribution of energy tax revenues to all citizens as a conversion allowance". Some position papers advocate to redirect fiscal instruments for a green recovery stimulus: public revenues generated could be used to fairly redistribute the economic burden across society and support the most vulnerable, while also providing an opportunity to reduce labour taxation.

Table 5: Which of the following accompanying measures do you consider as most relevant social policies?

| Stakeholder type | Reduction of other tax e.g. taxes on labour or social contributions | | Direct compensation to lower income groups via a lump sum | | Direct compensation to all households via lump sum | | Social welfare programs directed at poor households ¹ | |
|--|---|-----------------|---|-----------------|--|-----------------|--|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| Companies & business associations | 81.7% | 18.3% | 52.9% | 47.1% | 24.5% | 75.5% | 75.5% | 24.5% |
| EU & Non-EU citizens | 46.1% | 53.9% | 57.7% | 42.3% | 48.2% | 51.8% | 85.5% | 14.5% |
| Public authorities | 100.0% | 0.0% | 60.0% | 40.0% | 33.3% | 66.7% | 100.0% | 0.0% |
| Civil society (all other stakeholders) | 67.9% | 32.1% | 58.3% | 41.7% | 42.0% | 58.0% | 84.0% | 16.0% |

¹ reducing their energy costs for both home owners and rental dwellings

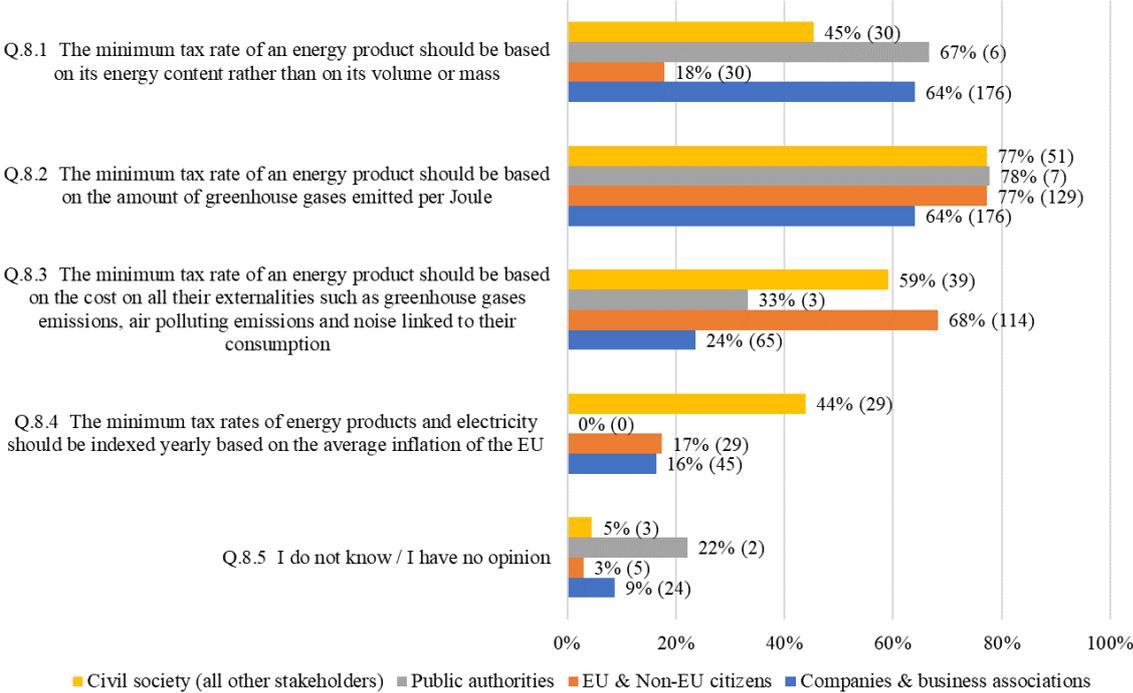
| Stakeholder type | Tax-free base/ threshold for heating and electricity taxes for basis energy consumption. | | Q.7.6 The possibility for lower taxation for local public transport should be kept | | Q.7.7 No accompanying social measures are needed | |
|--|--|-----------------|--|-----------------|--|-----------------|
| | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> | <i>agree</i> | <i>disagree</i> |
| Companies & business associations | 45.4% | 54.6% | 78.0% | 22.0% | 12.6% | 87.4% |
| EU & Non-EU citizens | 25.2% | 74.8% | 86.7% | 13.3% | 5.7% | 94.3% |
| Public authorities | 100.0% | 0.0% | 100.0% | 0.0% | 0.0% | 100.0% |
| Civil society (all other stakeholders) | 39.1% | 40.6% | 83.6% | 6.6% | 17.2% | 65.5% |

Source: Public consultation questionnaire responses

3.4 Standard Rules for energy taxation

Respondents' views on the basis that should be used for setting **minimum tax rates** for energy products are summarised in Figure 37, and the majority (70%) believe they should be based upon the amount of greenhouse gases emitted per Joule. There are similar percentages for two other options: based upon their energy content rather than on their volume or mass (47%); and based upon the cost of all externalities such as greenhouse gases emissions, air polluting emissions, and noise linked to their consumption (43%). 14% of respondents indicated that they did not know or had no opinion. There are considerable differences between stakeholder type, with companies and business associations favouring the first and second options, whereas citizens prefer the second and third options, and civic society prefers the second and third options, although some civic society respondents also opt for the first and fourth options. Stronger support for "indexing minimum tax rates annually to the average inflation in the EU" can be seen in Belgium and Poland.

Figure 3: Which options do you consider as relevant for minimum tax rates. Multiple options are possible



Source: Public consultation questionnaire responses

3.5 Sector exceptions

3.5.1 Agriculture, Forestry and Fishery

Respondents were asked their opinions on specific exemptions and policies relating to several specific sectors of activity. When asked about energy tax treatment exceptions for **agriculture and forestry**, and for **fishery**, a vast majority of citizens and civil society respondents and a small minority of businesses and public authorities indicated that no exceptions should be granted². For both questions, high numbers of respondents indicated that they did not know or had no opinion, with 36% and 43% respectively.

For fishery, position papers recommended that harmful incentives are abolished, and public funds are redirected to improved fisheries management and biodiversity protection. They also advocated support designed to target small-scale fisheries that operate in a way that minimises their impact on the environment.

3.5.2 Transport

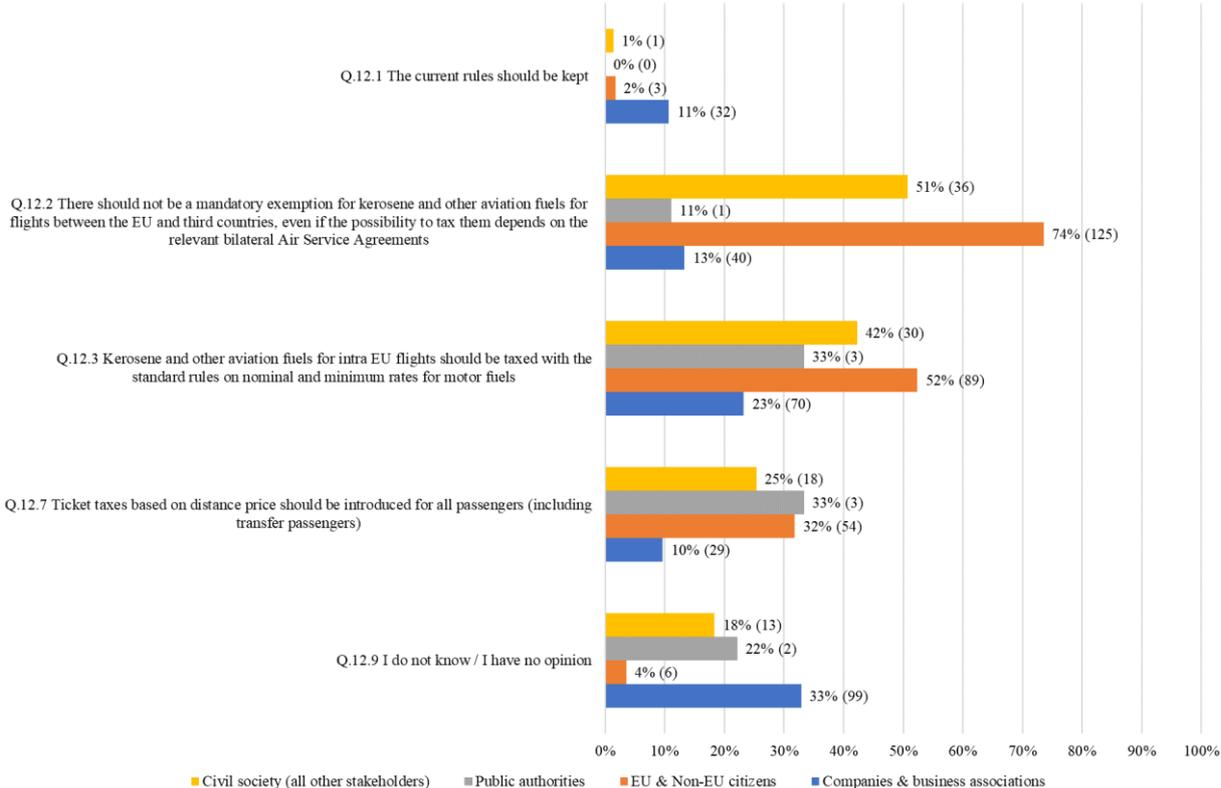
Overall, the public consultation revealed some support to equalising the taxes for different transport modes so that they can compete on a level playing field, the development of more energy efficient and low carbon transport modes as well as the incentivisation and deployment of transitional and lower carbon technologies and fuels particularly natural gas, LNG, CNG and fossil-based hydrogen. Moreover, position papers advocate to increase the use of biofuels

² Agriculture & Forestry: 63% of civil society, 82% of citizens, 25% of public authorities, 16% of businesses
 Fishery: 67% of civil society, 87% of citizens, 13% of public authorities, 14% of businesses

and hydrogen in vehicles, incentivise the development of new technologies and alternative fuels, exempt buses and coaches from the scope of the revised ETD and envision rail as a main future land-based transport mode.

Respondents were asked their opinion on the tax treatment of energy products and electricity for the **aviation** sector. There was reasonable support for two options. For the option gaining the most support, 44% indicated that “there should not be a mandatory exemption for kerosene and other aviation fuels for flights between the EU and third countries, even if the possibility to tax them depends on the relevant bilateral Air Service Agreements”. The second most popular option, with 41% of responses being in favour, is that “kerosene and other aviation fuels for intra EU flights should be taxed with the standard rules on nominal and minimum tax rates for motor fuels”. Only 22% of all stakeholders believe that “ticket taxes based on distance price should be introduced for all passengers (including transfer passengers)”. Furthermore, 26% of all respondents indicate that they do not know or have no opinion. The remaining response options all receive minimal support with less than 10% of respondents choosing these. Position papers wish to incentivise a commercial alternative to kerosene and the development of sustainable aviation fuels.

Figure 4: What is your opinion on the energy tax treatment for the aviation sector? (Multiple options)



Source: Public consultation questionnaire responses

Regarding respondents’ opinions on the energy tax treatment of energy products and electricity for **maritime** transport and **inland waterways**, 53% and 54%, respectively, indicated that fuels in these sectors should be taxed as motor fuel. In both questions, high numbers of respondents indicated that they did not know or had no opinion, 27% and 30% respectively.

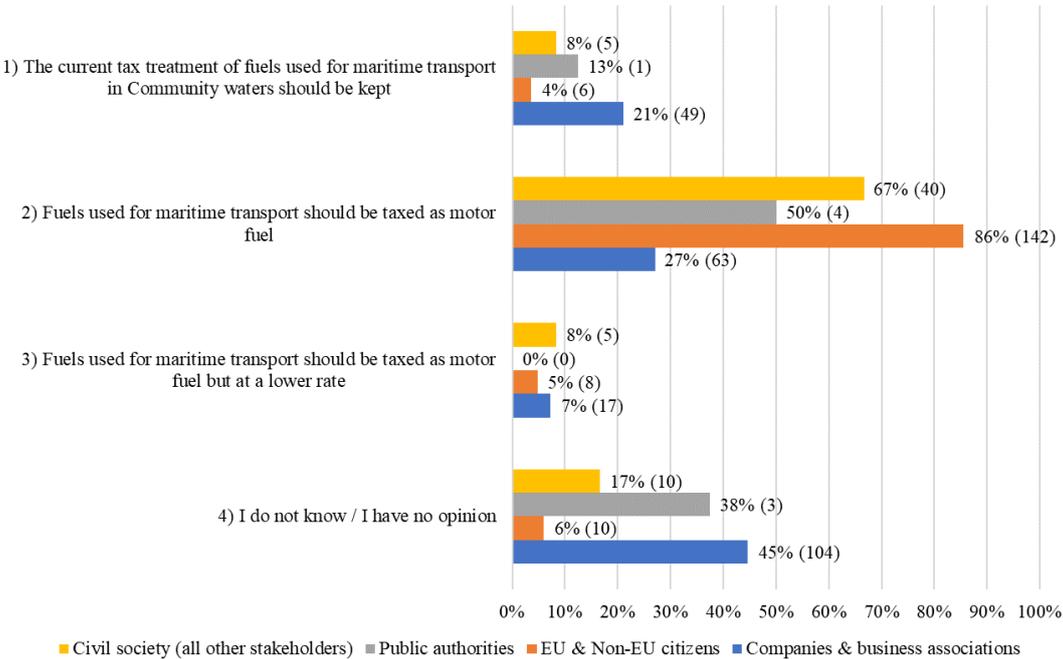
Respondents were also asked about their views regarding **shore side electricity** (SSE) and they favoured two options. The most selected option (61%) is that “SSE should be stimulated

by regulation, for instance by an obligation to use shore side electricity in harbours when available”. The second most selected option (53%) is that “instead of giving a special tax treatment for SSE, the use of fossil fuels on board of ships in harbours should be subject to energy taxation”.

Position papers for navigation highlighted the following main points

- Support alternative solutions in the maritime sector and European ports by facilitating and incentivising investments in a sustainable fuels infrastructure, including development, production, and use of renewable hydrogen and derived e-fuels.
- the EU ETS may be more effective in the maritime sector than an EU-wide fuel tax.
- Maintain the exemption for gasoil until the sector can fully transition to low carbon alternatives.

Figure 5: What is your opinion on the energy tax treatment for maritime transport? (Multiple options)



Source: Public consultation questionnaire responses

When asked about the tax treatment of **diesel or other motor fuels used as a propellant for commercial purposes**, a large majority of responses (70%)³ supported the option that any motor fuel used in road transport should be taxed with the standard rules, whether used for commercial purposes or not. Position papers favour the incentivisation of zero-emission alternatives and no differentiation of tax treatment between commercial and non-commercial.

When asked about the **tax treatment of electricity used in electric vehicles in road transport**, 49% of responses⁴ indicated that there is no need for a specific treatment of electricity used in electric vehicles (road transport). Only 19%⁴ indicated that a specific lower tax rate should be introduced for the use of electricity for electric vehicles, but this option was the most frequent response to the open text accompanying question, with 28 people raising this issue. In the open text responses, 25 people would like electricity from renewable sources

³ 75% of civil society, 94% of citizens, 71% of public authorities, 50% of businesses

⁴ No specific treatment: 43% of civil society, 66% of citizens, 43% of public authorities, 39% of businesses
 Lower tax: 26% of civil society, 17% of citizens, 14% of public authorities, 19% of businesses

to be subject to special conditions, and 24 people would like it to be based on CO₂ content. Position papers advocate for electromobility and the use of electricity over fossil fuels as well as the incentivisation of efficient energy use and storage.

3.5.3 Industry

Respondents were asked about their opinions on the **energy tax treatment of energy products in industry**, and although there was a mixed reaction overall, a clearly preferred treatment could be identified. The highest number of respondents (34%)⁵ consider that “energy products and electricity in the industry sector should not be differentiated when used for heating (including Combined Heat & Power generation) and motor fuels and industrial processes”. All three remaining choices have similar, relatively low levels of support.

39%⁶ of respondents preferred the option “energy products and electricity consumption by industry should be taxed with the EU standard rules on nominal and minimum rates”. However, 35% of respondents indicated that they do not know/have no opinion. The second most supported option (28%)⁶ is ‘energy products and electricity consumption by industry should be taxed with the EU rules only for the energy content and not for the carbon content because the latter is, for an important part, covered by the EU Emissions Trading System’.

In addition, position papers advocate to incentivise electricity over fossil fuels and energy efficiency as well as mandatory exemptions and low minimum tax rates to support international competitiveness of EU businesses, prevent carbon leakage, and keep the internal market balanced. Some recommend a modification of the current taxation on lubricants and harmonisation at European level.

3.6 Lower carbon energy products

When asked about differentiated tax treatments for **low-carbon fuels and applications**, and for **selected fuels (e.g. advanced biofuels and synthetic fuels)**, in both cases the majority said ‘Yes’, with 75% and 63% of respondents, respectively and position papers confirm this opinion. On the same wave length, some position papers advocated for an evaluation of bioenergy on the basis of utility from a holistic viewpoint, for a differentiated treatment for advanced biofuels to encourage emissions reductions with no preferential tax treatments for other types of biofuels.

About **hydrogen**, the highest level of support (51%)⁷ is for option “only if it is green hydrogen, e.g. from electrolysis with renewable electricity, in any of the above”. Some position papers are in favour of green or blue hydrogen (from natural gas).

When asked about their views on tax differentiation for Compressed Natural Gas (**CNG**) and Liquefied Natural Gas (**LNG**), the most frequent response (43%)⁸ was tax differentiation on these products is not acceptable. The second most frequent response (23%)⁹ was that preferential treatment is permissible but should be linked to the standard energy tax components (e.g. energy content and greenhouse gas emissions). Some position papers consider LNG/CNG is currently the only suitable alternative fuel for heavy road transport, public transport, aviation and maritime use and thus, should be incentivised as a transition fuel.

⁵ 43% of civil society, 67% of citizens, 13% of public authorities, 11% of businesses

⁶ Standard rules: 40% of civil society, 58% of citizens, 25% of public authorities, 27% of businesses

Energy content (not CO₂): 17% of civil society, 9% of citizens, 50% of public authorities, 43% of businesses

⁷ 58% of civil society, 77% of citizens, 78% of public authorities, 33% of businesses

⁸ 61% of civil society, 63% of citizens, 56% of public authorities, 26% of businesses

⁹ 21% of civil society, 15% of citizens, 22% of public authorities, 28% of businesses

Inputs from the related open text question and from position papers favour taxation on fuels to be differentiated based on energy content and/or on GHG emissions. They consider that the ETD should favour biofuel as a replacement of fossil fuel-derived energy sources (or at least ensure a level playing field, as sustainable renewable fuels cannot compete with fossil fuels if minimum excise rates are based on volume). They also wish to incentivise the use of transitional “lower carbon” fuels (natural gas, LNG, CNG, fossil-based hydrogen) and technologies that make efficient use of these fuels, in particular for district heating and CHP. Other papers however prefer to remove all fossil fuel incentives and accelerate decarbonisation of the grid and allow only specific exemptions for 'energy communities', self-consumption and self-production. Several papers insist on a clear definition of clean energy, taking into account the lifecycle impact, which would contribute to a gradual change towards a low carbon economy.

3.7 Additional information

Respondents were allowed to leave comments about any aspect of the survey and 300 provided comments covering 547 different issues, with three issues mentioned over 50 times:

- Taxation should be set according to the GHG emissions (well-to-wheel) of all fuels (89);
- The ETD must not result in double taxation (77);
- Incentives for investment in innovative and clean technologies and fuels are required (59).

4. Consultation results summary

The majority (70%) of respondents believe that the **minimum tax rates** of an energy product should be based upon the amount of greenhouse gases emitted per Joule. There is also support for two other options: basing it upon energy content rather than on its volume or mass (47%); or upon the cost of all externalities such as greenhouse gas emissions, air polluting emissions, and noise linked to their consumption (43%). This trend is confirmed in position papers. Overall businesses tend to prefer taking the energy content into account, whereas citizens and civil society prefer the idea of basing the cost on all the externalities.

This was studied in policy options 1 to 3 (energy content), 2c and 3c (air pollution) and 3 (greenhouse gas).

Regarding **nominal tax rates**, the strongest support (61%) is for national nominal tax rates to follow the same structure as those introduced for minimum tax rates. There is considerable unanimity between all the stakeholder groups except public authorities which would prefer no restrictions on national nominal tax rates.

This was studied in policy options 2 and 2 in terms of tax rate ranking between energy products.

Regarding the different **sectors of activity**, approximately half of respondents do not want to see tax exemptions in aviation (44%) and would prefer fuel to be taxed as motor fuel for maritime and inland waterways (50%). Similarly, approximately half the respondents do not want to see special treatment for electric vehicles (49%). Regarding commercial road transport, over two thirds of respondents would like to see fuel taxed as normal (70%). Citizens and civil society tend to favour an abolition of tax exemptions and reductions while businesses would prefer to keep part or all of their sector's preferential tax treatments. Overall, there is strong agreement that the ETD can play a significant role in supporting the production of energy from renewable sources.

A great simplification of the different sectors' and uses' exemptions and reductions was studied in policy options 2 and 3. The removal of the EU-wide mandatory exemption for aviation and maritime and the removal of the optional exemption for inland shipping is also part of policy options 1, 2 and 3.

There is strong support for differentiated tax treatments for **low-carbon fuels and applications**, and for **selected fuels (e.g. advanced biofuels and synthetic fuels)**; in both cases, over two thirds of respondents agreed with this. Regarding policy options addressing the uses of hydrogen, about half support the option of “only if it is green hydrogen, e.g. from electrolysis with renewable electricity, in any of the above”. There was a positive but less enthusiastic response to the idea of tax differentiation for Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) (43%).

The differentiated tax treatment for low carbon and selected fuels was studied in policy options 2 and 3. In these options, LPG and CNG are considered transitory fuel for decarbonation of transport and have a lower minimum tax rate than traditional fuels for a transitional period.

ANNEX 3: WHO IS AFFECTED AND HOW?

1. Practical implications of the initiative

The revision of ETD aims at introducing improvements and simplification in the tax rates and taxable base, as well as clarifications of the legal text. The envisaged changes however should not fundamentally alter the actual levy and administration of excise taxation on energy products and electricity. Energy suppliers or big energy consumers remain the main taxpayers or operators registered for excise purposes. They are responsible for the payment and collection of the tax proceeds, as well as the management of possible reductions and exemptions. The number of taxpayers therefore remains limited (energy suppliers or big energy consumers) and as a result, the administration costs are practically quite limited.

Notwithstanding the above some additional regulatory costs may arise as a result of the new energy products proposed to be introduced in the ETD's scope (e.g. hydrogen and solid biomass). Such costs, albeit limited may arise for the traders in the new energy products and for administrations as these new products will be subject to some provisions of the excise general arrangements. In order to provide an illustrative overview of the key processes and obligations related to the production and trade in energy products and electricity, see the following table, referring to the current Energy Taxation Directive¹⁰:

¹⁰ See the [Commission report: evaluation of the Energy Taxation Directive](#), SWD(2019) 329 final, and the final report on [Technical and legal aspects of Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity](#).

| ADMINISTRATIVE BURDEN | For economic operators | For Member States | Source |
|--|---|--|--|
| Declaration and payment of excises | | | |
| Excise declaration | * Register for the use of the electronic declaration system * Prepare data for the declaration * File the declaration (electronically) | * Set up and maintain IT system * Control the correctness of declarations * Ensure all consumptions have been duly declared --> perform physical and document-based audits | National legislation Horizontal Directive Commission Regulation EMCS |
| Payment of duties | * Establish a payment method * Ensure continuous operability (E.g. provide for sufficient amount on bank account) | * Set up payment system * Control payment is made | National legislation |
| Respect of minimum rates | / | * Ensure compliance with EU minimum levels of taxation | Energy Taxation Directive (art. 4) National legislation |
| Excise classification | * Ensure that categorization of products is up to date * Inform on the categorization of taxable products not explicitly listed in the legislation | * Update the IT system with Combined Nomenclature changes | Energy Taxation Directive (art. 2) National legislation |
| Exemptions and reductions | | | |
| Provide direct tax exemption/reduction (in practice, based on licensing schemes) | * Prepare and submit request for licenses/authorizations | * Assess and issue licenses/authorizations | Energy Taxation Directive (Art. 6) National legislation |
| Request for a refund | * Prepare and submit request for refund | * Assess and grant refunds | Energy Taxation Directive (Art. 6) National legislation |
| Record keeping and reporting requirements (fiscal control) | * Ensure compliant record keeping | * Perform physical and document-based audits | Energy Taxation Directive (Art. 5, 14-18, 21) National legislation |
| State aid | / | * Verify that State aid rules are not breached | State aid rules (EU and national) |
| Movement | | | |
| <i>Under suspension</i> - Operate EMCS | * Register to the EMCS system | * Set up and maintain EMCS system | Horizontal Directive Commission Regulation EMCS |
| <i>Under suspension</i> - Placing and release from goods in EMCS | * Prepare the data and use EMCS to place and subsequently release the movement under suspension of goods | * Ensure the movement under suspension of goods is compliant --> perform physical and document-based audits | Horizontal Directive Commission Regulation EMCS National legislation |
| <i>Under suspension and duty-paid</i> - Guarantee | * Foresee a guarantee | * Calculate the amount of guarantee | Horizontal Directive National legislation |
| <i>Duty-paid</i> - Request for a refund | * Prepare and submit request for refund in case of MS movements of duty-paid goods | * Assess and grant refunds | Horizontal Directive National legislation |
| Storage and production | | | |
| Request for a license | * Prepare and submit request for licenses/authorizations | * Assess and issue licenses/authorizations | Horizontal Directive National legislation |
| Guarantee | * Foresee a guarantee | * Calculate the amount of guarantee * Ensure guarantee is in place | Horizontal Directive National legislation |
| Record keeping and reporting requirements | * Ensure compliant record keeping | * Perform physical and document-based audits | Horizontal Directive National legislation |
| Member States derogations | | | |
| Monitor MS derogations | / | * Introduce request for further exemptions or reductions for specific policy considerations | Energy Taxation Directive (art. 19) National legislation |
| Statistical reporting | | | |
| Report to the EU Commission | / | * Inform the EU Commission about the levels of taxation applied and about the exemptions, reductions, differentiations and tax refunds adopted | Energy Taxation Directive (art. 25 26) National legislation |

Source: Study on "Technical and legal aspects of Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity"

2. Summary of costs and benefits

| <i>I. Overview of Benefits (total for all provisions) – Preferred Option 2a</i> | | |
|--|--|--|
| <i>Description</i> | <i>Amount</i> | <i>Comments</i> |
| <i>Direct benefits</i> | | |
| Contributing to the EU 2030 targets and climate neutrality by 2050 in the context of the European Green Deal | Change in EU 27 emissions in 2035 compared to the baseline: <ul style="list-style-type: none"> • • GHG: -1,6% • • NO_x: -1,7% • • PM_{2.5}: -2,5% • SO₂: -1,6% (see the relevant section on impacts of the policy options, results on option 2a) | By reducing emissions, the ETD will enable the EU to achieve its increased targets for 2030 and become carbon neutral by 2050 |
| Preserving the EU internal market and ensure fair competition | The introduction of the new minima and the broadening of the tax base will contribute to greater convergence of effective tax rates across Member States (see the relevant section on impacts of the policy options, results on option 2a) | The envisaged provisions on product coverage, tax rates and taxable base aims at fostering more harmonised rules to the benefit of the internal market (and national administrations, economic operators, citizens) |
| Budgetary impacts | Revenues in Member States are expected to increase. The evolution in EU27 of total tax revenues is expected as follows: <ul style="list-style-type: none"> • • +22% in 2035 corresponding to c. 24 billion EUR This additional revenue compensates for around 70% of the loss in revenue projected under the baseline (see the relevant section on impacts of the policy options, results on option 2a) | Due to the widened product coverage, increased minimum rates and enlargement of taxable base, revenues generated from energy taxation are expected to increase significantly. |
| Equity | Equity has been taken in due consideration in the policy design for the revision of the current legal system <ul style="list-style-type: none"> • The relative contribution towards GHG reduction differs noticeably among Member States. • The same holds for the increase in revenues. • In general, lower income Member States, which have lower national rate, will be the most affected. • The effect on income distribution is of small magnitude and seems just slightly larger in the first half of the income distribution. (see the relevant section on impacts of the policy options, results on option 2a) | As expected due to the very different national situations the proposed option will have distributional impact. This is one of the reasons why some changes are proposed following a transitional period of implementation. |
| Coherence with other initiatives of 'Fit for 55' Package and other relevant EU policies | The preferred option is fully coherent with other initiatives of 'Fit for 55' Package and relevant EU policies. (see the relevant section on impacts of the policy options, results on option 2a) | This option does not overlap with but in fact usefully complements other policy actions under the 'Fit for 55' Package. |

For the **costs** of the Directive's functioning, the specific implementation of the ETD is dependent upon several other factors. These include aspects such as specific national or other EU policies being applied in the same domain, national priorities and industrial legacy, prevailing economic and trading conditions or business models of individual sectors or companies.

According to the (already published) evaluation of the current ETD¹¹, due to the wide ranging flexibility left by the current ETD to Member States to apply exemptions, reductions and refunds it was vastly complicated to even calculate effective rates in a harmonised way

¹¹ See the [Commission report: evaluation of the Energy Taxation Directive](#), SWD(2019) 329 final

across the EU. Particularly that at the time of the evaluation no official data collection existed that was equipped to capture effective tax rates. Altogether means that it was difficult to single out and quantify some effects of the Directive's working.

However, in the current exercise, some economic costs have been identified in the relevant section on impacts of the policy options.

Moreover some regulatory costs (mostly managing authorisations, declarations and IT systems update) will arise for the traders in energy products newly introduced in the ETD's scope and for administrations as these products will be subject to some provisions of the excise general arrangements¹²; however these costs should be limited for hydrogen and solid biomass traders as these products will be allowed the same movement control simplifications as natural gas and coal respectively. The termination of excise duty exemptions for some fuels or sectors of activity (e.g. aviation and maritime) does not change the regulatory costs related to general arrangements as exempted fuels were anyway subject to holding and movement controls.

The collection of a fuel tax in the aviation sector is not expected to be problematic from an administrative perspective. Member States already have experience in collecting fuel taxes in other transport modes (mainly road transport). It is expected that an aviation fuel tax would be collected in a similar manner, with the fuel suppliers collecting the tax when they supply kerosene at airports, then transferring those funds to the relevant tax authorities.

In terms of efficiency, the costs of collecting the current motor fuel taxes can be used as a proxy for how much it would cost to collect an aviation fuel tax. A 2012 study carried out for DG MOVE¹³ found that administrative costs for public authorities represented between 0.65% and 0.85% of the revenue of fuel tax. It is estimated that the collection of a kerosene fuel tax would be somewhat simpler, as the supply of kerosene is concentrated at airports, of which there are only a few in each Member State. Given this, the lowest figure of 0.65% of revenue is considered as representing the administrative costs of collecting a fuel tax.

Those costs can be summarised as follows.

| <i>II. Overview of costs – Preferred option 2a</i> | | | | | | | |
|--|--------------|---|--|--|---|---|--|
| | | Citizens/Consumers | | Businesses | | Administrations | |
| | | One-off | Recurrent | One-off | Recurrent | One-off | Recurrent |
| Increase in effective taxation in the economy and broaden of the scope of the Directive | Direct costs | - Loss of employment by 0.2% at EU 27 level | - Increase in household heating and transport prices | As consumers: - Cost increase due to reduced exemptions including for new | As consumers: - Increase in fossil fuel prices As | limited regulatory costs for authorisations of new traders and new products | limited regulatory costs for declarations management and authorisations follow |
| | | | | | | | |

¹² Council Directive 2008/118/EC of 16 December 2008 concerning the general arrangements for excise duty and repealing Directive 92/12/EEC

¹³ CE Delft et al. (2012). An inventory of measures for internalising external costs in transport. Brussels: European Commission.

| | | | | | | | |
|---------------|----------------|---|--|---|--|--|--|
| | | | | taxed sectors (e.g. aviation and maritime) As suppliers: - Limited regulatory costs for traders that store or move cross-border new energy products | suppliers: - declarations management and authorisations follow up | | up Cost of collecting tax revenues. |
| | Indirect costs | | | | | | |
| Action | Direct costs | None as stated in the evaluation report | | | | | |
| | Indirect costs | None as stated in the evaluation report | | | | | |

ANNEX 4: ANALYTICAL METHODS

1. Introduction

In order to assess the environmental, macro-economic, and distributional impacts of the proposed revisions to the ETD, the analysis used three modeling tools: (1) JRC-GEM-E3, a computable general equilibrium model; (2) EUROMOD, a static microsimulation model; and (3) DG ECFIN's E-QUEST, a New-Keynesian dynamic stochastic general equilibrium model that has recently been enriched with a representation of the energy system.

2. The JRC-GEM-E3

2.1 Overview

The JRC-GEM-E3¹⁴ (General Equilibrium Model for Economy-Energy-Environment) is a recursive dynamic Computable General Equilibrium model. It is a global model, covering the European Union, alongside 13 other major countries or world regions. With a detailed sectoral disaggregation of energy activities (from extraction to production to distribution sectors) as well as endogenous mechanisms to meet carbon emission constraints, the JRC-GEM-E3 has been extensively used for the economic analysis of climate and energy policy impacts.

Divided into 31 sectors of activity, firms are cost-minimizing with CES production functions. Sectors are interlinked by providing goods and services as intermediate production inputs to other sectors. Households are the owner of the factors of production (labour, skilled or unskilled, and capital) and thereby receive income, used to maximize utility through consumption. Government is considered exogenous, while bilateral trade-flows are allowed between countries and regions.

In 5-year steps, an equilibrium is achieved at goods and services markets, and for factors of production through adjustments in prices.

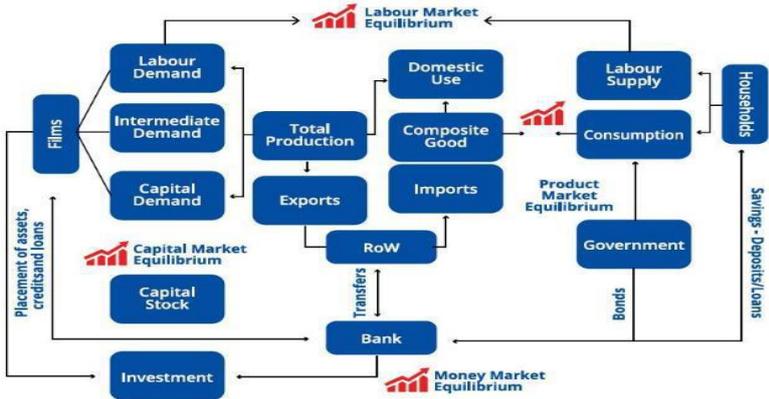
The model also integrates (in particular for the baseline building) inputs from energy system models (generally PRIMES for EU Member States and POLES-JRC for the rest of the world) on a number of variables of interest, such as a detailed use of energy products by consumers, global fuel prices, etc. More information on the integration of energy system model inputs in macroeconomic modelling in JRC-GEM-E3, can be found in the Impact Assessment of the Climate Target Plan (CTP) - Annex 9.3¹⁵

The JRC-GEM-E3 model is normally used to compare policy options against a baseline scenario, representing the evolution of the global economy under current energy and climate policies. This is the case in this analysis: a baseline is defined, which represents the European Union's current ETD.

¹⁴ <https://ec.europa.eu/jrc/en/gem-e3/model>

¹⁵ Impact Assessment SWD(2020) 176 final part 2. https://eur-lex.europa.eu/resource.html?uri=cellar:749e04bb-f8c5-11ea-991b-01aa75ed71a1.0001.02/DOC_2&format=PDF

Figure 6: A schematic representation of the GEM-E3 model.



Source: JRC-GEM-E3

The model has been used to provide the macro-economic, sectoral and trade economic assumptions as input for this Impact Assessment. JRC-GEM-E3 produces consistent sectorial value added and trade projections matching GDP and population projections by country taken from other sources such as the ECFIN t+10 projections for economic activity and the Ageing Report. The model can also be used to assess the impacts of the energy and climate targets on macroeconomic aggregates such as GDP and employment.

The most important results, provided by GEM-E3 are: Full Input-Output tables for each country/region identified in the model, dynamic projections in constant values and deflators of national accounts by country, employment by economic activity and by skill and unemployment rates, capital, interest rates and investment by country and sector, private and public consumption, bilateral trade flows, consumption matrices by product and investment matrix by ownership branch, GHG emissions by country, sector and fuel and detailed energy system projections (energy demand by sector and fuel, power generation mix, deployment of transport technologies, energy efficiency improvements).

2.2. Adjustments and data extensions to the GEM-E3 model

2.2.1 Taxing energy use – model enhancements to introduce excise taxes

In the model, both firms and households consume energy. For firms, energy products are used as inputs to the production. For households, energy products are used to render two types of utility-deriving services, namely fuels for heating and appliances and fuels for private transportation. Energy products are supplied through five different sectors of activity: coal products, oil products, natural gas, electricity and agriculture (for biofuels).

For the purpose of analyzing the impacts of changes to the ETD, two new model parameters we introduced, for firms and households respectively, which represent a unit excise tax per volume of energy consumption (ton of oil equivalent in the model). The new model parameters are created in four dimensions: per country, per year, per energy consumer (also distinguishing between heating and motor fuels for households) and per energy product.

In the baseline, these new model parameters must reflect as close as possible the existing energy taxation levels in the EU under the current ETD. The most up-to-date information on tax rates and tax bases were used to derive effective tax rates (net of rebates/exemptions) in the required format for the JRC-GEM-E3 modelling exercise.

2.2.2 Deriving effective tax rates for the JRC-GEM-E3

Context

The calculation of effective tax rates, in its simplest form can be summarized as follows:

$$\text{Effective tax rate (in € per toe)} = \frac{\text{Nominal tax rate (€ per toe)} \times \text{Taxable volume (toe)}}{\text{Total Consumption Volume (toe)}}$$

Identifying total consumption volumes per sector requires inputs from a highly detailed energy consumption database covering all Member States. The 2020 Eurostat Energy balances¹⁶, which also enables us to ensure compatibility with the JRC-GEM-E3 baseline building process¹⁷.

The calculation of effective tax rates is implemented in four steps:

- 1) Using the 2020 Eurostat Energy balances, the total consumption of fuels by consumers (production sectors and households) was employed at the level of detailed energy products reported in the balances (63 products);
- 2) Building on additional Commission analysis, the in-scope versus out-of-scope consumption volumes for each user was identified at the detailed energy product level;
- 3) Tax rates were mapped to the 33 consumers in the model, and 63 products in the energy balances (in consistent 2018€ per energy unit).
- 4) For each consumer, effective tax rates were derived by applying tax rates and tax bases, aggregating the detailed energy products to the level of the five energy-supplying sectors in the model.

The Eurostat energy balances present the supply and consumption of energy commodities throughout the economy in consistent units (tons of oil equivalent). The latest edition (2020) of the Eurostat energy balances was used for the most-recent available year, i.e. 2018, to derive the total use of energy products by JRC-GEM-E3 consumers.

Total consumption of energy products (fu) for each country (ct) and for each of the 33 consumers (co , 31 sectors and two households uses) was defined as the sum of inputs for transformation processes (e.g. for heat generation) and final consumption, as below:

$$TotCons_{fu,co,ct} = Trans_inp_{fu,co,ct} + Fin_cons_{fu,co,ct}$$

In-scope energy consumption

While the total consumption for JRC-GEM-E3 sectors and households represents how much energy products are actually consumed overall, this consumption is not fully subject to excise taxes. In the absence of full-fledged dataset on the actual volumes of energy subject to taxation across the Member States, further analysis was undertaken to identify the amount of energy consumption that is completely exempt from taxation according to article 2 of the ETD for energy intensive industries.

Using the same matching methodology as above to calculate total consumption, the in-scope energy consumption was identified at the level of JRC-GEM-E3 sectors as the difference between total consumption, and the identified out-of-scope volumes inputs for transformation processes and final consumption:

¹⁶ <https://ec.europa.eu/eurostat/web/energy/data/energy-balances>

¹⁷ The JRC-GEM-E3 model relies on input from energy system models to represent the present and future evolution of energy consumption for firms and households in the baseline. For EU MS, the projections of the PRIMES model are used, for which the Eurostat energy balances are the starting point.

$$InScopeCons_{fu,co,ct} = TotCons_{fu,co,ct} - OutScopeTransinp_{fu,co,ct} - OutScopeFC_{fu,co,ct}$$

Furthermore, a number of Member States apply special rates to industry on certain out-of-scope processes, as well as for products used for heat generation in CHP.

Therefore, the calculation of effective tax rates also requires the identification of volumes for the various out-of-scope processes at the disaggregated product level. Therefore an out-scope volume with a process dimension¹⁸ ($OutScopeCons_{fu,co,pro,ct}$) was computed for each of the out-of-scope processes, namely: *Chemical reduction, Electrolysis, Metallurgical processes, Mineralogical processes, Dual use and Uses other than motor or heating fuel*¹⁹.

The volume of products used to generate heat in CHP processes ($CHPScopeCons_{fu,co,ct}$) was also computed. In the absence of data on the volume of fuels used for heat or for power in CHP, we use the heat/power output split in each sector and country provided in comments to JRC.C7 by the International Energy Agency²⁰.

Finally, full exemptions to a set of activities were assigned namely: energy products for electricity generation, fuels used for aviation and navigation. For these sectors, in-scope volumes are zero.

Mapping tax rates to consumers and products

First tax rates per sector and product groups -currently in volume (1000L), weight (1000kg) or energy units (GJ, MWh)- were converted into consistent units across fuels, namely per ton of oil equivalent (€/toe). For this exercise conversion rates based on Eurostat's 2019 calorific values from the Energy Balances Guide were employed Table 6.

Detailed tax rates were assigned to the JRC-GEM-E3 consumers, namely the 31 sectors of activity and two households uses as described in Table 7

Table 6: Conversion factors for original tax rate units to EUR per toe

| Units provided by TAXUD → | EUR/ 1000 litres | EUR/ 1000 kg | EUR/ GJ | EUR/ MWh |
|---------------------------|------------------|--------------|---------|----------|
| Petrol | 1.25 | | | |
| Gasoil | 1.15 | | | |
| LPG | | 0.89 | | |
| Heavy Fuel | | 1.04 | | |
| Coal and Coke | | | 41.87 | |
| Natural gas | | | 41.87 | |
| Kerosene | 1.19 | | | |
| Electricity | | | | 11.63 |

Source: JRC

Table 7: Mapping tax rates to JRC-GEM-E3 consumers

| JRC-GEM-E3 energy consumers | | Tax database |
|-----------------------------|-------|--------------|
| 1 | Crops | Agriculture |
| 2 | Coal | Industry |

¹⁸ For instance, the consumption of natural gas for metallurgical processes in the Iron and Steel sector.

¹⁹ Note that in Article 2, another exemption exists: Electricity accounting for more than 50% of the cost of a product. However, due to lack of data on production costs, we were unable to identify the corresponding volumes.

²⁰ For 22 out of 27 Member States, which are also members of the OECD; the five remaining MS are assigned EU average values.

| | | |
|-------|-----------------------------|--------------------------------------|
| 3 | Crude Oil | Industry |
| 4 | Oil Products | Industry |
| 5 | Gas | Industry |
| 6 | Electricity supply | Industry |
| 7 | Ferrous metals | Industry (ETS) |
| 8 | Non-ferrous metals | Industry (ETS) |
| 9 | Chemical Products | Industry (ETS) |
| 10 | Paper Products | Industry (ETS) |
| 11 | Non-metallic minerals | Industry (ETS) |
| 12 | Electric Goods | Industry |
| 13 | Transport equipment | Industry |
| 14 | Other Equipment Goods | Industry |
| 15 | Consumer Goods Industries | Industry |
| 16 | Construction | Industry |
| 17 | Transport (Air) | None - exempted |
| 18 | Transport (Land) | Commercial Haulage- Public transport |
| 19 | Transport (Water) | None - exempted |
| 20 | Market Services | Services |
| 21 | Non Market Services | Services |
| 22-29 | Power technologies | None - exempted |
| 30 | Livestock | Agriculture |
| 31 | Forestry | Agriculture |
| n/a | Household heating | Household heating |
| n/a | Household private transport | Households motor |

Source: JRC

Effective tax rates

Finally, using consumption volumes and tax rates for each of the 33 consumers by detailed energy product, effective tax rates at the JRC-GEM-E3 dimensions, were derived aggregating energy products into five energy-supplying sectors (su).

$$efftax_{su,co,ct} = \frac{[InScopeCons_{fu,co,ct} \times Inscope\ rate_{fu,co,ct} + OutScopeCons_{fu,co,pro,ct} \times Outscope\ rate_{fu,co,pro,ct} + CHPScopeCons_{fu,co,ct} \times CHP\ rate_{fu,co,ct}]}{\sum_{fu} TotCons_{fu,co,ct}}$$

In addition to reflect out-of-scope volumes, this method allows us to differentiate tax rates between sectors (particular industrial sectors) based on their underlying energy mix. For instance, while the gasoil nominal tax rates for the Iron and Steel and non-ferrous metal sectors might be the same, the effective tax rate on oil products (supply sector 04) will vary based on (i) the ratio of in-scope over total consumption for each sector and (ii) the composition of their consumption of oil products (e.g. I&S might consume higher or lower volumes of LPG or gasoil than NFM).

2.2.3 Introduction of air pollutant emissions in the JRC-GEM-E3

To study the impact of the various proposal on air pollutant emissions, the JRC-GEM-E3 model was further developed to cover emissions of NOx, PM2.5 and SO2 for all sectors, energy carriers and countries in the EU. Air pollutant emissions were provided by the GAINS

model (IIASA, <https://iiasa.ac.at/web/home/research/researchPrograms/air/GAINS.html>), and corresponding emission control policies are in line with the baseline of the Second Clean Air Outlook (COM/2021/3 final) for the year 2030.

After mapping the sectors of both models, these emissions were converted into emission factors by dividing with the corresponding drivers: energy use or economic activity. Emissions that could not be clearly linked to either energy use or sectoral activity were kept fixed across scenarios. Emission factors for 2030 were then applied to the years 2025 and 2035, which could lead to slight underestimation (overestimation) of emission reductions in 2025 (2035) if emission factors are decreasing faster in regions where the ETD scenarios are particularly impactful.

While the JRC-GEM-E3 model combines economy-wide coverage with sector- and fuel-specific detail, a few caveats should be considered when interpreting the results on air pollutant emissions. First, emissions related to the use of solid biomass for energy in industry are not accounted for. Second, the model does not capture the split between diesel and petrol, hence may underestimate the benefits of the air pollution component in the minimum rates in terms NO_x emission reductions.

3. EUROMOD

EUROMOD (EM) is the European Union tax-benefit microsimulation model²¹. The EM model combines country-specific coded policy rules with representative household microdata (mainly from the European Union Statistics on Income and Living Conditions database, EU-SILC). The model employs information on countries' tax codes and on household characteristics and economic circumstances to simulate tax liabilities and cash benefit entitlements. Taxes and transfers that are not possible to simulate because of lack of relevant information are used as recorded in the original surveys. The model simulations take into account the role played by each tax-benefit instrument, their possible interactions, and generate the disposable (i.e. income after taxes and cash benefits) household²² income. Therefore, the model results are particularly suitable for the analysis of the distributional, inequality and poverty impact of tax reforms, by household or by individual groups according to socio-economic variables of interest. Cross-country comparability is enabled by coding the policy systems of the EU Member States according to a common framework. EM simulations also provide estimations of the budgetary effects and indicators which are commonly used to measure work incentive effects of the policy reform scenarios.

It should be kept in mind that EUROMOD simulations do not incorporate any behavioural effects that may also affect the fiscal as well as the distributional outcome of a reform. Thus, the model is static and delivers the first-round effects ('the overnight effect').

The analysis of the energy taxation reform scenarios is based on the recently developed Indirect Tax Tool version 3 (ITTv3) extension of the Euromod model.²³ The ITT allows the simulation of indirect taxes (such as VAT and excises) and their impact on household disposable income and government budgets. In a first step, the ITT augments the micro-data

²¹ <https://euromod-web.jrc.ec.europa.eu/about/what-is-euromod>

²² The main income inequality and poverty indicators which are used to evaluate the impact of reforms are generally based on *equivalised* household disposable income, considering economies of scale in consumption within the household: *equivalised* income refers to the fact that household members are made equivalent by weighting them according to their age, using the so-called modified OECD equivalence scale.

²³ <https://euromod-web.jrc.ec.europa.eu/about/what-is-euromod#inline-nav-3>

underlying Euromod with information on household expenditures. This is accomplished by imputing private household expenditure information for more than 200 commodity categories from the harmonised Eurostat Household Budget Surveys (EU HBS henceforth) into the microdata underlying EUROMOD. In a second step, the tool applies the indirect taxation rules in place in each country (including VAT, specific and ad-valorem excises) to compute households' indirect tax liabilities based on their imputed consumption basket. Currently, the ITT rests on the assumption of full tax compliance and of full pass-through, and it is available for 18 countries (BE, CY, CZ, DK, FI, FR, DE, EL, ES, HU, IE, IT, LT, PL, PT, RO, SI and SK).

The simulations used in this analysis are based on EUROMOD version I2.0. The tax-benefit systems simulated in the baseline refer to those in place in each country as of June 2019, while the underlying input data mainly come from the 2010 EU-SILC²⁴ and the 2010 HBS. Incomes reported in the EU-SILC of 2010 refer to 2009-2010. Uprating factors are used to update income and prices from the date of the input data to the year of interest, in this case 2019.

The impact of the energy tax reforms on household budgets is analysed by estimating the changes in household post-fiscal income (post-fiscal income = household disposable income²⁵ – indirect taxes) across the income distribution. Distributional, inequality and poverty risk indicators are calculated on household post-fiscal income for the total population or for specific groups. Their variations in the environmental tax reform scenario under consideration²⁶ are compared against the baseline. EM simulations are also performed for a scenario in which the energy tax reforms are accompanied by a budget-neutral compensatory measure that redistributes the additional revenue through lump-sum transfers among households.

For the simulations of these energy taxation reforms, EM has been linked to the GEM-E3 macroeconomic model to account for the economy wide impact of the reforms. Two main steps are followed to link the two models. In the first step, the baseline scenarios of the two models are aligned.²⁷ For this end, the consumption of each household in the ITT is adjusted proportionally in order to ensure that the aggregate share of consumption expenditure by each group of goods and services (e.g “Education”, “Food” etc) matches the one in the GEM-E3 model. In the second step, EM is fed with the impact of the simulated tax reform over prices and incomes, as simulated by the GEM-E3. In more detail, the consumption expenditure of each household is adjusted to account for the changes in prices (while keeping constant quantities). Such consumer price changes reflect both the tax change as well as the impact that the reform has on producer prices. Furthermore, household income is also adjusted to account for the changes in labour and capital income triggered by the reform, as simulated by the GEM-E3.

It should be noted that for the scenario with a compensatory measure, the tax revenues to be redistributed among household are estimated within the EM framework. Revenues estimated

²⁴ While there are more up to date EU-SILC data, the 2010 version was chosen to match latest EU-HBS dataset available for the imputation of consumption data.

²⁵ Household market income net of direct taxes and cash benefits.

²⁶ For impact assessment EUROMOD was used for the analysis options 1/2.

²⁷ There are a number of reasons for the baselines of Euromod and GEM-E3 not to be necessarily aligned in a given year. One of them is that EM and GEM-E3 variables are constructed in accordance to different sets of statistics: for example, while in GEM-E3 household consumption is aligned with National Account data, consumption is recorded from survey data in EM.

from the macro model are larger, because they account for the increase in taxation in other sectors of the economy as well (e.g. the corporate sector).

This procedure rests on two key assumptions affecting the estimation of the change in the indirect tax burden for households. First, in the reform scenario, households are assumed to continue consuming the same quantities of all goods as before the tax hike. This can be interpreted as demand being inelastic or the “morning-after effect” (households do not adapt their consumption basket after the change in price). That effectively rules out any offsetting effects via reduced demand.²⁸ Second, changes in indirect taxation are measured by the variations in consumer prices resulting from the tax reforms. That amounts to assume constant producer prices and a full pass-through of the tax burden to consumers. This is a restrictive assumption since depending inter alia on market conditions, the pass-through could be imperfect and producer prices could vary to offset or to reinforce the impact of tax changes over consumer prices. Accordingly, the estimates from this approach might result in either an over-estimation (driven by the inelastic demand assumption) or an under-estimation (driven by eventual shifts of producer prices) of the additional tax burden borne by consumers. We nonetheless expect any estimation error to affect the different percentiles of the income distribution in a proportional manner, therefore preserving our qualitative conclusions.

4. QUEST

QUEST²⁹ is the global macroeconomic model that the Directorate General for Economic and Financial Affairs (DG ECFIN) uses for macroeconomic policy analysis and research. It is a structural macro-model in the New-Keynesian tradition with rigorous microeconomic foundations derived from utility and profit optimisation and including frictions in goods, labour and financial markets.

There are different versions of the QUEST model, estimated and calibrated, each used for specific purposes. In this impact assessment we used the E-QUEST model, which builds on the structure of dynamic stochastic general equilibrium (DSGE) models³⁰. For this project, the model is set-up for two-regions, the European Union (EU) and the rest of the world (R). In each region, the economy consists of households, firms, a monetary and a fiscal authority. Following the standard DSGE literature, households can be liquidity or non-liquidity constrained depending on their access to financial markets. Households offer differentiated labour services to firms in three skill levels, low-, medium-, and high-skilled. In each region, firms produce differentiated goods and services for domestic and foreign markets. Production requires labour, general (non-energy) capital, a composite of intermediate goods and a composite of fuel and electricity-intensive capital-energy bundle. In the fossil fuel-intensive capital-energy bundle, capital is combined with fossil fuel energy while in the electricity-intensive bundle electricity is required to use the corresponding capital. The main innovation

²⁸ It is generally the case that when the price of a good raises (e.g. because an increase in taxation) its demanded quantity decreases. Empirically, price elasticity of demand are typically found to be in the range of (-1, 0).

²⁹ https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/economic-research/macro-economic-models_en

³⁰ The model is an extension of the European Commission’s QUEST III model (Ratto et al. 2009, Burgert et al. 2020). Ratto, M., Roeger, W., and in 't Veld, J. (2009). QUEST III: An Estimated Open-Economy DSGE Model of the Euro Area with Fiscal and Monetary Policy. *Economic Modelling* 26: 222-233. Burgert, M., Roeger, W., Varga, J., in 't Veld, J. and Vogel, L. (2020). A Global Economy Version of QUEST. Simulation properties. *European Economy Discussion Papers* 126. Directorate General Economic and Financial Affairs, European Commission.

in the E-QUEST model compared to the standard DSGE models is the inclusion of energy-input substitution allowing for a more detailed description of substitution possibilities in different energy sources for the economic agents. Firms have imperfect substitution possibilities between fossil fuel and electricity-intensive capital-energy bundles.

The model also differs from standard DSGE models by introducing sectoral disaggregation in order to address climate policy related measures targeting fuel and electricity-intensive sectors. There are seven sectors in the model: a fossil fuel and a fossil fuel-intensive capital producing sector, an electricity and an electricity-intensive capital producing sector, a sector manufacturing general, non-energy related capital goods, an emission-intensive sector and an aggregate of the remaining economic sectors.

The model features fully forward looking intertemporal optimization and it is calibrated and solved at annual frequencies. There is endogenous labour supply, demand and wage setting, imperfect (monopolistic) competition with real and nominal frictions in all sectors of the economy. The fiscal authority receives its revenue from taxes on domestic and imported goods and taxes on factor incomes. On the expenditure side, we assume that government consumption, government transfers and government investment are proportional to GDP and unemployment benefits are indexed to wages. The monetary authority follows a standard Taylor-rule reacting to the deviation from an inflation target.

ANNEX 5: EFFECTIVE TAX RATES

1. Introduction

This paper delivers a systematic overview of tax reliefs in the EU27 and Norway. Much of the EU's energy consumption is not taxed at the nominal levels listed in national legislation. A wide range of energy consumers benefit from various tax reliefs, in the form of rebates, refunds, differentiation and exemptions. This Impact Assessment quantifies tax reliefs in the transport, agriculture, households, services and industry sectors. In addition the criteria attached to tax reliefs are inventoried.

Effective tax rates are best suited to serve as the basis for policymaking. Effective tax rates are synthetic indicators, which present nominal rates adjusted by tax reliefs. The difference between nominal and effective rates show that the tax burden eventually born by consumers- can vary significantly from the nominal rate. Therefore, it is important to use duly computed effective tax rates to measure the impact of proposed policy changes. Effective tax rates – unlike their nominal counterparts- also allow for cross country and cross sector comparison.

Effective tax rates are also the best indicators to summarise the shortcomings of the current ETD and consequently the drivers for its revision. While nominal rates themselves provide no clear indication for the environment or internal market related problems of the EU's current energy taxation design, effective rates can serve the purpose. They illustrate the ETD's shortfalls in terms of preserving the EU's internal market as well as contributing to the 2030 targets and climate neutrality by 2050 in the context of the European Green Deal. Effective rates demonstrate harmful fossil fuel incentives in the form of sector and use specific tax reliefs and show the real differences in energy taxes paid by consumers across Member States.

The tax code can be changed in two ways. Firstly, by altering nominal tax rates. In other words, increasing or decreasing the rates applied to energy products and different uses. Secondly, by altering the taxable base. This can be achieved by changing the list of beneficiaries or eligibility criteria attached to tax reliefs. Such measures impact volumes of energy that benefit from various tax reliefs. Where applicable, this report builds sector- wide weighted averages, combining volumes of energy that are taxed at nominal rates - and therefore do not benefiting from any tax relief- with volumes of energy that are subject to zero or reduced rates.

Findings of the report are based on a survey completed by 28 Finance Ministries. In early 2020, DG TAXUD conducted a survey that was completed by all 27 EU Member States and Norway (further EEA28). TEMS- Taxud Energy Metadata Survey allowed for the collection of systematic information on tax reliefs and the national criteria attached to their application. TEMS also covered the taxation of various environmentally friendly technologies that are important drivers of the blocks energy transition. Amongst them, hydrogen, energy storage and renewables. In order to keep the reporting burden low for Member States, the survey was designed to be complemented by external data sources. Most notably, Taxes in Europe Data Base and Eurostat energy balances.

The table below illustrates the source and methodology of effective rates that fed into the modelling of economic impacts by sector. It also shows that the analysis, based on effective rates, covers a large proportion of fuels and uses. The figures represent the share of fuel consumption, based on 2018 energy balances for all Member States.

Table 8: Sector coverage of effective tax rates (2018 energy balance)

| | | Petrol | Gasoil | HFO | Kerosene | LPG | Natural Gas | Coal | Electricity | Biofuels |
|-------------|---------|--------|--------|-------|----------|-------|-------------|-------|-------------|----------|
| Households | Motor | | | | | | | | | |
| | Heating | 0.5% | 8.9% | 0.2% | 13.0% | 34.7% | 37.9% | 35.8% | 28.2% | 63.7% |
| Agriculture | | 0.2% | 6.6% | 2.9% | 0.1% | 4.6% | 1.6% | 4.2% | 2.1% | 8.7% |
| Transport | Road | 98.5% | 76.1% | 0.0% | 0.0% | 34.5% | 0.8% | 0.0% | 0.1% | 87.6% |
| | Air | 0.1% | 0.0% | 0.0% | 76.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| | Rail | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.9% | 0.1% |
| Services | | 0.4% | 4.1% | 3.4% | 8.8% | 10.1% | 19.2% | 4.3% | 29.5% | 4.3% |
| Industry | | 0.4% | 3.8% | 93.5% | 1.3% | 16.2% | 40.5% | 55.7% | 38.2% | 35.5% |
| Total | | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

| | |
|--|--|
| | Effective Rates (Source: TEMS) |
| | Effective Rates (Source: JRC- Petten, TEMS) |
| | Effective Rates (Source: TEDB**) |
| | Nominal Rates (Source: TEDB) |
| | No rate defined for the modelling*** or no rate defined by the current ETD *** |

* DG JRC: Quantification of the industrial energy consumption within the scope of article 2 of the Energy Taxation Directive (JRC124019)
 ** no significant tax reliefs apply or mandatory exemption applies
 ** due to relatively insignificant share in the energy mix
 **** rate of the fuel of equivalent use and optional tax reliefs apply

Source: European Commission

Well designed tax reliefs are not always harmful. A country that sets its nominal tax rates relatively high, thereby using taxation as an instrument of environmental policy, might decide to grant tax reliefs to certain consumers or uses. These tax reliefs might allow this country to maintain this relatively high nominal rate, thus increasing energy conservation and energy efficiency across its economy, while safeguarding selected users. Such measures are used in order to pursue certain national policy goals (particularly for industries exposed to international competition or to protect vulnerable consumers).

Exemptions and reductions for any use of fossil fuels remain fossil fuel incentives. Tax reliefs for the consumption of fossil fuels increase their price advantage over less polluting alternatives and lock- in the use of fossil fuels.

2. Transport

This chapter presents effective rates in the transport sector, the sector that accounts for 30% of the EEA28's energy consumption. Aviation, maritime and inland shipping are covered by tax exemptions. Therefore, effective rates are automatically zero for these modes of transport. Most transport on inland water- ways is also untaxed.

Road transport accounts for 95% of all energy consumed in transport. Road transport is dominated by fossil fuels, as they provide 94% of all energy consumed on the EEA28's roads. Among fossil fuels, gas oil is the most prevalent. It accounts for over two- thirds of all energy used in road transport (67%), followed by motor petrol as a distinct second (24%). Renewables and biofuels account for the remaining 6%³¹. In road transport, commercial gas oil is the most notable beneficiary of tax reliefs. In line with the ETD, commercial gas oil may be used exclusively for the transport of goods and passengers. 14% of all gas oil used in transport benefits from commercial gas oil tax reliefs.

Table 9: Energy Mix of Road Transport.

| Gas Oil | Gasoline | Blended biofuels | Pure Biofuels | LPG | Natural gas | Electricity |
|---------|----------|------------------|---------------|------|-------------|-------------|
| 67.1% | 24.2% | 5.5% | 0.3% | 2.2% | 0.6% | 0.1% |

Source: Eurostat FC_TRA_ROAD_E 2018

Tax reliefs to gas oil in road transport result in EUR 3.85 billion tax expenditure. This amount incentivizes the use of a fossil fuel. Consequently, it also constitutes part of fossil fuel incentives the EU aims to decrease in the context of its G20 commitment and the Paris Agreement. In line with these international commitments, the Clean Energy for All Europeans communication states: “the remaining but still significant public support for oil (...) continues to distort the energy market, creates economic inefficiency and inhibits investment in the clean energy transition and innovation.”³²

Ten countries provide some type of tax relief for the commercial use of gas oil. Eight of them implement refund schemes. In Germany, the scheme covers only public transport and not the transport of goods. Two apply a rebate, in the form of providing gas oil with fiscal marking at a differentiated price or refueling from special tanks. This means, that 17 MS and Norway apply the standard propellant rate to the commercial use of gas oil in road transport. In addition, Malta defines various rates for the use of gas oil in water borne transport. These include the conveyance of passengers between Malta, Comino and Gozo as well as certain maritime commercial activities³³.

³¹ Source: Eurostat. Complete Energy Balances nrg_bal_c

³² COM(2016) 860 final, p.12.

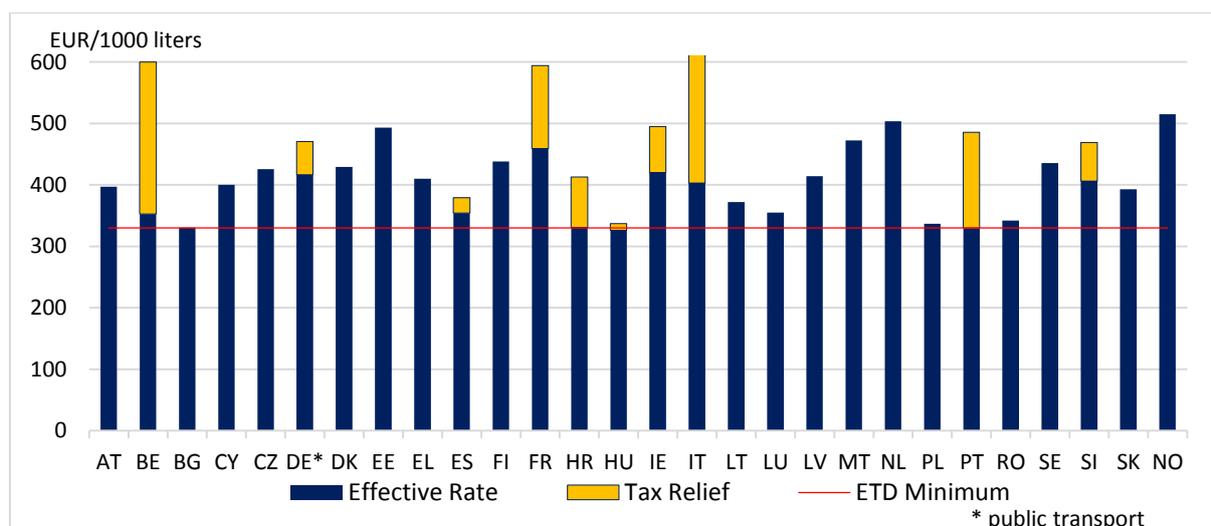
³³ Also conveyance of passengers and goods between shore and ocean- going vessels or Separate rates for inland navigation between Malta and Gozo for vessels below and above 3500 tonnes weight.

Table 10 Share of Commercial Gas Oil Benefiting from a Tax Relief in Total Gas Oil Consumption in Road Use 2018/19. Source: TEMS and Eurostat FC_TRA_ROAD_E
Source: TEMS and Eurostat FC_TRA_ROAD_E

| | | | | | | | | | | | | | |
|----|-----|----|----|----|----|----|----|----|-----|----|-----|-----|-----|
| AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU |
| 0% | 37% | 0% | 0% | 0% | 4% | 0% | 0% | 0% | 17% | 0% | 32% | 13% | 30% |
| IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | NO |
| 7% | 29% | 0% | 0% | 0% | 0% | 0% | 0% | 7% | 0% | 0% | 40% | 0% | 0% |

Effective rates range from 330 to 530 EUR/1000 litre. This report presents effective rates in a harmonized way, therefore the type of tax relief applied by each MS does not make a difference when displaying them. Yet, all effective rates must respect the following provisions laid down by the ETD: countries may differentiate between commercial and non-commercial gas oil, provided that Community minimum levels are observed. In other words, the effective rate may be lower than the national standard propellant rate, but may not fall below the ETD minimum. In the case of some other uses of gas oil, the effective rate may go below the minimum, even to zero. The ETD also defines a weight criteria: the gross laden weight of vehicles fueled by commercial gas oil must be at least 7.5 tonnes.

Figure 7: Effective Rates for Commercial Gas Oil in Road Transport, 2018/19.



Source: TEMS

The ETD allows for the tax exemption of certain public transport and freight modes. The directive states that MS may apply, under fiscal control exemptions or reductions in the level of taxation to energy products and electricity used for the carriage of goods and passengers by rail, metro, tram and trolley bus. This provision allows MS to set tax rates that go below the minima, including zero rate. The list however excludes some environmentally friendly modes of public transport, such as electricity and hydrogen- fueled buses. The environmental performance of these low carbon transport modes could mandate their inclusion in the list of modes eligible for a full exemption.

The energy mix of rail transport³⁴ is dominated by electricity. Electricity accounts for 68% of all energy used by railways to transport goods and passengers. Taking into account

³⁴ Local and high speed railways (excluding metro)

the share of renewable electricity in each EEA28 country’s power generation mix and adding blended biodiesel consumption, we find that 39% of energy used by the EEA28’s railways is of renewable origin. Consequently, rail transport is one of the most environmentally friendly modes of transport available today. Railway transport makes up only half a percent of the EE28’s final energy consumption and 2% of all energy used by the block’s transport sector.³⁵

Table 11: Electricity Mix of the EU’s rail transport sector.³⁶

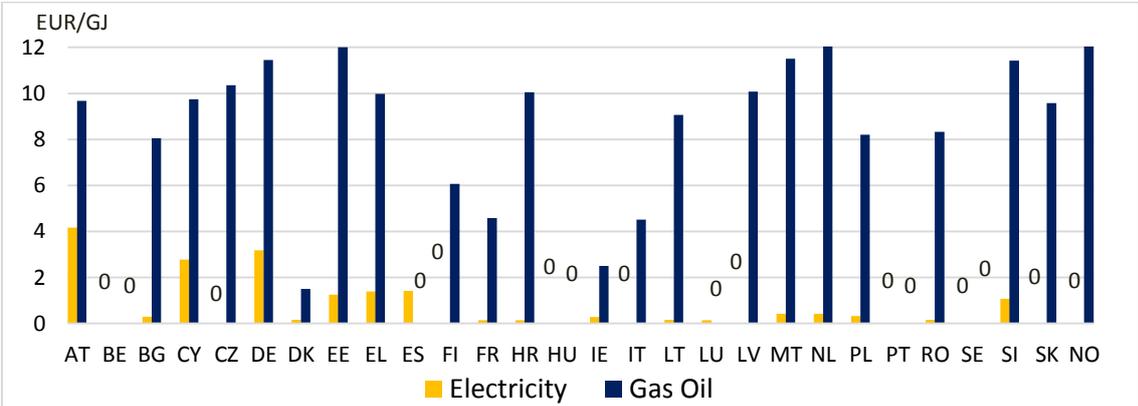
| Renewable elec. | Fossil elec. | Gas Oil | Coal | Biodiesel | Other |
|-----------------|--------------|---------|------|-----------|-------|
| 38% | 30% | 27% | 2% | 0.4% | 3% |

Source: Eurostat FC_TRA_RAIL_E, SHARES nrg_ind_ren

EEA28 tax expenditure on electricity in rail transport is 8 times less than on commercial gas oil. Tax expenditure on electricity in rail transport amounts to approximately EUR 445 million . This amount comprises of exemptions in ten countries and refunds in three others. Belgium, Czechia, Finland, Hungary, Italy, Latvia, Portugal, Sweden, Slovak Republic³⁷ and Norway³⁸ do not tax electricity used in rail transport. Therefore, the effective rate is zero. The cumulative rail transport electricity consumption of these countries, accounts for 27% of all electricity consumed by the EEA28’s railways. Germany, France and Denmark provide refunds, resulting in effective rates of EUR 11.42 (DE), 0.5358 (DK) and 0.5 (FR) per MWh.

Ten countries apply tax reliefs to gas oil consumption in rail transport. Less than 1% of all gas oil used in the EU’s transport sector is consumed by railways. Therefore, the economic and environmental impact of these tax reliefs is limited compared to other tax reliefs for the consumption of oil products, be it in road transport, households or industry. Seven Member States, Belgium, Spain, Luxembourg, Hungary, Portugal and Sweden exempt gas oil in rail transport. Denmark, Finland, France, Italy, Ireland apply reductions resulting in effective rates ranging from 62 to 249 EUR/1000 litres.

Figure 8: Effective Tax Rates in Rail Transport - Electricity and Gas Oil.



Source: TEDB, Eurostat FC_TRA_RAIL_E

Other modes of public transport and services may also benefit from tax reliefs. Provided, that they respect the minimum levels of taxation prescribed by the ETD, differentiated rates of

³⁵ Source: Eurostat Complete Energy Balance nrg_bal_c
³⁶ Assuming that the share of renewable electricity is the same in rail transport as in each country’s energy mix.
³⁷ Source for EU MS: TEDB Taxes in Europe Data Base.
³⁸ Norwegian Tax Administration <https://www.skatteetaten.no/en/business-and-organisation/vat-and-duties/excise-duties/about-the-excise-duties/electrical-power-tax/>

taxation may be applied by MS in the following cases: local public passenger transport (including taxis), waste collection, armed forces and public administration, disabled people, ambulances. Under this provision, MS may apply rates that go below the national standard rates but do not go below the ETD minima. Table 12 provides a list of these tax reliefs, which are socially justified by the countries, without quantifying volumes of energy subject to them, as their economic and environmental impacts are limited.

There are no significant tax reliefs for petrol used in transport. Unlike for gas oil, there are no wide spread refund schemes for the propellant use of petrol. Only two Member States Germany and France, grant tax reliefs for the use of petrol, by local public transport and taxis respectively. Taxis running on gas oil also benefit from tax reliefs in Belgium, Spain, and Italy. In France the effective rate for the gas oil use by taxis is 359 EUR/1000 litres, resulting in 190 EUR tax expenditure per 1000 litres. In Italy and Spain tax reliefs bring down the effective rate of gas oil to 330 EUR/liter, which corresponds to the ETD minimum. Tax expenditures per 1000 litres of gas oil used in taxis equal 270 EUR and 49 EUR, in Italy and Spain respectively. In Belgium, tax expenditure on gas oil used in taxis equals 248 EUR per 1000 litres. These tax reliefs incentivize the use of a fossil fuel.

Table 12: Tax Reliefs Applied to Public Transport, Motor Fuels for Public Services and Taxis, as of July 2020

| MS | Product | Beneficiary and unit | Rate |
|----|-------------|--|--------|
| BE | Gas oil | Taxis and use by disabled persons. Per 1000 litreslitres. | 352.54 |
| DE | Petrol | Local public passenger transport (sulfur content not exceeding 10 mg/kg). Per 1000 litreslitres. Unleaded. | 600.48 |
| | Petrol | Local public passenger transport (sulfur content exceeding 10 mg/kg). Per 1000 litres. Unleaded. | 615.78 |
| | Gas Oil | Local public passenger transport (sulfur content not exceeding 10 mg/kg). Per 1000 litres. Unleaded. | 416.38 |
| | Gas Oil | Local public passenger transport (sulfur content exceeding 10 mg/kg). Per 1000 litres. Unleaded. | 431.68 |
| | LPG | Local public passenger transport. Per 1000 litres | 251.62 |
| | Natural gas | Natural gas and hydrocarbon gases, used for local public passenger transport. MWh. | 12.90 |
| | Electricity | Local public passenger transport. MWh. | 11.42 |
| ES | Gas Oil | A partial refund for the transport of goods or passengers and taxis. The refund equals 49 EUR /1000 litres of gas oil purchased. The amount of gas oil refunded shall not exceed 50,000 litres (per vehicle and year). A different limit applies for taxies: 5,000 litres (per taxi and year). | 330.00 |
| FR | Petrol | Taxis benefit from a refund of 331.0€/1000 litres. Unleaded. | 384.60 |
| | Gas Oil | Taxis benefit from a refund of 305.3€/1000 litres | 289.00 |
| | Gas Oil | Public passenger transport and haulage operators benefit from a refund of 175.4€/1000 litres | 418.60 |
| | Petrol | Taxis, ambulances, armed forces. Per 1000 litres. Unleaded. | 359.00 |

| | | | |
|----|---------|--|--------|
| IT | Gas Oil | Local public passenger transport. Per 1000 litres. | 403.22 |
| | Gas oil | Taxis, ambulances motor fuel for armed forces. Per 1000 litres | 330.00 |

Source: TEDB.

3. Households

This chapter presents two types of tax rates paid by households for various energy products. Firstly, the rate paid by the average household. Secondly, a sector- wide effective tax rate. The latter, in the form of a weighted average that is built taking into account exemptions, reductions and differentiated rates. The ETD itself does not define tax rates for households, instead it sets minimum rates for business and non- business use. Households fall under the second category. However, the ETD allows countries to apply exemptions and reductions. Therefore, the combination of non- business rates and tax reliefs yield the effective rates.

Households account for 22% of the EU's total energy consumption. Electricity, natural gas and renewable thermal energy are the sources households use most commonly. On average across the EU, the energy mix of households consists of 32% natural gas, 24% of electricity and 20% renewable energy, most of which (16%) consists of primary solid biofuels, such as firewood and wood pellets³⁹. These wood products as well as heat output, accounting for 9% of household energy consumption are not taxed by the ETD. Oil products make up further 11% and solid fossil fuels, including coal 3%. This average however, conceals highly different national energy mixes.

The following sections analyze the taxation of electricity, natural gas and coal consumed by households. Electricity is used by households for lighting and heating purposes, including the provision of hot water, space heating and cooking as well as to power appliances. The prevalence of electric heating differs significantly across countries. Coal and natural gas are used for heating purposes in many countries. Due to social considerations, heating fuels are typically taxed at lower rates than transport fuels. This includes tax differentiation for the same fuel: when used for heating, rates are commonly lower for the same product used for other purposes. For example the ETD minimum rate for natural gas used as propellant is 2.6 EUR/GJ compared to 0.15 and 0.30 EUR/GJ for business and non- business heating respectively.

Table 13: Energy Mix of Households in the EEA28.

| Natural gas | Electricity | Wood products | Oil products | Heat | Thermal RES | Coal |
|-------------|-------------|---------------|--------------|------|-------------|------|
| 32% | 25% | 16% | 11% | 9% | 4% | 3% |

Source: Eurostat

Eight countries exempt all electricity consumption of households. These countries do not condition the exemption on any criteria. All households are exempted, irrespective of their income or geographical location. The cumulative electricity consumption of households in these countries make up 6.8% of all electricity consumed by households in the EE28. In all but 2 of these Member States⁴⁰ the per capita GDP does not reach 60% of the EU 2013 average (as defined by the Modernization Fund).

Eight countries exempt all natural gas consumption of households. Together, their consumption accounts for 11.5% of all natural gas consumed by households in the EE28. The list of the countries exempting natural gas is not identical with the list of countries exempting

³⁹ Excluding peat, which is also untaxed by the current ETD. Peat exceeds 1% of the household energy mixes of IE (7%) and LV (1%).

⁴⁰ CY, IE.

electricity. In 5 Member States⁴¹ both products are exempted. In Czechia, Romania and Poland natural gas is exempted, while electricity is taxed. In Ireland and Latvia the opposite holds. In Cyprus electricity is exempted. Natural gas is not used on the islands of Cyprus and Malta.

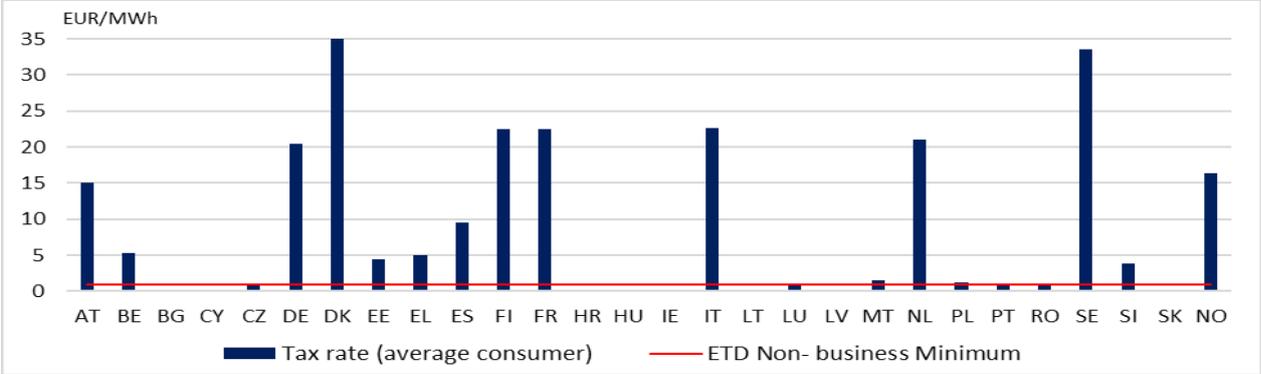
Table 14: Tax exemption of household gas and electricity consumption. X= exemption applies.

| | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Elec | | | X | X | | | | | | | | | X | X |
| Gas | | | X | | X | | | | | | | | X | X |
| | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | NO |
| Elec | X | | X | | X | | | | | | | | X | |
| Gas | | | X | | | | | X | | X | | | X | |

Source: TEMS

Other countries grant partial exemptions based on social and regional grounds. These exemptions typically apply only to a small share of total consumption and apply to defined groups, mostly vulnerable consumers. In Belgium 3.3% of household electricity and 11% of gas consumption is exempted, being delivered to "residential protected clients with a low income or in a vulnerable position".⁴² In Portugal 12% of household electricity and 1.4% of gas consumption is delivered to economically vulnerable households⁴³. In Norway, the household electricity consumption of the two northernmost municipalities, Troms and Finnmark is exempted. Their consumption accounts for 2.6% of all household electricity consumption.

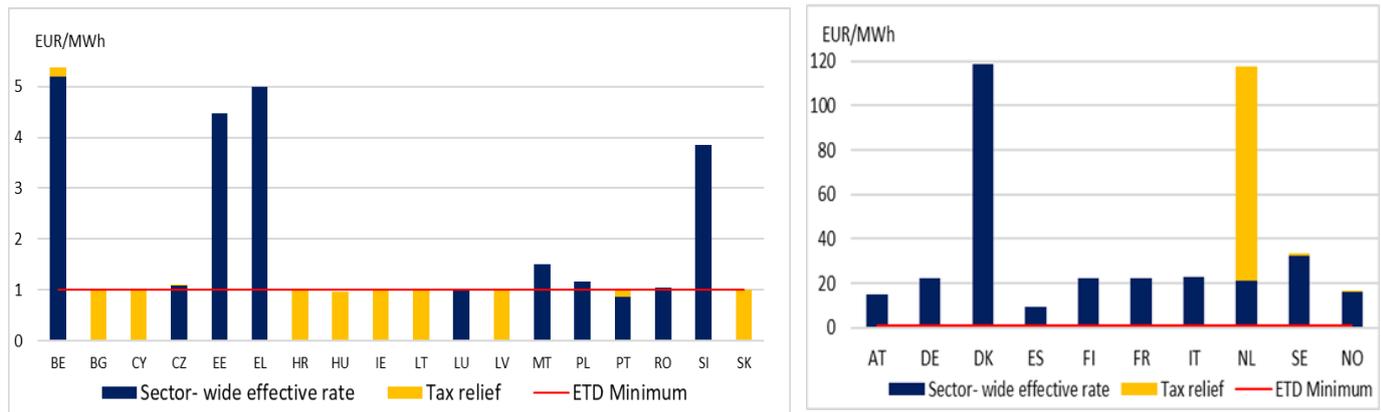
Figure 9: Taxation of Household Electricity Use – Tax Rate paid by the average consumer



Source: TEDB

⁴¹ BG, HR, HU, LT, SK.
⁴² As defined by Article 20, § 2 of the law of the 29th of April 1999 concerning the organisation of the electricity market.
⁴³ These households are characterized by receiving a social benefit or having an annual income of € 5808 or less. The beneficiary must be the electricity supply contract holder and the installation must be low voltage, with a contracted power less or equal to 6,9 KVA.

Figure 10: Sector- wide effective rates of household electricity consumption⁴⁴



Source: TEMS

Two countries differentiate energy taxes according to regions.

In France, the national electricity tax rate of 22.5 €/MWh applies to all households. In addition to the national rate, a local rate is applied. This local tax for households is the result of a uniform rate of 0.75 €/MWh multiplied by a coefficient according to departments (2, 4, 4.25) or town councils (0, 2, 4, 6, 8, 8.5). Hence, the local tax on electricity consumption can vary between 1.50€/MWh and 9.56 €/MWh. As a result, total households electricity taxes range from 24€/MWh to 32.06 €/MWh. In Sweden, a lower tax rate is applied in the northern parts of the country. The lower rate is set at 257 SEK/MWh, compared to the general level of 353 SEK/MWh.

Yet other countries differentiate household rates based on consumption volume. In these countries the consumption bands and corresponding rates constitute of tiers. These systems are explained in detail under the section **Tiered Systems**.

In the Netherlands, a tiered system with regressive rates is applied to all consumers. In other words, households and businesses are all assigned to one of four consumption bands. In this degressive system, the higher the consumption band, the lower the per unit tax rate. Almost all households fall in the first tier. The Netherlands also grants a lump sum per connection annually, which is automatically deducted from consumer's combined electricity and natural gas bill. This report presents an effective rate for Dutch households taking into account this lump sum.

In Malta, also a consumption volume based, tiered system applies. The tariff structure is composed of consumption bands and similarly to the Netherlands, it applies to both business and non- business consumers.⁴⁵ The rates however, are degressive. In other words, the per unit tax rate increases as consumption increases. Beyond consumption volume, 2 other factors

⁴⁴ The ETD minimum rate applies as the benchmark

⁴⁵ The tariffs are based on a cumulative consumption per annum and are applied pro rata on basis of the number of days covered by the bill. The kWh tariff structure applicable for the consumption of electricity differentiates between registered primary residence premises (household, primary residence), domestic premises (household, not primary residency) and non-residential premises (non household).

vary along a specific tariff structure. Connection capacity⁴⁶ and eligibility for an “Eco-Reduction”⁴⁷ also contribute to determining the final price.

In Denmark, consumption indirectly differentiates the effective rates paid by households. There are two different rates applied to the household consumption of electricity. A lower rate applies to electricity used for heat production. Households that are electrically heated, typically by heat pumps, pay a reduced rate for monthly consumption over 4000 kWh. This limit is based on the average household’s consumption of electricity for purposes other than heating. In other words, a lower rate applies to heating, while a higher rate applies to uses other than heating. The effective rate for each individual household results from the amount of power they use above 4000 kWh. Differentiating the taxation of electricity according to its specific uses is a challenge in all Member States. The Danish system, with a specific tax rate applied to a lump sum of consumption assigned to heating, does not require households to measure and separate their electricity consumption by end use.

Several countries exempt the auto- production of electricity. Slightly different definitions apply across countries, but auto- production basically means that the producer and consumer of electricity are the same legal entity and the consumption takes place at the site of generation. Solar panels installed on the rooftop of a family house are a common example. Additionally, some countries set upper or lower limits to the name plate capacity of installations that can benefit from an exemption. Therefore, households are unlikely to benefit from the exemption. On the other hand, Spain sets an upper limit. Tax exemption is granted when the installed capacity of cogeneration, renewable and waste electricity auto- producers does not exceed 50 MW.

Unlike for all other exemptions, the impact of auto- production could not be quantified. Volumes subject to the above listed tax reliefs could be quantified, included in the TEMS data base and taken into account for the calculation of effective rates. The same couldn't be done for auto- production. The reason for this is that most national authorities do not distinguish between auto- production by households and auto- production by other consumers. As an exemption, Czechia reported that 25 GWh renewable auto- production, equalling 0.25% of the countries household electricity consumption is exempted.

79% of household coal consumption is untaxed. Only seven countries tax exempt the household consumption of coal. However, the cumulative coal consumption of Belgium, Spain, Hungary, Luxembourg, Poland, Romania and the Slovak Republic accounts for 79% of

⁴⁶ Beyond the kWh tiered tariff structure as described briefly in the box above, a fixed annual service charge that differentiates between a single-phase service and a three-phase service and a maximum demand tariff €/kW is payable in the case of household consumers with a service connection capacity rating exceeding 60Amps/phase.

⁴⁷ The rebate, referred to as 'eco-reduction' is not on the electricity excise tax, but on the applicable tariff rates according to consumption, whereby a lower applicable tariff rate in the form of an automatic rebate applies when the level of electricity consumption is below a certain applicable threshold. Registered primary residence premises (households' primary residence) only, shall be eligible for an eco- reduction of the amount due for consumption of electricity for the billing period in question, which shall be calculated in accordance with set rates and thresholds, on a pro rata basis of the relative annual cumulative consumption. The reduction will not be applicable if the indicated thresholds are exceeded. Household consumers may receive a percentage reduction of electricity rates, an 'eco reduction', on their electricity consumption bill on one registered primary residence as follows: Households composed of two or more persons may benefit from a two tier eco reduction mechanism provided that the consumption per person does not exceed 1750kWh per annum. A reduction of 25% in the consumption bill is possible if the consumption does not exceed 1000kWh per person for the first tier. The second tier consists of a reduction of 15% in the bill on the next 750 kWh per person/household, Single person households receive a reduction of 25%.

all coal consumed by households in the EEA28. The prevalence of coal differs significantly across national household energy mixes. It is virtually zero in half of the EEA28 countries and is typically higher in the countries that grant an exemption.

Table 15: Share of Coal in Households Energy Mix.

| | | | | | | | | | | | | | |
|------|------|------|------|-------|------|------|-------|------|------|------|------|------|------|
| AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU |
| 0.3% | 0.9% | 5.1% | 0.0% | 11.2% | 0.9% | 0.0% | 0.1% | 0.1% | 0.5% | 0.0% | 0.1% | 0.1% | 1.6% |
| IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | NO |
| 4.7% | 0.0% | 2.8% | 0.0% | 0.5% | 0.0% | 0.0% | 31.9% | 0.0% | 0.4% | 0.0% | 0.0% | 1.5% | 0.0% |

Source: Eurostat

4. Services and Data Centers

This chapter presents tax rates paid by services, accounting for 14% of the EE28's energy consumption. This includes both commercial and public service providers. Electricity (47%) and natural gas (30%) make up most of the sector's energy consumption, with a wide range of other products accounting for smaller shares. Therefore, the taxation of these two products is further examined below.

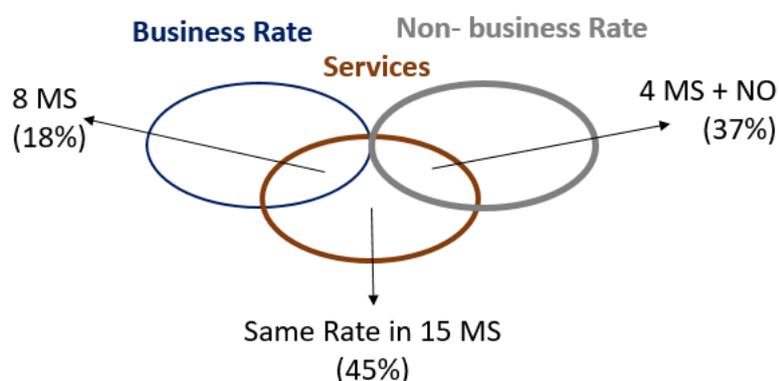
Table 16: Share of Services in Final Energy Consumption.

| AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 10% | 14% | 13% | 17% | 13% | 14% | 14% | 17% | 14% | 14% | 12% | 17% | 12% | 12% |
| IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | NO |
| 13% | 17% | 12% | 13% | 15% | 24% | 15% | 11% | 15% | 8% | 13% | 9% | 13% | 17% |

Source: Eurostat FC_OTH_CP_E and FC_E

Neither the ETD, nor Member States set specific rates for services. Moreover, the ETD doesn't define minimum rates neither for industry nor for households. Instead, minimum rates are set for business and non-business uses of electricity, natural gas and coal⁴⁸. In the case of gas oil, commercial use is distinguished. Non-business rates are higher in the ETD minima as well as in the national implementation of each country. Given the business versus non-business distinction, it would be natural to assume that the energy use of services is taxed at the business rate. This is however far from the actual situation.

Figure 11: Taxation of the electricity consumed by services⁴⁹



Source: TEMS and Eurostat FC_OTH_CP_E

5 countries tax services at the higher, non-business rate. In Germany, Finland, Spain, Sweden and Norway the definition of business is narrower, as the ETD allows Member States to limit the scope of business. Together these countries account for 37% of all electricity consumed by the EEA28's services. In Germany the non-business rate applies to all consumers not classified as companies in the manufacturing, agriculture or forestry sectors. In Finland business rate is restricted to industry, mining, data centers and agriculture. In Norway, the non-business rate applies to all consumption outside of industrial manufacturing and

⁴⁸ The ETD also defines separate minimum rates for the business and non-business use of heavy fuel oil, gas oil and kerosene. However these minimum rates are identical for business and non-business respectively.

⁴⁹ The graph assumes that the distribution of electricity consumption between private and public services does not vary highly across countries.

mining as well as CHP.⁵⁰ Additionally, Denmark taxes non- VAT registered services at the non- business rate, alongside its households.

15 countries do not distinguish between business and non- business. They apply one rate. The cumulative electricity consumption of services in these countries accounts for 45% of all electricity consumed by EEA28 services. Among them, Croatia, Lithuania, Luxembourg and Romania apply the ETD minima⁵¹. As 5 countries tax services at the higher “non- business rate” and 15 countries do not differentiate, 8 countries tax services at the lower, “business” rate. This means that only 18% of electricity consumed by services is taxed at a dedicated business rate, be it the minimum rate or higher. The Netherlands applies the same tiered system to all electricity consumption, be it by households or industry. However, business and non- business are distinguished in the largest consumption band, covering annual consumption of 10 GWh and above.

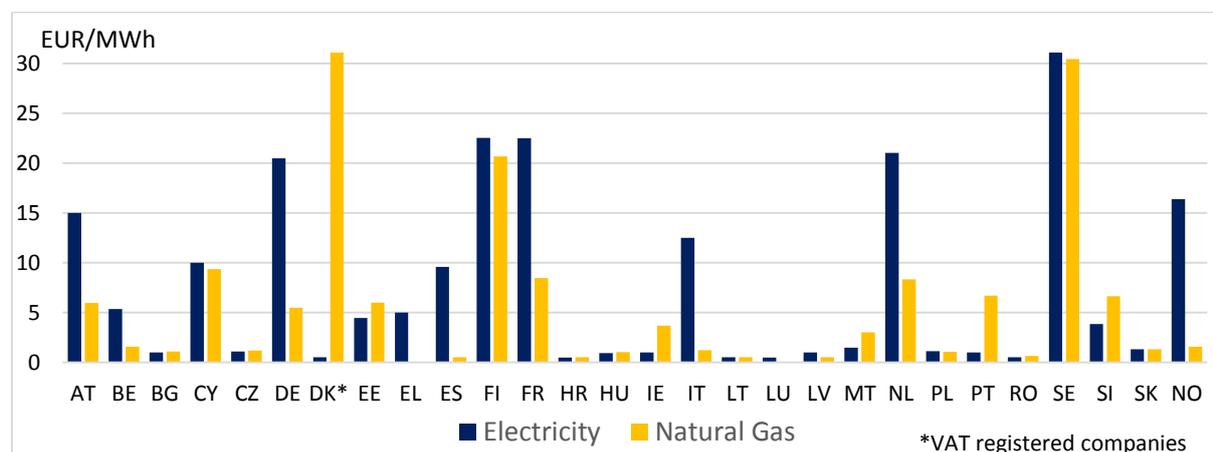
Table 17: Electricity rate applicable to commercial services. B= Business. NB= Non-business. SR= Same Rate.

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU |
| SR | SR | B | B | SR | NB | B | SR | SR | NB | NB | SR | B | SR |
| IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | NO |
| SR | B | B | B | SR | SR | SR | SR | SR | B | NB | SR | SR | NB |

Source: TEMS and TEDB

Even less countries differentiate the business and non- business use of gas. In Finland and France, the business versus non- business distinction, that is applied to electricity, does not exist for gas. Neither does the Netherlands apply a differentiation for the highest bracket of gas consumption, that is applied for electricity. In Italy, all gas is taxed at the non- business rate when used for other than industrial purposes. In Spain, the non- business rate applies to uses other than fuel, as well as to natural gas intended for use as fuel in stationary engines.

Figure 12: Nominal Tax Rates applicable to Services.



Source: TEDB

Public services are usually taxed at non- business rates. Local and national administrations, educational institutions, hospitals, welfare institutions, lightning of public roads and squares were commonly listed by countries as public services in the TEMS survey. In Cyprus, all uses defined as non- business, including public services, can benefit from an

⁵⁰ The lower, business rate applies also to all commercial activity in Finnmark and certain municipalities in Nord-Troms, to data centres with an output in excess of 0.5 MW and to commercial vessels.

⁵¹ 0.5 EUR/MWh for business and 1 EUR/MWh for non- business.

exemption. In the northernmost parts of Sweden, similarly to households and service sector companies, public services may benefit from a lower rate. In the countries where all households are exempted, its only public services that fall under the non-business category. For example, households pay no tax on natural gas, while public services pay the non-business rate.

Data centers benefit from special provisions in some countries. Data centers are energy intensive services. In Finland, data centers can benefit from the lower, business rate, alongside industry, mining and agriculture. In France, data centers can benefit from a reduced tax rate of 12 €/MWh for the fraction of their annual consumption that exceeds 1 GWh, if their total consumption of electricity equals or exceeds 1 kWh/€ of added value. Norway also attaches a criteria: data centers with an output in excess of 0.5 MW can benefit from the business rate. In Sweden, the lower tax rate of SEK 5/MWh for business use applies to electricity used in data centers, alongside manufacturing and shore-side electricity.

Services can benefit from tax reliefs as long as resulting effective rates respect the ETD minima. The ETD allows national administrations to grant tax exemptions and reductions to businesses based on a range of criteria, including energy intensity, trade intensity and energy efficiency. Services typically do not fulfill these criteria, with the exemption of tax reliefs conditioned on annual consumption volume. Services can consume large volumes of energy and therefore qualify for this type of tax relief. Services also pay differentiated rates in countries that apply tiered systems. Where such tax regimes are applied, services like all other consumers, might pay different rates based on the volume of their energy consumption.

Tiered Systems

Article 5 of the ETD allows countries to differentiate tax rates according to consumption volumes. Several countries make use of this provision for various areas of use of electricity and natural gas. Several countries make use of this provision for various products and uses. In these countries the bands of consumption volumes and corresponding rates built tiered tax systems. These systems are typically degressive: the higher the consumption band the lower the per unit tax rate. These tiered systems are used in multiple sectors of the economy, including industry, households and services. They are typically not applied in the transport and agriculture sectors where the use of liquid fuels is dominant. Where applied, such tiered systems pose particularly difficult challenges to the establishment of effective tax rates. While households are generally taxed at the rate of the first bracket (lowest consumption band and highest rate), individual companies in industries and services sectors can fall in multiple brackets. Therefore, the taxation of users in these sectors can be highly differentiated. The following table provides an overview of tiered systems applied by countries based on the TEMS Survey and Taxes in Europe Data Base.

Table 18: Overview of tiered systems applied by countries based on the TEMS Survey and Taxes in Europe Data Base

| | | | | | | |
|----|------|-----------|-----|-------|---------|--|
| BE | Elec | Business | I | -0% | annual | 0-20,000 MWh; reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | II | -15% | annual | 20,000-50,000; reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | III | -20% | annual | 50,000-250,000; reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | IV | -25% | annual | 250,000-1000,000, reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | V | -45% | annual | >1000,001 (starting with 1000,001), reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | VI | cap | annual | Federal contribution is capped at 250.000 EUR |
| BE | Gas | Business | I | -0% | annual | 0-20,000 MWh; reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | II | -0.15 | annual | 20,000-50,000; reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | III | -0.2 | annual | 50,000-250,000; reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | IV | -0.25 | annual | 250,000-1000,000, reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | V | -0.45 | annual | >1000,001 (starting with 1000,001), reduction in federal contribution. Base rate: 3.4439 EUR/MWh |
| | | | VI | cap | annual | Federal contribution is capped at 750.000 EUR |
| EL | Gas | Business | I | 1.5 | annual | 0-36,000 GJ |
| | | | II | 0.45 | annual | 36,000-360,000 GJ |
| | | | III | 0.4 | annual | 360,001-1,800,000 GJ |
| | | | IV | 0.35 | annual | 1,800,001-3,600,000 GJ |
| | | | V | 0.3 | annual | > 3,600,000 GJ |
| IT | Elec | Business | I | 12.5 | monthly | 0-200 MWh |
| | | | II | 7.5 | monthly | For the share of monthly consumption in excess of 200 MWh but below 1200 MWh. |
| | | | III | cap | monthly | If the monthly consumption exceeds 1200 MWh a flat rate of 4,820 EUR applies for the share in excess of 200 MWh. |
| LU | Gas | Non- bus. | I | 1.08 | annual | Cat. A |
| | | Business | II | 0.54 | annual | Cat. B |
| | | | III | 0.30 | annual | Cat. C2 |
| | | | IV | 0.05 | annual | Cat. C1 |
| NL | Elec | Both | I | 125 | annual | 0-10 |
| | | | II | 88.33 | annual | 10-50 MWh |
| | | | III | 34.04 | annual | 50-10,000 |
| | | | IV | 0.95 | annual | >10,000 |
| NL | Gas | Both | I | 9.82 | annual | 0 – 5,978.9 GJ (National rate 0 – 170,000 Nm3; conversion rate 0.03517GJ/Nm3) |
| | | | II | 2.32 | annual | 5,978.9 – 35,170 GJ (National rate 170,000 – 1,000,000 Nm3) |
| | | | III | 0.85 | annual | 35,170 – 351,700 GJ (National rate 1,000,000 – 10,000,000 Nm3) |
| | | | IV | 0.45 | annual | > 351,700 GJ (National rate > 10,000,000 Nm3) |
| SI | Elec | Both | I | 3.05 | annual | 0-20 |
| | | | II | 3.05 | annual | 20-160 |
| | | | III | 3.05 | annual | 160-10,000 |
| | | | IV | 1.08 | annual | >10,000 |

5. Agriculture

Agriculture accounts for 3% of the EEA28's total energy consumption. Gas oil is the dominant fuel in the sector: half of all energy consumed is covered by gas oil. Gas oil in agriculture is used both as propellant (for example driving tractors) and for heating (for example heating green houses). As a distant second, electricity accounts for 16% of the sectors energy mix, followed by natural gas (12%), biofuels (4%) and other renewables (6%), including solar- and geothermal. Coal use is negligible in all countries but Poland, where it accounts for 22%. The following sections analyze the taxation of the three products with the highest shares in the sector's energy mix, namely gas oil, natural gas and electricity.

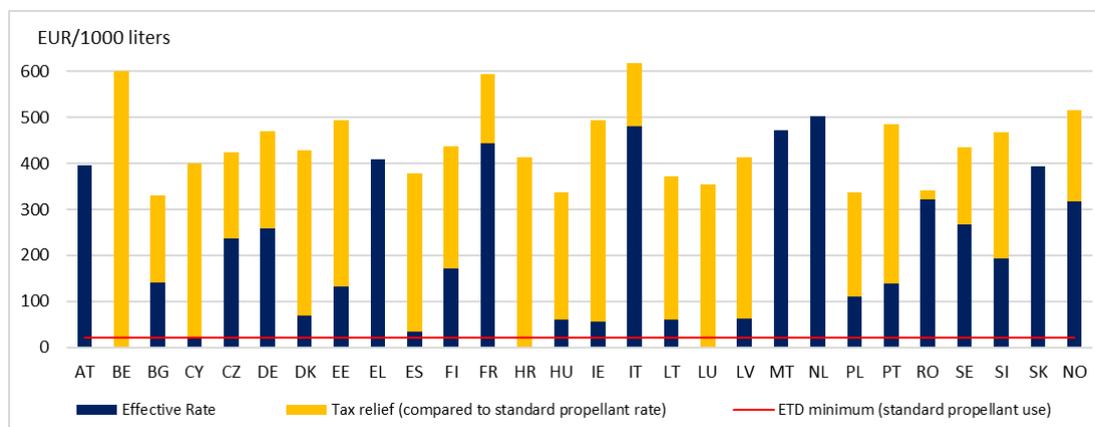
Table 19: Energy Mix of the EEA28's agriculture sector.

| Gas oil | Electricity | Natural Gas | Biofuels | Other RES | Other FF |
|---------|-------------|-------------|----------|-----------|----------|
| 52% | 16% | 12% | 4.0% | 6% | 10% |

Source: Eurostat

Twenty- one countries provide some form of tax relief to tax gas oil used in agriculture. Three of them apply a full exemption. The aggregate consumption of Belgium, Croatia and Luxembourg equals to 18265 TJ or 3% of the total EU27 gas oil consumption in the agriculture sector. 18 other countries provide other forms of tax relief. Eleven grant a refund and 7 apply differentiated rates. Most of these countries use fiscal marking to fight abuse of rebated fuel. A colorant is added to the fuel allowing for on-spot visual as well as for laboratory testing. Irrespective of the type of tax relief, the ETD allows for agriculture rates that go below the ETD minimum of standard propellant use.

Figure 13: Effective Rates for Gas Oil Use in Agriculture.



Source: TEMS

Total EEA28 tax expenditure on gas oil in agriculture amounted to EUR 3.2 billion Euros in 2019. This amount was incentivizing the use of a fossil fuel. Furthermore, it constitutes an implicit loss of revenues. It is to be remembered that per liter and total tax expenditures cannot be compared across countries. A country that applies the minimum rate to both standard propellant and agricultural use, would show zero per liter incentive. Another country that applies a high standard propellant rate, thus fostering energy conservation, and at the same time grants a large refund to agricultural use only, would show a large per liter incentive.

The tax code of 6 countries distinguishes different agricultural uses of gas oil. Germany, Denmark, Ireland and Sweden distinguish between propellant and other uses of gas oil, which mostly consist of heating. Czechia applies different rates to plant- and

livestock production. Romania lists gas oil used for agriculture and aquaculture separately, albeit the same rate applies to both. For these countries, a weighted average that takes into account respective rates and consumption volumes, is presented in this report.

Table 20: Differentiated Taxation of Gas Oil in Agriculture

| Country | CZ | DE | RO | SE |
|------------|--------------------------------------|------------|-------------------|------------|
| Category 1 | Plant production, forestry, fishpond | Propellant | Agriculture (all) | Propellant |
| Category 2 | Livestock | Heating | Aquaculture | Heating |
| Rate 1 | 0.255 | 0.215 | 0.211 | 0.257 |
| Rate 2 | 0.055 | 0.015 | 0.211 | 0.342 |
| % Vol. 1 | 26% | 99% | 99.8% | 89% |
| % Vol. 2 | 74% | 1% | 0.20% | 11% |

Source: TEMS

The role of natural gas shows high divergence on the national level. While natural gas makes up less than 1% of the agriculture sector’s energy consumption in 11 Member States, it reaches 57% in the Netherlands, 35% in Belgium and 20% in Romania. In these countries, natural gas is typically used to heat green houses. Biofuels and thermal renewable energy (geothermal and solar thermal) also provide a sizeable share of the sectors energy consumption in Sweden (37%), Austria (35%) and Finland (29%).

Three countries apply total or partial exemptions to electricity used in agriculture. Belgium and Greece exempt all power use in agriculture. The consumption of these two countries accounts for 7% of all electricity used in the EEA28’s agriculture sector. Norway exempts electricity supplied to commercial green houses. Sweden also provides a tax relief for electricity in agriculture: the same lower tax rate applies to electricity used in agricultural, forestry and aquacultural works as the one applied to data centers, shore side electricity and industrial manufacturing processes.



Brussels, 14.7.2021
SWD(2021) 641 final

PART 3/3

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a Council Directive

**restructuring the Union framework for the taxation of energy products and electricity
(recast)**

{COM(2021) 563 final} - {SWD(2021) 640 final} - {SWD(2021) 642 final} -
{SEC(2021) 663 final}

ANNEX 6: COST ASSESSMENT OF AIR POLLUTION

1. Objective

The objective of this methodology is to assess the cost of non-GHG air pollutants emitted by the consumption of energy products (e.g. fuel combustion) and to take it into account in the EU-wide minimum rates defined in the Energy Taxation Directive (ETD).

The amount of air pollution emitted by individual sources depends a lot on the combustion characteristics and filtering systems. In addition, the impact of the pollutants emitted depends on the location of air pollutant emissions (notably on the proximity to densely populated areas). The ETD however relies on EU-wide minimum rates for types of energy products (e.g. gasoil, petrol, coal, natural gas) and for two usages (motor fuel and heating fuel). For these reasons, the methodology adopts a conservative approach and targets an approximate low-end value for the air pollution cost assessment so that it can be applied to the ETD's types of fuels and usages for all motors and heating systems independently of combustion and filtering devices or of location.

2. Scope

The methodology focusses on the types of energy products and usages that are in the scope of the proposed revision of the ETD.

Consequently, only the end use or final consumption of energy products are in the methodology's scope and, in particular, energy products used for the production of electricity are out of scope.

3. Overview

An ETD air pollution component, expressed in €/quantity of fuel¹ used, can be computed for (non-GHG) air pollution as the sum of a PM2.5 tailpipe emission component and a NOx emission component, where each of these components is computed by multiplying an emission factor, by a mortality ratio (in terms of premature deaths or years of life lost), by a compatible valuation of mortality (also related to premature deaths or years of life lost):

$$A_p * \frac{B_p \text{ (or } B_p^*)}{C_p} * D \text{ (or } D^*) = \frac{\epsilon_p}{\text{quantity of fuel}}$$

Where

- A_p = pollutant emission factor for the fuel and user category considered (in g per quantity of fuel), as used to compute the pollutant p Emission Inventories under the National Emission reduction Commitments (NEC) directive;
- B_p or B_p^* = premature deaths or Years of Life Lost (in number per year) attributable to the pollutant p, as computed and reported by the European Environment Agency;
- C_p = are the emissions of pollutant p (in kt per year), as reported by the MS in their inventories under the NEC directive;
- D or D^* = Value of Statistical Life or Value of Life Years for the EU (in € per premature death or Year of Life Lost), as computed by the OECD and used in

¹ In this explanation we use "fuel" to mean any type of energy source used by activities under the scope of the ETD, be it in liquid, gas or solid form, of renewable or fossil source, and including electricity.

different impact assessments. Each of these components has to be used in an internally consistent way, specifically use Value of Statistical Life (D) to value premature deaths due to the emissions (B), and Value of Life Years (D*) to value Years of Life Lost (B*).

In other words, the ETD air pollution component is computed as

$$\frac{\text{€}_{PM2.5}}{\text{quantity of fuel}} + \frac{\text{€}_{NOx}}{\text{quantity of fuel}}$$

This can be expressed in € per mass (kg), or € per volume (litre), or € per energy content, through simple multiplication with the appropriate conversion factors for each fuel considered.

4. Detailed description and Assumptions

It should be noted that this approach limits the computation to covering only the main health impacts of air pollution (i.e., ignores non-health impacts such as impacts on resource availability, ecosystem impacts -including on agricultural output-, impacts to buildings and aesthetic/ethical impacts), and even then only a sub-set of the health impacts are covered (e.g., it ignores impacts on morbidity). It is generally considered in the literature that in the EU, health impacts account for about 90% of the value of air pollution impacts².

Moreover, we also only cover the impacts arising from PM2.5 and from NOx emissions, thus ignoring other air pollutants relevant under the NEC. This choice to cover only PM2.5 and NOx is based on the fact that these are generally considered to be the two main health concerns in terms of air pollution in the EU³. A third air pollutant of concern is ozone. However, whereas ozone results from primary pollutants emissions related to fuel combustion, ozone is not directly emitted and its formation is strongly driven by weather patterns, making it extra difficult to establish stable links to fuel consumption. As such, although fuel combustion does play an important role in ozone formation, we choose to ignore it in the computations and restrict the calculation to primary pollutants (directly emitted by the vehicles) to avoid the introduction of assumptions that would increase complexity and uncertainty.

² See for instance the Second Clean Air Outlook report (COM(2021)3) and its supporting reports:

<https://ec.europa.eu/environment/air/pdf/CAO2-MAIN-final-21Dec20.pdf>

<https://ec.europa.eu/environment/air/pdf/CAO2-ANNEX-final-21Dec20.pdf>

But also : <https://epha.org/wp-content/uploads/2018/11/embargoed-until-27-november-00-01-am-cet-time-ce-delft-4r30-health-impacts-costs-diesel-emissions-eu-def.pdf>; See in particular table 2 (page 8) and the 1st para in the executive summary “(...)the total of the health and non-health related costs of road traffic related air pollution in the EU28 in 2030 is estimated at €19.5 billion; of which € 18.3 billion are health-related (...). When using the adjusted emission factors (TRUE), the sum of the 2030 health and non-health related costs amount €25.6 billion (of which € 23.3 billion are health-related) (...)”. The first sentence in page 24 “Most of the damage costs for traffic air pollution are related to health costs (90-100%)” and Table 9 (page 27) also states the same thing.

³ The WHO (<https://www.who.int/airpollution/ambient/pollutants/en/>) and EEA state that the pollutants with the strongest evidence of health effects are particulate matter (PM), ozone (O3), nitrogen dioxide (NO2) and sulphur dioxide (SO2).

While remains pertinent in other regions of the world, SO₂ is by now a much smaller issue in the EU where its emissions went from 7604 Gg in 2005 to 2031 Gg in 2018 (<https://www.eea.europa.eu/data-and-maps/dashboards/necd-directive-data-viewer-3>).

The overall goal is to capture the value of the externality generated by the combustion of the fuels covered, following the segmentation of fuel types, user categories and usages allowed/used in the ETD. The separation of distribution channels for each fuel type should also be taken into consideration, as it is relevant for the practical feasibility of the segmentation. For instance Diesel used for road transport might be differentiated for Diesel used for Agriculture or for diesel used for Rail transport (to the extent that these have different distribution channels), but it is only feasible to segregate Diesel used by road passenger cars from diesel used by trucks if these would be effectively segregated in the distribution channel (eg by always using separate pumping/measuring facilities). Since this is currently not the case, all uses for road fuels are aggregated together by fuel type.

It should also be noted that usage of electricity (for instance, in battery-electric vehicles) and of hydrogen in fuel cells generates no combustion air pollution emissions and as such the corresponding ETD air pollution component for these energy sources is always zero.

Beyond this general setup there are a series of specific choices to be made about each of the components of the computation regarding:

1) Valuation of Mortality (D)

This expresses the social cost of the health impacts, in terms of €/premature death, or €/Year of Life lost attributable to emissions of the pollutant. This is the same for all air pollutants.

One option is to do the computations based on the number of premature deaths (i.e., using Value of Statistical Life and mortality factors in terms of Premature Deaths). Another option is to do the computations based on the number of Years of Life Lost, combined with the Value of Life Years (VOLY).

Under both options we use the **same VSL/VOLY value for the whole EU population**, rather than MS-specific values.

We use the VSL/VOLY values recommended by DG ENV's consultants when valuing air pollution (which are based on the latest OECD meta-study of VSL and VOLY). These are 3,060,000€ for VSL and 79,500€ for VOLY, both expressed in 2005€, which are then converted to 2019€ to account for EU 27 inflation since then (about 26%). We do this by considering the values of the Annual Consumer Price Index for the EU, as published by Eurostat.

We eventually used the **Years of Life Lost and VOLY** for the assessment of the cost of air pollution due to fuel combustion. Indeed, Premature Deaths and VSL are more appropriate for assessing the impact of sudden deaths such as in car accidents.

2) Mortality ratios (B/C)

This expresses the number of Premature Deaths/kg of emissions, or the number of Years of Life Lost /kg of emissions. This varies with each air pollutant.

Consistent with using the same VOLY for the whole EU, we use **EU27 average mortality ratios**, rather than MS-specific values (i.e. we consider B/C, where B is EU number of Years of Life Lost attributable to emissions of the pollutant and C is EU total emissions of the pollutant).

It is important to recognise that the measures of mortality B are computed based on actual measurements of pollutant concentrations at different locations in the EU 27 and considering the populations exposed to them. As such, these concentrations (and the resulting mortalities) capture the effects of all sources of emissions, including primary and secondary pollutants, as well as both natural and anthropogenic sources. It is thus important to ensure that the same scope of emissions driving the mortality (the numerator B) is captured in the denominator (C) of the mortality ratio. If some of

the emission sources explaining the mortality values are not counted in C, then we would be charging fuel-consuming entities for the damage attributable to non-anthropogenic and secondary pollutants. As such, in order that the emission amounts considered for the denominator C have the same scope as the mortality numbers used in the numerator B of the mortality ratio, we compute C using the emission data from the CLRTAP emission inventories with the following rules:

- a. We include all sources of primary pollutants, except for international maritime and cruising aviation emissions
- b. We compute secondary PM2.5 pollution based on non-PM2.5 primary pollutants, using the MS specific mortality equivalent conversion factors used for the NEC Directive impact assessment (TSAP report 15, Annex 2), ie

$$PM2.5_{sec_i} = K_{SO2_i} * SO_{xi} + K_{NO_{xi}} * NO_{xi} + K_{NH3_i} * NH_{3i} + K_{VOC_i} * NMVOC_i$$

One may note that $B/C * D$ gives a measure of the damage value of the air pollutant, i.e. €/kg of emissions. This will vary with each air pollutant.

3) Emission Factors (A).

These express the amount of emissions which results from the combustion of one unit of the fuel.

We take the emission factor values from the EMEP/EEA guidebook⁴, which Member States must use⁵ when submitting their national emission inventory data.

Regardless of the unit used to measure fuel used (be it energy, mass, or volume), the emission factors will vary depending not only on the fuel considered, but also on the broad user category (e.g., road transport vs residential heating), specific type of usage (e.g., large cars/small cars/vans/trucks), and technology used in the combustion and emission after-treatment (each with different emission factors). In this regard, it should be noted that the emission factor for a given technology and user category will vary from one type of usage to another, based on the different usage patterns of each usage type. Moreover, for each fuel/user category/usage combination, the emission factors used by MS for the determination of their national emissions inventories are in many cases presented in a range (capturing the different technologies available), with the MSs then using the values from those ranges that best capture their specific realities of usage in each MS (the validity of this process is assessed by the Commission at the moment of submitting the emission inventories).

In our computations, we chose to always **use the minimum value of emission factors** available in the EMEP/EEA guidebook for a given fuel/user category combination, to provide a conservative measure of the externality, consistent with it being used for establishing minimum rates.

⁴ <https://www.eea.europa.eu/publications/emep-eea-guidebook-2019>

⁵ unless they can provide better data more suited to national circumstances

Specific attention is also devoted to several user categories, where there is more detailed information about the distribution of usages and technologies for each fuel in the EU is available.

a. Road Transport

- i. Aggregating emission factors for multiple usages of a given fuel up to a value per fuel.

Road transport emission factors vary with the category of vehicle used (passenger car vs light commercial vehicle, vs buses vs heavy-duty trucks vs L-category vehicles), segment within each category (small vs large-SUV-Executive passenger cars, rigid heavy duty trucks <7.5T vs articulated heavy duty trucks 50-60T), the technology used (older vehicles tend to equip less efficient emission reduction technologies), but also the patterns of usage inherent in each vehicle category (cold-engine combustion typically represent a much smaller proportion of fuel consumption in buses or heavy duty trucks than in small passenger cars).

We compute the powertrain type & vehicle type-weighted average emission factor for each fuel under the conservative **assumption that all the users of a given fuel would only have vehicles with the cleanest technology as of 2020**. This is implemented by only considering the emission factors of the new vehicles as of 2020, based on the SIBYL 2015 dataset projections for 2020.

In other words, we treat all the dirtier, older vehicles on the road as if they were brand-new vehicles with the cleanest technologies on the market by 2020. It is clear that this conservative hypothesis captures only a fraction of all the road emissions that will actually take place in 2020. Indeed the overwhelming majority of road transport fuel consumption in 2020 will be made by vehicles with more than 1 year, which generally have dirtier technologies (sometimes by several multiples for vehicles only a few years apart) and in reality will generate more pollutants per amount of fuel consumed than what assign them with our estimates.

For each of the vehicle categories and segments within a given fuel, we compute the disaggregated “new 2020 vehicle” emission factors as the EU27 average emission factor for new vehicles as of 2020 (total EU27 emissions by each vehicle category and segment divided by total EU27 TJ of fuel consumed by the vehicle category and segment). These disaggregated “new 2020 vehicle” emission factors are then aggregated up to a value per fuel as the weighted average of the disaggregated “new 2020 vehicle” emission factors of each vehicle category and segment, weighted by the share of total 2020 fuel consumption by new vehicles that comes from the new vehicles of each vehicle category and segment.

For a given fuel F (e.g. diesel), the calculation described above is summarised by the following formula:

$$\begin{aligned} \text{weighed EF (F)} &= \sum_{C,S} \left(\frac{\text{emission (C, F, S, A = 0)}}{\text{consumption (C, F, S, A = 0)}} \right) \\ &\times \text{weight (C, F, S, A = 0)} \end{aligned}$$

where

- “weighed EF” is the weighed emission factor of a given pollutant (e.g. PM2.5) for fuel F, in mass of pollutant per quantity of fuel (e.g. t per TJ); it is calculated by summing elements (see below) for all categories and segments for vehicles of age zero (i.e. new) in 2020;
- “emission” is the 2020 forecast pollutant emissions for a given vehicle category C, fuel F, segment S and Age zero, in mass of pollutant (e.g. ton);
- “consumption” is the 2020 forecast fuel F consumption for a given category C, segment S and Age zero, in quantity of fuel (e.g. TJ);
- “weight” is the ratio of the 2020 forecast fuel F consumption of vehicles of a given category C, segment S and Age zero over the total consumption of all vehicles that consume fuel F.

Note: for PM2.5, the term of the sum in the formula above is multiplied by the exhaust emission factor (see item “ii” below).

This allows us to capture the relative weight of different types of vehicles and usages in the relative consumption of each fuel as of 2020 (e.g. medium passenger cars of all ages are expected to consume about 35% of all diesel in 2020, but only about 31% of the diesel consumed by new vehicles in 2020).

Considering in the formula that all vehicles use the 2020 technology takes into account the revised ETD’s date of application (2023 at the earliest) and the rapidly evolving composition of the road vehicles fleet towards newer and cleaner technology.

ii. Exhaust vs other road transport emission sources

In the ETD we aim to **cover only the air pollution emissions arising from the combustion of fuel.**

However, the EMEP road transport emission factors cover not only emissions arising from fuel combustion, but also evaporative emissions, emissions arising from brake and tyre wear, and emissions arising from the combustion of lubricants. This issue is particularly pertinent for PM2.5 emissions, where the non-combustion/exhaust share of emissions can be particularly large.

The share of exhaust emissions in total emissions depends on the filtering and catalysing technologies used (which are themselves fuel-specific), as well as on the usage patterns, and on the types of vehicles they are applied to. Generally, the heavier the vehicles the greater the

amount of emissions, and the more recent the technology the lower the exhaust emissions, per amount of fuel used. Whereas hydrogen fuel cell and purely electric driven vehicles have no exhaust emissions, for other fuels (e.g. diesel, petrol) we need to determine the % of the EMEP emission factors which corresponds to combustion/exhaust emissions.

This is computed for each type of road fuel, but considering the COPERT data on total and on non-exhaust PM2.5 emissions.

This data allows to compute the non-exhaust % of total PM2.5 emissions for each fuel/ technology type and usage, given the actual patterns of technology use in the EU (i.e. EURO6 may be used in smaller or in larger petrol vehicles, and EURO VI may be used in buses or in different types of heavy-duty trucks, all of them with different usage patterns). We then compute the average exhaust % of total PM2.5 emissions for each fuel, as the weighted average of the exhaust % of total PM2.5 emissions for each fuel/technology type and usage, considering only the cleanest technologies available in 2020 for each fuel and usage type. The weights used are the share that each of these cleanest 2020 technology usages has in all the 2020 PM2.5 emissions done with the cleanest technologies. The resulting number captures the EU average % of total PM2.5 which would be combustion driven for a given fuel, if all the usages of that fuel only had the cleanest technology as of 2020.

For a given type of fuel F (e.g. diesel), the calculation described above is summarised by the following formula:

$$\begin{aligned} \% \text{ exhaust } (F) &= \sum_{C,S,Tech2020} \left(1 - \frac{\text{non exhaust } (C, F, S, T)}{\text{total } (C, F, S, T)} \right) \\ &\times \frac{\text{total } (C, F, S, T)}{\text{total Tech 2020 } (F)} \end{aligned}$$

where

- “% exhaust” is the percentage of the 2020 forecast exhaust PM2.5 emissions on the total emissions, for a given fuel F; it is calculated by summing elements (see below) for all categories, segments and latest 2020 technologies;
- “non exhaust” and “total” are the 2020 forecast PM2.5 emissions (non-exhaust only and total respectively) for a given category C, fuel F, segment S and technology T;
- “total Tech 2020” is the sum of the 2020 forecast total PM2.5 emissions for a given fuel F and for all categories and all segments of vehicles of the latest technology available in 2020

The resulting values (ranging from 0% for purely electric, to 7.9% for Diesel, to 14.8% for CNG) are then applied to the aggregation of the EMEP road transport emission factors described in the previous step.

b. Aviation

Only the Landing-and-Take-off (LTO) portion of the emissions from aviation are considered for the purposes of the NEC directive (cruising air pollutant emissions are considered not to have impacts on human health). As such, only a fraction of all the air pollutant emissions from the fuel combusted in aviation activities is to be covered in the ETD. The actual share of LTO in total air pollutant emissions depends on the departure and arrival airports taxing time and flight distance.

Based on CLRTAP cruise and LTO emission factors for international and domestic aviation, we compute the share of LTO emissions in aviation emissions and therefore apply a correction coefficient to the EMEP emissions, leading to the following values:

- PM2.5 26.0%
- NO_x 12.9%

EMEP/EEA Tier 1 data provides data for aviation gasoline and we tentatively assume the emission factors for jet gasoline (kerosene) are the same as for aviation gasoline.

5. Experts review

The methodology was reviewed by members of the following organisations:

- European Environment Agency (EEA)
- Joint Research Centre (JRC) units C4 (Sustainable Transport) and C5 (Air and Climate)
- IIASA – Markus Amann (external reviewer)
- Economics Research Consulting – Mike Holland (external reviewer)

Reviewers all support the idea of pricing instruments via ETD to reduce air pollution. Overall the reviewers believe our approach underestimates the cost of air pollution and does not take into account the local aspect of it. The former is due to the conservative approach chosen and the latter is inherent to having an EU-wide tax component for minimum rates. Several comments were requests for clarification which were implemented in the methodology description above.

The main more detailed comments were as follows:

1) General:

- a. JRC performed an **alternative calculation** for a part of our methodology (number of years of life lost per kg of pollutant), came up with similar results and concluded “The obtained values in proposed ETD methodology therefore appear to be justifiable”; Mr Holland (ERC) made an alternative calculation from EEA and ETC-ATNI⁶ work which led to a similar environmental cost (€ per kg of pollutant emission) for PM2.5 and an about twice higher cost for NO_x. This is explained, inter alia, by not taking into account secondary formation of fine particulate matter arising from NO_x emissions.

⁶ [European Topic Centre on Air Pollution, Transport, Noise and Industrial Pollution](#)

- b. The **scope** of the methodology should be extended to other pollutants and/or to other impacts than mortality impact as the current approach underestimates the cost of air pollution; however this proved to be difficult due to the lack of data and the time constraints on the exercise.
- c. **National environmental performance and/or the location** (e.g. urban area or countryside) of air pollutant emissions should be taken into account. This is impossible in the ETD where the minimum tax rates apply EU-wide; however Member States have the flexibility to take these factors into account by taxing above the minimum rates.
- d. Solid **biomass** should be in the ETD's scope, especially but not only in an option with a tax component on air pollution

2) Road transport:

- a. Considering that **all vehicles use 2020 technology** is very “generous”. This is due to the conservative approach, which intends at not penalising new technology; moreover, the ETD will be applicable as of 2023 at the very earliest, at which time the 2020 technology will be more spread out in the road vehicle fleet.
- b. Counting only the **exhaust emissions** (directly due to fuel combustion) and not the non-exhaust ones such as tyre/brake wear was perceived as generous too but is consistent with the scope of the ETD.

6. Results

Environmental Cost of air pollutants

The environmental cost of an air pollutant computed by the methodology presented above is summarised below (in euro per kg of air pollutant emission):

| Air Pollutant | Environmental cost (€ / kg) |
|----------------------|------------------------------------|
| PM2.5 | 103.1 |
| NOx | 8.1 |

Cost of Air Pollution per ETD type of fuel and usage

The cost of air pollution computed via the methodology described before, per ETD type of fuel and usage is provided in option 3c. This cost is also the value of the air pollution component in the EU minimum energy tax rate.

ANNEX 7: AVIATION TAXATION

1. Introduction

In support of the impact assessment on the revision of the Energy Taxation Directive, DG TAXUD commissioned an external study specifically on the taxation of the air transport sector for various reasons. There is increasing international pressure for appropriate pricing measures properly reflecting the environmental and climate impacts of aviation activities. Several Member States have introduced or are considering introducing aviation ticket taxes, partly because there is no fuel tax applied to aviation fuel. Therefore, the Study compares the possible impacts of a harmonised fuel tax to the possible impacts of ticket taxes on aviation. Furthermore, the taxation of air transport is a legally complex issue and specific impacts like connectivity, fuel tankering, economic competitiveness and competition within the sector need to be taken into account.

A consortium led by Ricardo together with the partners GWS, Ipsos NV, TAKS/Vital Link and Alice Pirlot have carried out this Study.

The study provides an analysis of the impact of various sub options of a fuel tax on the traditional aviation fuel (kerosene) and used the same baseline (EU Reference Scenario) as in the impact assessment of the ETD. One of the analysed sub options of a fuel tax of 0.33 €/1.000 litre or 9.35 €/GJ, is comparable with the proposed rate for kerosene for aviation in the Impact Assessment of the ETD and has been analysed on basis of the GINFORS model (section 6.8 of the IA ETD). The GINFORS model includes the aggregates of the whole aviation sector. The JRC modelled the impact of the intra EU fuel tax by multiplying the rate of intra EU fuel tax with a factor that represents the share of intra-EU fuel use. Thus, instead of applying a high rate to a small sector, JRC applied a lower rate to a broader sector.

In the support study, as described in this annex, a more sector specific model is used, the AERO-MS model. This model differentiates for example between the types of flights (between intra and extra EU, low cost carriers and traditional carriers, passenger and cargo) and uses different elasticities per type of flight. Despite the different models used, we can conclude that the outcomes of impact of the proposed intra EU fuel tax on the aviation sector do not deviate substantially and seem to be coherent.

Additionally, the study provides an analysis of the possible use of ticket taxes in air transport (this is beyond the scope of the ETD) and given the possible limitation on the use of fuel taxation beyond intra-EEA aviation the study also looks into a possible combined application of a ticket tax and a fuel tax.

The study covers the whole of the European Economic Area (EEA), namely the EU27 plus Norway and Iceland. It assumes that potential policy options would be implemented in 2023, with the impacts being assessed for the period up to 2050.

This annex describes the approach and methodology of the study and summarizes the outcome of the assessment and presents the comparison of the different options.

2. Approach and methodology

The analysis assesses the impacts of the proposed policy options against two baseline scenarios. The use of two baselines was motivated by the severe impacts on the aviation sector, and society more widely, from the global COVID-19 pandemic. The health and economic crises generated by the pandemic have affected and will continue to impact demand for travel, potentially inducing long-term changes to businesses and people's habits, making any forecast of aviation demand very uncertain. Therefore, a main baseline scenario reflecting developments under current trends and adopted policies is used. It builds on the baseline scenario underpinning the impact assessment accompanying the 2030 Climate Target Plan and the staff working document accompanying the Sustainable and Smart Mobility Strategy, but it additionally considers the impacts of the COVID-19 pandemic and the National Energy and Climate Plans. In this scenario, air passenger traffic recovers by 2025, with a return to growth rates akin to historic rates in subsequent years. A sensitivity baseline with lower future growth is also used, based on EUROCONTROL's scenarios for the post-COVID recovery for the aviation sector.

The following tools are used to assess the impacts:

- A model, AERO-MS, focussed on the aviation sector, with detailed data at an airport pair level. This model is used to quantify impacts on the aviation sector of the various policy options.
- Results from the AERO-MS are transferred to a macro-economic model, GINFORS-E. This model, which includes bilateral world trade data, is used to quantify wider economic impacts on other transport modes and other economic sectors for the different policy options.
- The use of both models provides a comprehensive overview of impacts in comparison with each of the baselines included in the study, with results produced for short-term (2025), mid-term (2030) and long-term (2050) impacts.
- The study also includes a thorough legal analysis of the EU and international legal framework currently in place, in order not only to ensure the effectiveness of the different policy options under current legislation, but also to assess the potential legal consequences of the interventions.
- A focused field research programme is also part of the study, with conversations held with experts in the competent ministries of Austria, Germany, Sweden and the Netherlands. All of these are Member States with experience in levying national air ticket taxes.
- A case study on peripheral and island regions is also conducted, to investigate and quantify possible negative socio-economic impacts that could take place on those regions, given their reliance on aviation for their economic activities, if taxation on the aviation sector is implemented in the EU. The regions and Member States under analysis were the Canary Islands (Spain), Crete (Greece), Ireland and Malta.

3. Assessment of policy options

3.1. Fuel tax

3.1.1. Overview of policy options

The policy options implementing a fuel tax for intra-EEA aviation activity would amend the current exemption from excise duty of aircraft fuel in Article 14(1) of the ETD. This responds to the need for a harmonised approach, since the capacity to waive current exemptions for

domestic flights or intra-community flights via bilateral agreements between Member States under Article 14(2) has not been used so far. The current minimum excise duty rate for kerosene, according to the Energy Taxation Directive, is € 330/1,000 L (or 33 cents/L). The sub-options consider variations around (above and below) the minimum kerosene tax rate that would be applicable to commercial aviation, as well as a number of exemptions. This is summarised in the table below.

Summary of policy options for the implementation of a fuel tax

| Policy package | Tax rate | Other considerations |
|--|--|---|
| Harmonised fuel tax for intra-EEA aviation under the revised ETD | <p>€0.17, €0.33 and €0.50/litre⁷</p> <p>(equivalent to approximately €4.82, €9.35 and €14.17 per GJ, respectively)</p> <p>Tax applies to passenger flights but not to cargo-only flights⁸</p> <p>Tax is either implemented at once or over a ten-year period (increments of 10% of the full value in each year)</p> <p>Sustainable aviation fuels are exempt from fuel tax</p> | <p>Exemptions for flights operated under public service obligations</p> <p>Exemptions for flights to and from EU outermost regions</p> <p>No earmarking of revenues</p> |

The tax rates shown in the table above can also be related to the CO₂ emissions produced from the combustion of the fuel. The three rates shown are equivalent to approximately €67, €131 and €198 per tonne CO₂, respectively.

A tax on the fuel loaded for (or used on) a flight can help towards internalising the external costs of greenhouse gases and air pollutants emissions, related to the quantity of fuel consumed. The airline is expected to pass through the cost to consumers by raising ticket prices, leading to a reduction in passenger demand and hence fuel consumption. To a more limited extent, airlines are also incentivised to choose more efficient aircraft for their operations to reduce the fuel consumed. The effectiveness of the fuel tax in achieving those goals could be reduced if the airlines use the practice of ‘tankering’ to reduce their tax burden (i.e. filling up the aircraft in destinations where there is no fuel tax and then using the same aircraft to fly intra-EEA flights where fuel would be taxed) or if they shift some of their intra-EEA flights to destinations in third countries.

From an efficiency perspective, the collection of a fuel tax is not expected to be problematic. Member States already have experience in collecting fuel taxes in other modes, namely on road transport. It is expected that an aviation fuel tax would be collected in a similar manner, with the fuel suppliers collecting the tax when they supply kerosene at airports, then transferring those funds to the relevant tax authorities.

From a legal perspective, no issues are identified for the implementation of a tax on fuel loaded for intra-EU flights by EEA carriers. Furthermore, most air services agreements (horizontal agreements, HAs, and comprehensive air transport agreements, CATAs) between

⁷ Prices are modelled, and presented in the report, in constant 2019 Euros

⁸ Due to modelling limitations, the impact results presented include the application of the fuel tax to cargo-only flights. The contribution of such flights to the overall emissions is small, so the effects of including the tax on them is also considered to be small.

the EU and third countries also allow the taxation of fuel used by their carriers on intra-EU flights. Updates to these agreements might be needed to allow the taxation of fuel used by their carriers on flights between the EU and the other EEA countries.

3.1.2. Assessment of impacts

Overall, the options implementing a tax on fuel loaded for intra-EEA flights all have noticeable impacts on CO₂ emissions in the long-term, with reductions of between 6% and 15% for intra-EEA flights, relative to the baseline, for tax rates from €0.17 to €0.50 per litre (the short-term impacts depend on whether a transition period is included). This result corresponds closely to the level of the reduction in passenger demand – while the fuel tax leads to a small improvement in aircraft fuel efficiency, the large majority of the reduction in emissions is due to a reduction in demand due to increased ticket prices. These results are only marginally affected when considering them against a lower baseline demand (representing a slower recovery following the COVID-19 pandemic).

The impacts of the fuel tax and the consequent changes in demand reduce total GDP in the EU27 by approximately €9 billion (about 0.05%) by 2050, under the assumption that revenues collected are used for deficit reduction purposes. Should the revenues be recycled, for example to fund reduction in other taxes, the negative impact on GDP would be smaller. In terms of tax revenue, the existing national ticket taxes contribute €2.6 billion of revenue from intra-EEA flights in 2025; under the €0.33 per litre option, the tax on fuel contributes about €6.7 billion per annum in 2050. The wider impacts on the economy from the reduction in aviation demand then reduce the rise in total tax revenue over the baseline to €5.4 billion per annum.

Regarding the impact on connectivity, the lower demand resulting from the introduction of a ticket tax would be expected to reduce flight frequencies across all routes. In principle, this could potentially lead to the loss of air transport on some routes, should these cease to be financially viable for air carriers to operate. However, this negative effect may be limited. This is because the expected number of intra EEA flights in the baseline for 2025 is 21% higher compared to base year 2016. By 2025, the introduction of a fuel tax of €0.33/litre (with no transition period) would lead to a reduction of 10% in the number of flights when compared to the baseline. Given this, it is expected that, overall, the flight frequency on most routes would be still higher than it was in 2016, although some variations are expected and specific regions could indeed see their connectivity reduced.

In terms of competitiveness of EEA carriers in relation to third country carriers (and between different EEA carriers) there could be negative impacts on the former. This is because non-EEA carriers might be subject to a more lenient tax regime in their ‘home’ market, allowing them to be more profitable overall and be in a better position to compete with the EEA carriers on the routes on which the two sets of carriers compete.

The implementation of a fuel tax on intra-EEA flights could give rise to concerns regarding ‘hub switching’, as carriers change the connection airport on an indirect flight (between an EEA departure and a non-EEA destination) from an EEA airport to a non-EEA airport, to take advantage of the lack of fuel tax on the initial leg. This is more likely to impact traditional network carriers than low-cost carriers, as the latter tend to fly mainly direct flights. However, the extent to which hub switching may occur depends on a number of factors, including slot availability at airports and passenger preferences, so it is not possible to quantify the likely impact at this stage.

3.2. Ticket tax

3.2.1. Overview of policy options

The policy options implementing a fuel tax define a minimum, EU-wide ticket tax applicable to passenger services and, potentially, to air freight services. A number of EU Member States and their neighbours (Austria, France, Germany, Italy, Netherlands, Portugal and Sweden, together with Norway and the UK) already implement a ticket tax – in some jurisdictions better defined as a levy or charge – on all departing air passengers. While the applicable rates of existing national ticket taxes vary significantly, most of them share some common features: exemptions for transit and transfer passengers; differentiation between short haul and long haul flights, based on different criteria; and no earmarking of revenues to a dedicated fund. Air freight services are typically not affected by national taxes on the ground of international competitiveness. Many of these features also characterise the ticket tax policy option, as summarised in the table below.

Summary of policy options for the implementation of a ticket tax

| Policy package | Tax rate | Other considerations |
|-------------------------------------|---|--|
| Harmonised ticket tax across the EU | Different types of passenger taxes considered: <ul style="list-style-type: none"> • Flat tax <ul style="list-style-type: none"> ○ €10.43 for all passengers • Tax increasing with the distance flown <ul style="list-style-type: none"> ○ €10.12 for intra-EEA flights ○ €25.30 for extra-EEA flights of up to 6,000km ○ €45.54 for extra-EEA flights over 6,000km • Tax decreasing with the distance flown <ul style="list-style-type: none"> ○ €25.30 for flights of up to 350km ○ €10.12 for flights over 350km Tax could be the same for all passengers in a flight, or be differentiated depending on the class of travel (non-premium/premium tickets). | Exemptions for flights operated under public service obligations Exemptions for flights to and from EU outermost regions No earmarking of revenues |

In terms of efficiency, conversations with Member States government officials indicate that the administrative burden of implementing and managing a ticket tax is relatively low both for public administrations and airlines. Overall administrative costs are expected to be lower than equivalent costs for implementing a fuel tax. Analysis indicates administrative costs of €465 thousand to €1 million per Member State per year (€12.6 million to €27.6 million across the EU).

From an effectiveness perspective, unlike a fuel tax, ticket taxes can at most have an indirect relationship with fuel consumption (e.g. if they increase with distance). They do not provide direct incentives for increased fuel efficiency (passengers on two different aircraft with different fuel efficiencies would pay the same ticket tax) but are essentially a demand management measure, as they essentially increase the price of air tickets. This gives a small disadvantage of ticket taxes compared to fuel taxes. An advantage of a ticket tax is that it can be more easily applied (from a legal perspective) to an increased scope (intra-EEA, extra-EEA flights or both), which increases the potential demand effects of such a measure and reduces the need for renegotiating some international air transport agreements.

3.2.2. Assessment of impacts

The impacts of the different types of ticket tax considered were as follows:

- For the flat ticket tax, where a single tax rate applies to all flights, the reduction in demand is 9% on intra-EEA flights and 1.5% on extra-EEA flights. The total tax revenue is about €6.7 billion in 2025, rising to €9.9 billion in 2050, representing increases of €4.1 billion to €6.2 billion above the baseline values.
- The stepped rate option, with a higher tax rate applying to longer flights (over 6,000 km), has a slightly lower impact on intra-EEA demand, but a significantly greater impact on extra-EEA demand (about 4.5% reduction in demand), compared to the flat rate option. The tax revenue from this option in 2050 is €6 billion over the baseline.
- The inverse stepped rate, with a higher rate applying to short flights (below 350 km), has a slightly higher impact on intra-EEA demand, and a very similar impact on extra-EEA demand, compared to the flat rate option. The tax revenue from this option in 2050 is €7 billion over the baseline.

In terms of CO₂ emissions, the different ticket tax options lead to reductions of between 8% and 10% on intra-EEA flights and between 3% and 5.5% on extra-EEA flights.

Regarding other potential sub-options, the application of tax multipliers of 3.0 and 7.5 for premium seats has only a small effect on the demand impacts of the tax options as they target passengers with more inelastic demand. Multipliers have a more significant effect on the tax revenue, increasing revenue to about €13 billion in 2050 under the flat rate tax with a 7.5 premium multiplier. The relative impacts of the ticket tax (as percentage changes) do not change when considering them against a lower baseline demand (representing a slower recovery following the COVID-19 pandemic).

With respect to the impact on connectivity, and not unlike the options introducing a fuel tax, the lower demand resulting from the fuel tax would be expected to reduce flight frequencies across all routes. However, under the different policy options that introduce a ticket tax, by 2025 demand is expected to be above 2016 levels – e.g., under a stepped ticket tax with no reduction in national ticket taxes, by 2025 number of flights by legacy carriers is expected to be 12% higher than in 2016, and for low-cost carriers 9% higher. That is, the introduction of a ticket tax, while reducing the expected growth in demand, is not expected to reduce demand when compared to 2016 levels and thus the impacts on connectivity are expected to be limited.

The implementation of a ticket tax, covering both intra-EEA and extra-EEA flights, might also raise concerns on the potential for hub switching. The ticket tax options considered in this study all exempt passengers travelling from a non-EEA origin to a non-EEA destination, connecting via an EEA airport; this exemption is expected to reduce the risk of airlines deciding to move their hubs away from EEA airports. The risk of passengers electing to travel from the EEA to a non-EEA destination, with a connection at a non-EEA airport (rather than connecting at an EEA airport) will depend on the exact design of the tax (e.g. whether the tax is calculated on the ‘ticket’ for the full journey or individual legs). Overall, the impact of hub switching on the competitiveness of EEA carriers and airports is expected to be limited.

3.3. Combined tax options

3.3.1. Overview of policy options

Different combinations of the two types of taxes were developed to identify whether there are advantages in having such combinations. Sub-options include the case where the ticket tax is applied to all flights (intra-EEA and extra-EEA), to intra-EEA flights only and to extra-EEA flights only. Otherwise, the combined tax options have the same considerations in terms of efficiency, effectiveness and legal issues as the fuel and ticket taxes considered individually.

3.3.2. Assessment of impacts

All the combined tax options considered in this study include a tax on the fuel supplied for intra-EEA flights and a ticket tax on extra-EEA flights. The cases considered have combined a €0.33 per litre fuel tax on intra-EEA flights and a ticket tax (flat, stepped or inverse stepped) on extra-EEA flights.

All tax options analysed have significant impacts on CO₂ emissions in the long-term, with reductions of about 10% on intra-EEA flights and up to almost 5% on extra-EEA flights. The option with the stepped ticket tax on extra-EEA flights has a greater impact than the other two combined tax options considered. The impacts on demand are very similar to those on emissions, with slightly lower magnitudes of change (up to 9.7% on intra-EEA flights and 4.0% on extra-EEA flights).

The additional tax revenue from aviation under the combined tax options ranges from €14 billion to €16 billion per annum by 2050. The impacts on the economy from the reduction in aviation demand reduce the rise in total tax revenue from the transport sector to about €12 billion per annum. A similar reduction in GDP is also expected by 2050 in the EU27 Member States.

4. Comparison of options

The table below presents a quantitative comparison of the impacts of the main indicators for the ‘main’ sub-option of each policy option – the heading of the table provides the details of the sub-option under consideration. All impacts are presented for the year 2030. To simplify the table, all increases in parameters (demand, tax revenue, etc.) are marked as ‘+’, while all reductions are marked as ‘-’.

Comparison of main policy options

| | Policy option 1: €330 per 1,000 litres fuel tax on fuel loaded for intra-EEA flights | Policy option 2: Stepped rate ticket tax (€10.12 per ticket on intra-EEA flights, €25.30 per ticket on extra-EEA flights up to 6,000km, €45.54 per ticket on extra-EEA flights over 6,000km) | Policy option 3: €330 per 1,000 litres fuel tax on fuel loaded for intra-EEA flights, €25.30 per ticket on extra-EEA flights up to 6,000km, €45.54 per ticket on extra-EEA flights over 6,000km |
|--|---|--|--|
| Economic impacts | | | |
| Total flights | -9.1% intra-EEA; 0.0% extra-EEA | -8.1% intra-EEA; -8.9% extra-EEA | -9.1% intra-EEA; -5.9% extra-EEA ⁹ |
| Total aviation passenger demand (p-km) | -9.2% intra-EEA; 0.0% extra-EEA | -8.3% intra-EEA; -4.6% extra-EEA | -9.2% intra-EEA; -2.7% extra-EEA |
| Total rail + aviation passenger demand (p-km) | -5.6% (1,078.8 billion p-km) | -5.0% (1,097.0 billion p-km) | -5.6% (1,090.3 billion p-km) |
| Revenues in aviation sector ¹⁰ | -0.5% intra-EEA; 0.0% extra-EEA; -3.2% total net revenue | -0.7% intra-EEA; +0.8% extra-EEA; -8.5% total net revenue | -0.5% intra-EEA; +0.5% extra-EEA; -6.5% net revenue |

⁹ Although the ticket tax rates on extra-EEA flights are the same under policy options 1 and 2, the impacts of policy option 3 are lower in 2030 as the tax (including both fuel tax and ticket tax elements) is implemented with a 10-year transition period starting in 2024, whereas under policy option 2 the tax is implemented in full from 2024.

¹⁰ The aviation sector revenues are the incomes to the airlines from passenger tickets and freight charges. The gross impacts (presented for intra-EEA and extra-EEA flights) include additional incomes from passing through the ticket taxes to passengers (and cargo taxes to freight companies), while the impact on net revenues includes the payment of the ticket and cargo taxes collected, and fuel taxes, to the tax authorities.

| | Policy option 1: €330 per 1,000 litres fuel tax on fuel loaded for intra-EEA flights | Policy option 2: Stepped rate ticket tax (€10.12 per ticket on intra-EEA flights, €25.30 per ticket on extra-EEA flights up to 6,000km, €45.54 per ticket on extra-EEA flights over 6,000km) | Policy option 3: €330 per 1,000 litres fuel tax on fuel loaded for intra-EEA flights, €25.30 per ticket on extra-EEA flights up to 6,000km, €45.54 per ticket on extra-EEA flights over 6,000km |
|--|---|---|--|
| Revenues from taxation (aviation), including existing ticket taxes | €7.44 billion intra-EEA; €10.36 billion total | €7.44 billion intra-EEA; €19.14 billion total | €7.43 billion intra-EEA; €15.87 billion total |
| GDP | -0.04% | -0.06% | -0.04% |
| Environmental impacts | | | |
| CO ₂ emissions (aviation sector) | -9.9% intra-EEA; 0.0% extra-EEA; -3.7% total | -7.8% intra-EEA; -5.2% extra-EEA; -6.2% total | -9.9% intra-EEA; -3.6% extra-EEA; -6.0% total |
| Social impacts – number of persons employed | | | |
| Air transport services | -1.0% | -1.8% | -1.3% |
| Total transport services | +0.02% | +0.04% | +0.02% |

All three policy options are found to have similar impacts on intra-EEA flights: introducing a tax (either fuel tax or ticket tax) on commercial aviation increases ticket prices and reduces demand. Options 2 and 3 add in the extra impacts of including extra-EEA flights in their scope and, therefore, give greater total reductions in emissions and total tax revenues. Although options 2 and 3 include the same ticket tax rates on extra-EEA flights, the impacts are slightly greater in the table for option 2 as the taxes are assumed to be implemented immediately (in 2024) under that option, while option 3 assumes a 10-year transition period (in line with that used for the fuel tax on intra-EEA flights).

.ANNEX 8: ENERGY SYSTEM IMPACT OF THE CENTRAL OPTION OF THE ETD REVISION (CONTRIBUTION BY DG ENER)

By increasing the minima applied to energy taxes, the proposed energy content option of the ETD in the context of the “Fit for 55” package will contribute, to a limited extent, to the required evolution of the EU’s energy mix away from fossil fuels.¹¹ Changes occur in Member States that apply taxes below the proposed minima and in those that are affected by the changes of the tax base.

End-user prices for fuels, sectors and Member States are differently affected, depending on the current tax levels. On the one hand, the impacts on end-user fuels with relatively high levels of existing taxation across the EU, like diesel and gasoline end-user prices for private road transport or electricity for households, are limited. On the other hand, the ETD energy content option would lead to an increase of end-user prices for fuels with low levels of existing of taxation. This is the case of the fossil fuels end-user prices for households, up to 5.8% for coal prices on average at EU level in 2030, and higher for gas and LPG in the road transport sector.

As a consequence, the ETD energy content option would contribute to reduced final energy consumption of fossil fuels through energy efficiency and fuel switch. In particular, coal consumption sees a significant impact (-3.5%) in final energy consumption in 2030. While the renewable energy shares in transport (RES-T) and in electricity (RES-E) would not be affected by the ETD energy content option, the contribution of renewables in heating and cooling (RES-H&C) in final energy consumption would increase, by one percentage point, notably through electrification and ambient heat in buildings.

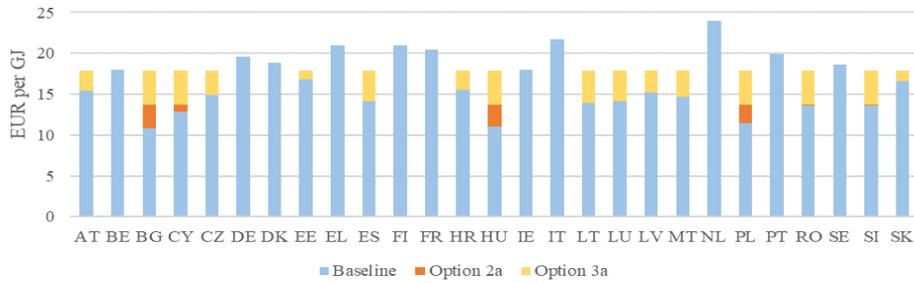
Overall, the changes lead to an increase in system costs by 2030 due to the increase in energy related expenses. In absolute terms, the transport sector sees the highest increase compared to a world in which the ETD was not revised but where other initiatives of the ‘Fit for 55’ package are implemented.

¹¹ The analysis is based on stylised modelling with the PRIMES model using the MIX scenario used by several initiatives of the “FitFor55” package which includes the revision of the ETD under the energy content option with a counterfactual setting removing the changes proposed by the ETD revision but keeping all other policy elements and drivers of the modelling constant.

ANNEX 9: STATISTICAL ANNEX

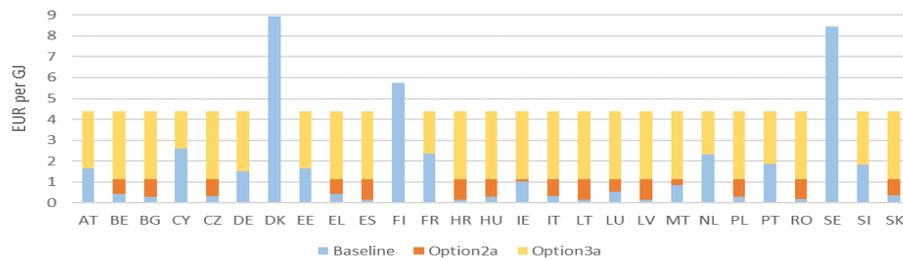
Additional statistics on the convergence of tax rates against the minima (impact on the internal market)

Figure 1: Tax rates by 2035 – Households, Motor, Petrol



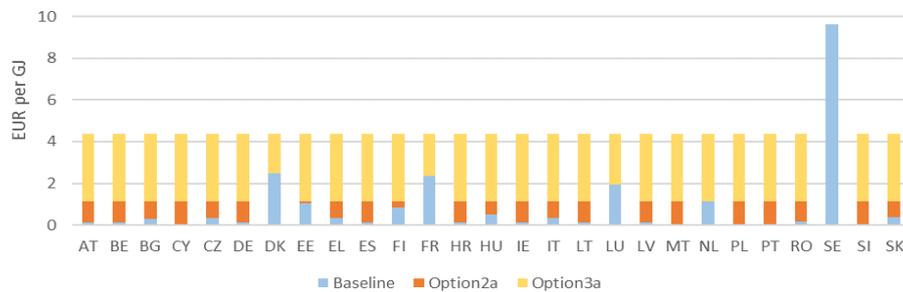
Source: JRC

Figure 2: Tax rates by 2035 – Services, Natural gas



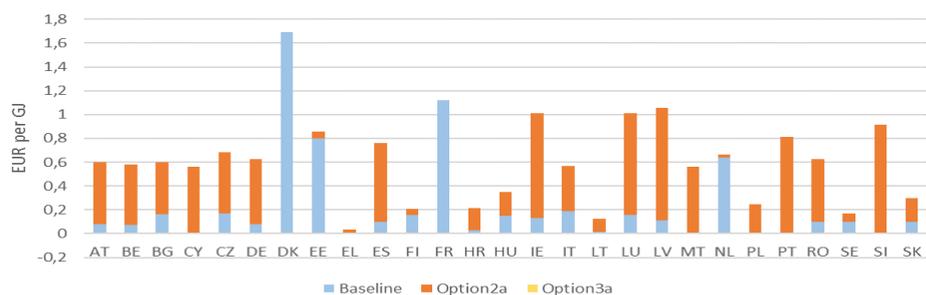
Source: JRC

Figure 3: Tax rates by 2035 – Other industries not covered by ETS, Natural gas



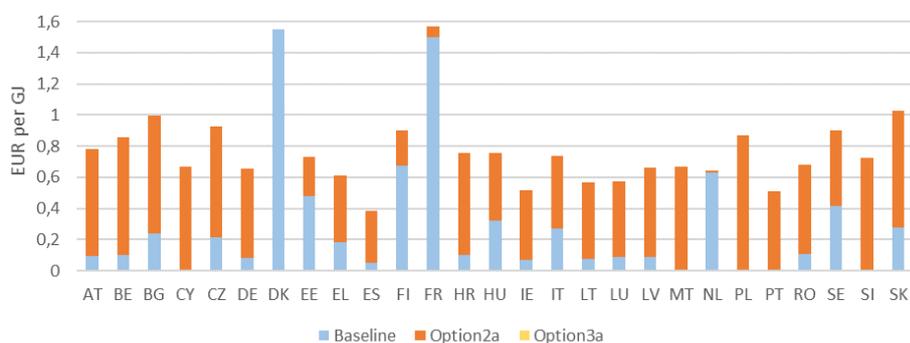
Source: JRC

Figure 4: Tax rates by 2035 – Chemicals, Natural gas¹²



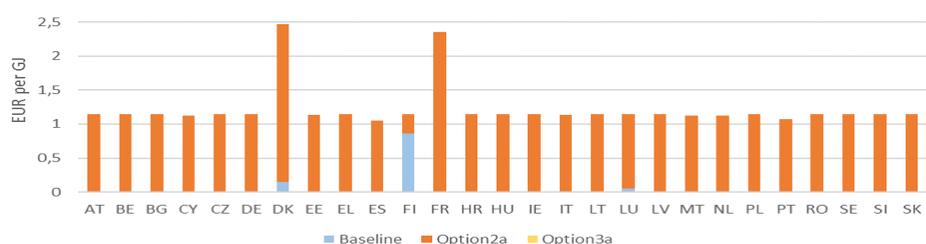
Source: JRC

Figure 5: Tax rates by 2035 – Paper and pulp, Natural gas



Source: JRC

Figure 6: Tax rates by 2035 – Non-metallic minerals, Natural gas

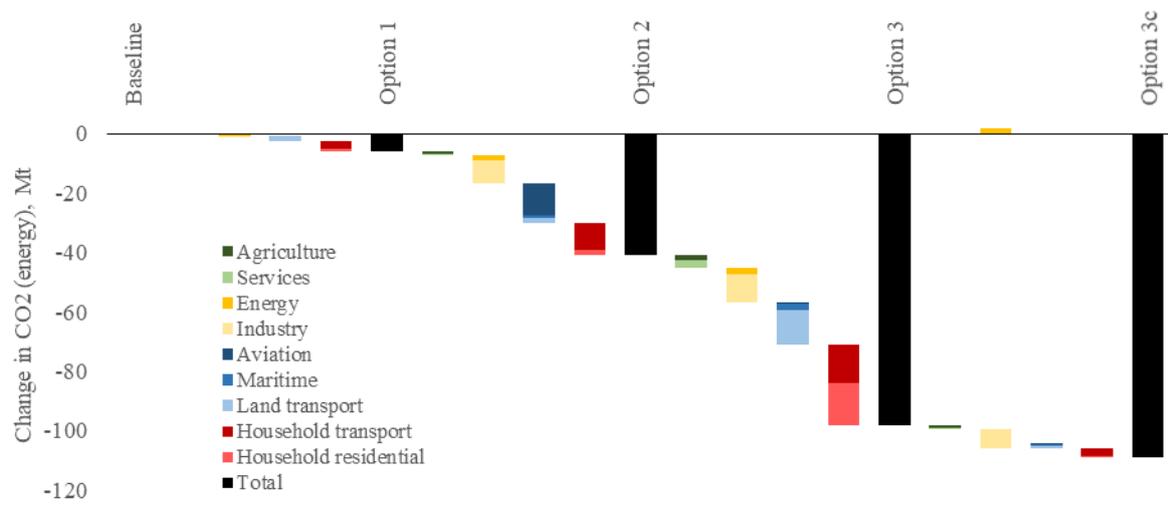


Source: JRC

Additional statistics on GHG

¹² For energy intensive industries, the effective tax rates are calculated net of energy volumes defined as out-of-scope of the Directive (therefore not taxed). Some out of scope processes (such as dual use) remain outside the revised ETD. Hence the extent to which each Member States relies on those processes remaining out-of-scope defines how much the rates will change. This explains the remaining national differences in effective rates for EIIs in Options 3a, 3b and 3c, despite the equalisation of most rates in EUR/GJ by 2035.

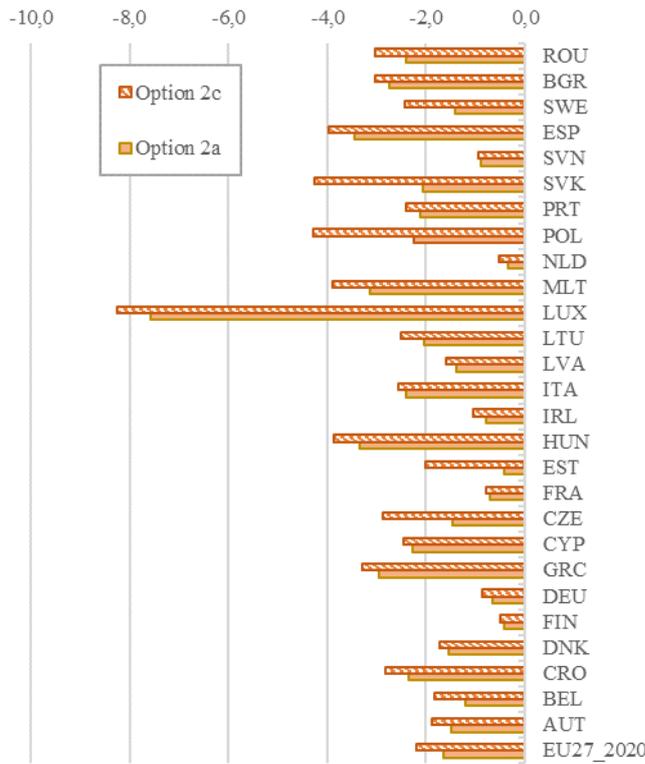
Figure 7: Change in CO2 emissions, Mt under different options



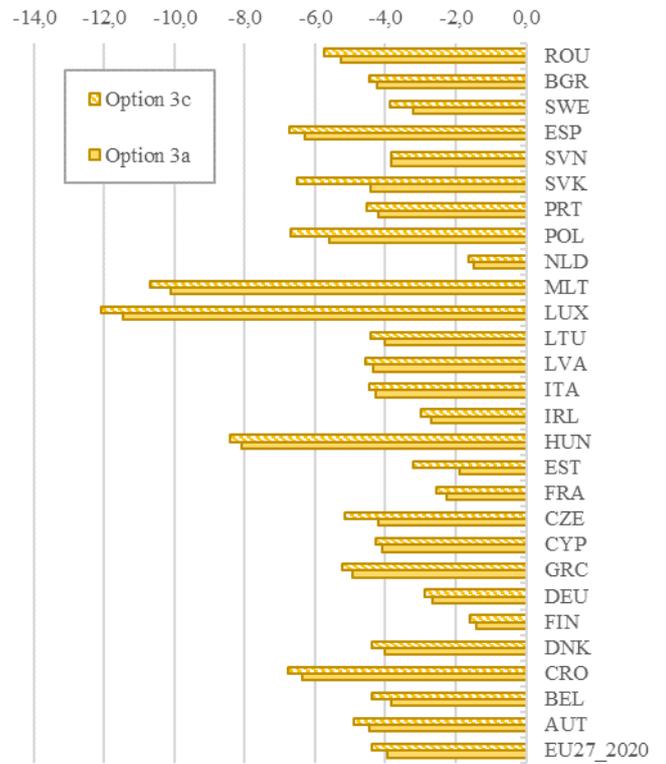
\Source: JRC-GEM-E3

Figure 8: Member States percentage decrease in GHG emissions for options inclusive of pollution component compared to baseline in 2035

Option 2a and 2c

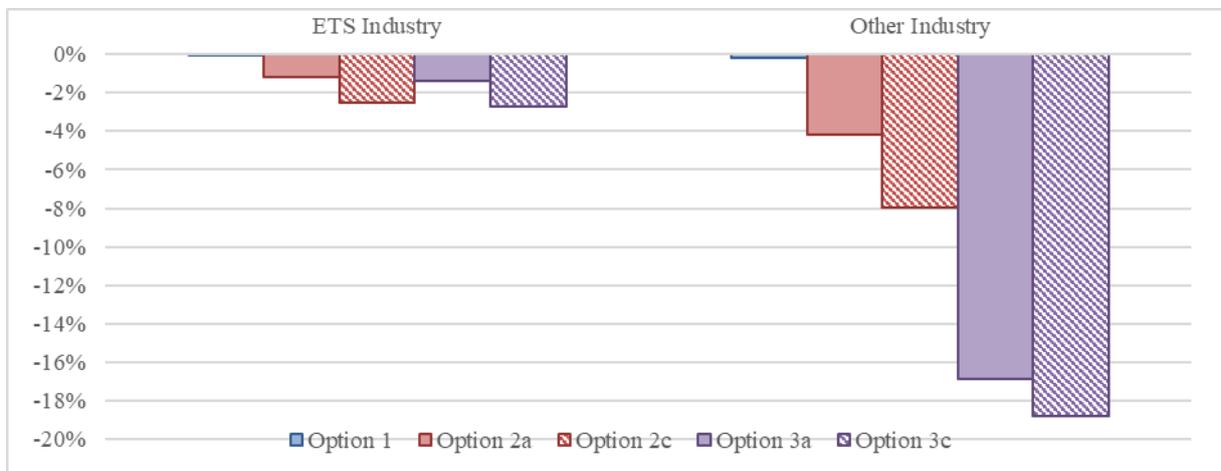


Option 3a and 3c



Source: JRC-GEM-E3

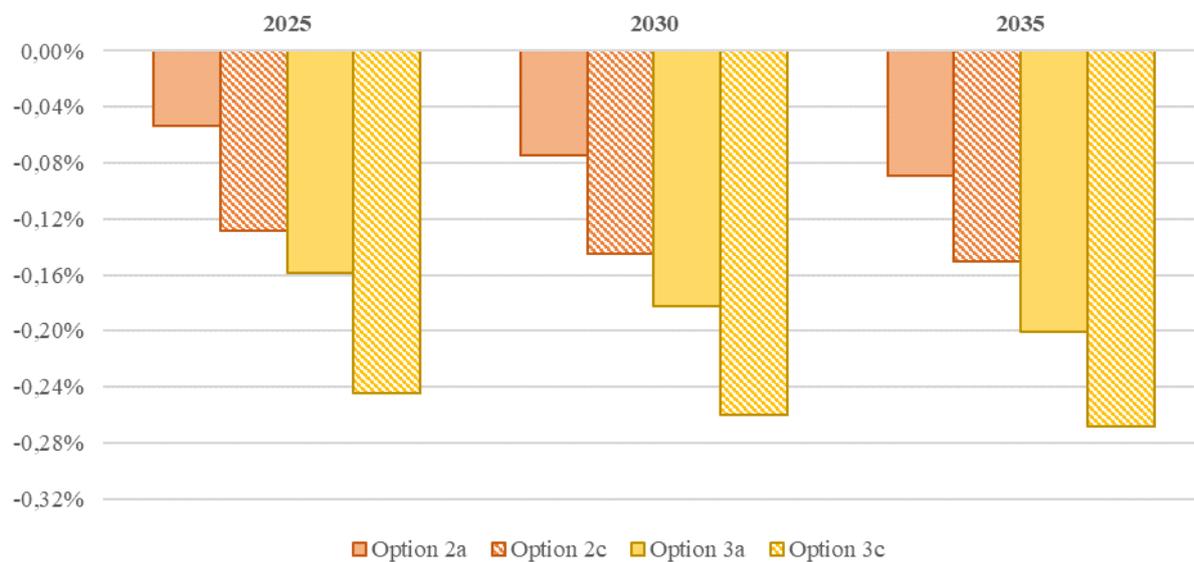
Figure 9: Decrease in industrial GHG emissions for all options compared to baseline in 2035



Source: JRC-GEM-E3

Statistics on macroeconomic and revenue impact

Figure 10: Change in EU 27 GDP compared to the baseline Options 2 and 3 with and without the pollution component



Source: JRC-GEM-E3

Figure 11: Change in tax revenues by Member State inclusive of the pollution component in 2035 (% change relative to the baseline)

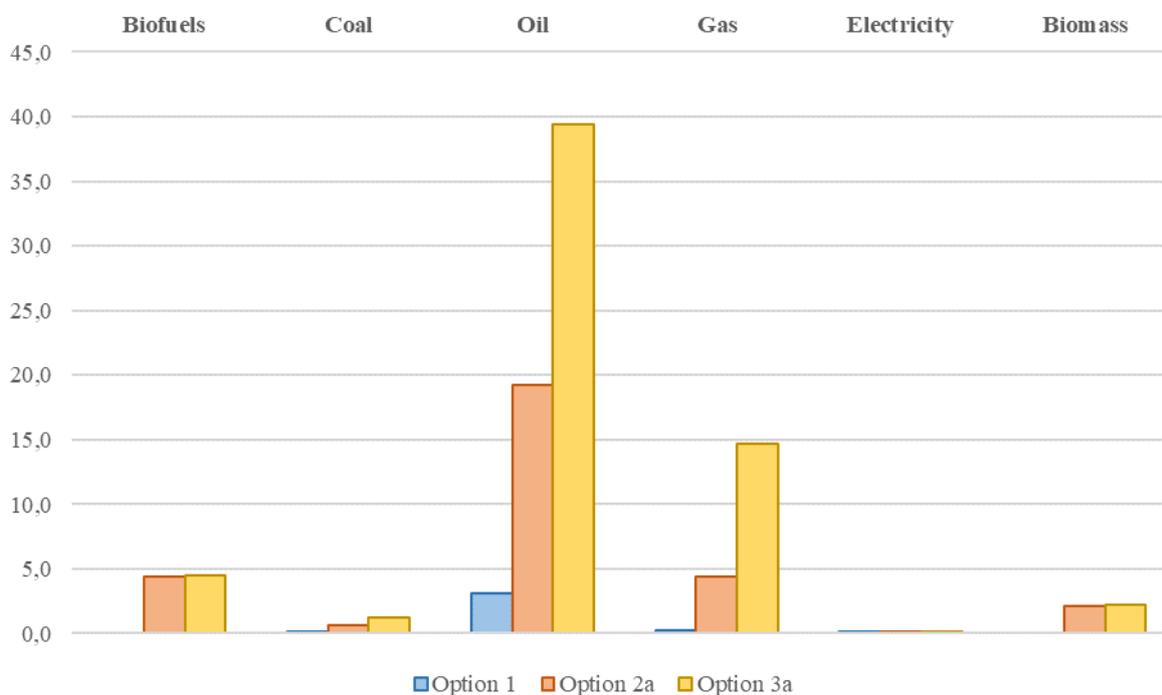
Option 2a

Option 3a



Source: JRC-GEM-E3

Figure 12: Change in revenue by product group compared to baseline EU27 – 2035 (% change for baseline)



Source: JRC-GEM-E3

Statistical details on distributional effects by Member State

a. Methodological issues

Input microdata

This analysis uses EUROMOD’s ITT extension and microdata from two household surveys:

- the European Union Statistics on Income and Living Conditions database, EU-SILC, which contains information on household income and other household- and individual-level characteristics.
- and the EU Household Budget Surveys, from where information on household consumption expenditures at the 4-digits COICOP categories of goods/services is extracted.

The EUROMOD’s ITT extension uses as input a database obtained from matching these two surveys, in order to compute indirect tax liabilities (VAT and specific excises) for each household. These are calculated on top of the direct taxes, social contributions and cash benefits simulated by the core EUROMOD model.

Link between GEM-E3 and EUROMOD

First, the macroeconomic impacts of the energy tax reform scenarios are simulated in the GEM-E3 macro model. Then, in order to study the distributional impacts of the ETD options on households at the micro level, key variables from the macro simulation are used to feed the micro model. By linking the two models in this way, the distributional analysis at the micro level is able to account for the economy-wide impact of the tax policy reform under consideration and captures the effects of the policy option not only through its direct impact on the tax burden, but also through its broader implications on consumer prices and household incomes.

It is important in this sense to mention the variables that are passed on from the macro model GEM-E3 to the micro model EUROMOD, as this can help interpret the microsimulation results. Firstly, on the expenditure side, EUROMOD is fed with the tax policy-induced consumer price changes, relative to the baseline, as simulated by GEM-E3. This concerns 14 aggregate consumption categories based on COICOP groups.¹³ Since expenditures are imputed for each household at the commodity level, the mapping into these 14 categories only requires aggregation (without further assumptions nor correspondence matrices). These price changes include both direct effects of tax changes and indirect price changes through inputs along the supply chain. Secondly, on the household income side, the relative changes to the baseline for both labour and capital income also feed the microsimulation. In this way, the economic environment of EUROMOD is approximated to the one foreseen by the GEM-E3 model.

Besides, an additional scenario is analysed for each of the policy options, which assumes the recycling of the energy taxation revenues through a lump-sum transfer, equally distributed among individuals. This compensation mechanism ensures budget neutrality within the EUROMOD environment.

The impact of each policy option on household budgets, across the income distribution, is disentangled across three effects:

- The 'price effect', which captures the distributional effect of the energy tax reform under analysis arising only from the predicted changes in consumer prices.
- The 'price and income effect', which adds the predicted changes in market income to the changes in consumer prices for the distributional analysis.
- The 'price, income and compensation mechanism effect', which draws on the results of the scenario with the lump-sum transfer to analyse the distributional impacts.

All options are compared against the baseline, given by the tax-benefit policy system in place in 2019 in the Member State under consideration.

b. Results

¹³ The 14 categories are: food beverages and tobacco, clothing and footwear, housing and water charges, fuels and power, household equipment and operation excluding heating and cooking appliances, heating and cooking appliances, medical care and health, purchase of vehicles, operation of personal transport equipment, transport services, communication, recreational services, miscellaneous goods and services and education.

Option 1

Figure 13 presents the change in equivalized¹⁴ household adjusted disposable income¹⁵, relative to disposable income, resulting from ETD revision option 1, and including the compensation mechanism.

Each figure groups a number of countries, classifying them according to the magnitude of the impact of the reform over the first decile of the income distribution. Figure a shows the group of countries with strongest impact on the first decile, c the countries with the mildest impact and b those in between.

Results for the 18 Member States suggest:

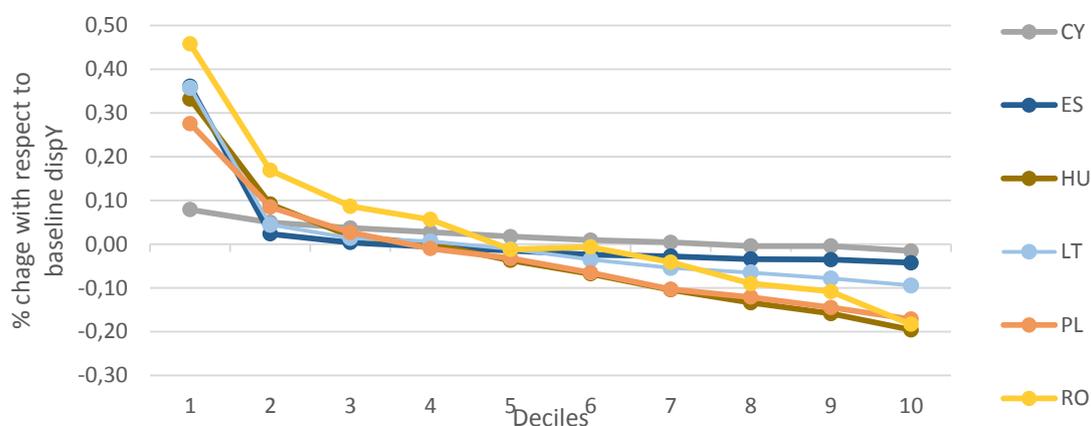
- For all countries, the policy impact of the energy tax reform together with the compensation mechanism over households' income is negligible. Whether positive or negative, the impact on adjusted disposable income is – in absolute terms - less than 0.5% (with respect to baseline disposable income) for countries in figure 1a, and less than 0.05% for all the remaining.
- Except for Portugal, the overall impact of the reform (including the compensatory measure) in the first decile is positive. This impact is however very small. On average, adjusted disposable income for the first decile is expected to increase by 0.1% with respect to disposable income in the baseline.
- Overall, the tax reform when combined with the compensation mechanism is progressive.

¹⁴ Indicators reported here are based on *equivalised* household disposable income, considering economies of scale in consumption within the household: *equivalised* income refers to the fact that household members are made equivalent by weighting them according to their age, using the so-called modified OECD equivalence scale.

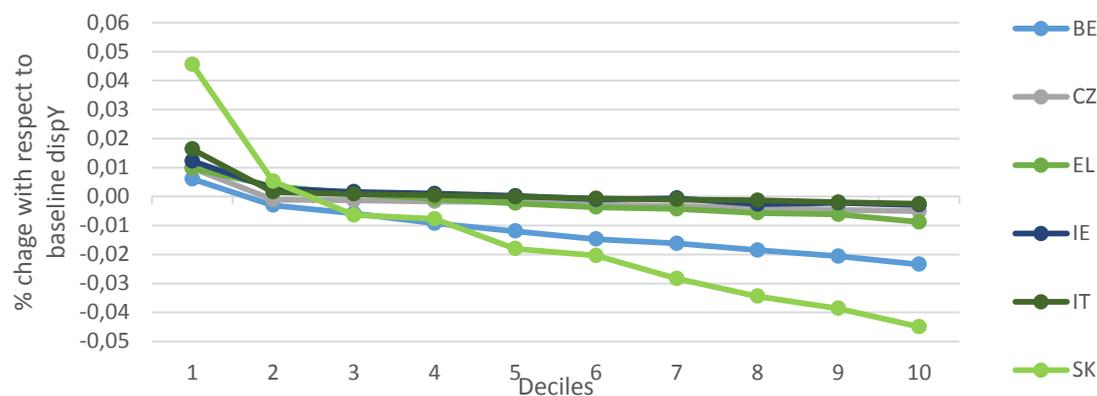
¹⁵ Disposable income is household market income (gross wages and capital income, among others) net of direct taxes and social contributions, including cash benefits (unemployment benefits, social assistance, among others). To take into account the effect of indirect taxes, here we report the *adjusted* disposable income, which is defined as disposable income minus indirect tax payments (VAT and excises).

Figure 13. % change in adjusted disposable income resulting from ETD option 1, including the lump-sum compensation mechanism: country grouping

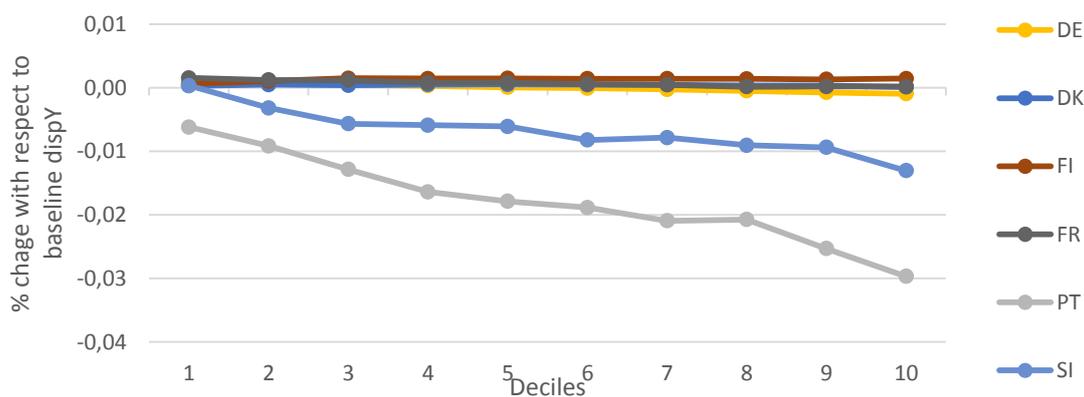
a. Strongest positive effect on the first decile



b. Moderate (intermediate) effect on the first decile



c. Mildest negative effect on the first decile



Note: Plots show the **total effect of the energy tax reform and the budget-neutral compensatory measures** expressed as the % change in equivalent adjusted disposable income in relation to equivalent household disposable income in the baseline. Households are classified in deciles based on equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income after the subtraction of indirect taxes (VAT and excises). The scaling of y-axis differs across the three groupings. Equivalence scales used are the standard “OECD-modified” ones.

Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Figure 14 shows the disaggregated ‘price’, ‘price and income’ and ‘price, income and compensation’ effects country by country for this reform scenario. There we can note that the policy is progressive when combined with compensation mechanisms. Without compensation, it is generally regressive in most countries with the exception of Belgium, Hungary, Portugal, Romania and Slovakia. In these countries, instead, changes in prices and income predicted by the macro model harm more households at the middle and top of the income distribution for the income effect more than offset the regressive impact of the price increase.

Figure 14 % change in adjusted disposable income resulting from ETD revision option 1: disaggregated effects country by country





Note: Plots show the total effect of the energy tax reform and the budget-neutral compensatory measures expressed as the % change in adjusted disposable income in relation to household disposable income in the baseline. Deciles of equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income after the subtraction of indirect taxes (VAT and excises). Equivalence scales used are the standard “OECD-modified” ones. Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Option 2a

Figure 15 presents the change in equivalized household adjusted disposable income, relative to disposable income, resulting from ETD revision option 2, and including the compensation mechanism.

Each figure groups a number of countries, classifying them according to the magnitude of the impact of the reform over the first decile of the income distribution. Figure a shows the group of countries with strongest impact on the first decile, c the countries with the mildest impact and b those in between.

Results for the 18 Member States suggest:

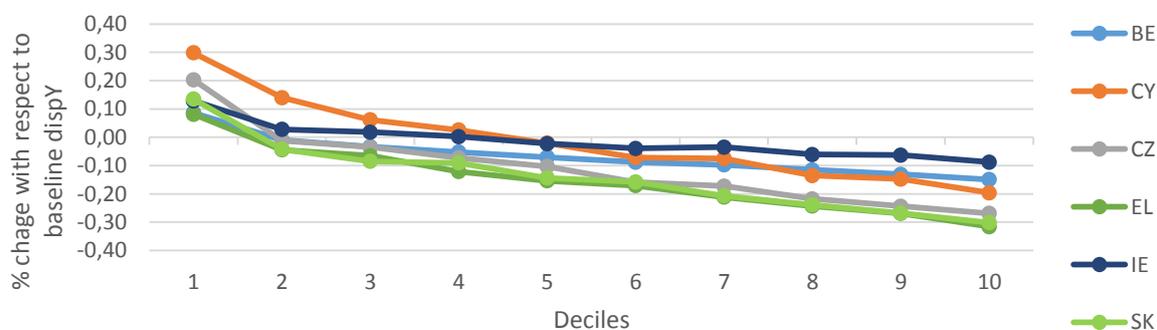
- The impact of this energy tax reform along with the compensation mechanism on household adjusted disposable income ranges from -0.62% of baseline disposable income (Hungary, tenth decile) to 1.37% (Spain, first decile).
- As in option 1 above, except for Portugal, the impact of the reform in combination with the lump-sum transfers over household adjusted disposable income is positive for all households in the first decile. The largest increase takes place in Lithuania, Romania and Spain, where adjusted disposable incomes increase by more than 1%. For the rest of the households (i.e. second decile of the distribution onwards), the impact is generally very small (being – in absolute terms – typically less than 0.5%,).
- Overall, this energy tax reform when combined with the compensation mechanism is progressive.

Figure 15 % change in adjusted disposable income resulting from ETD option 2a, including the lump-sum compensation mechanism: country grouping

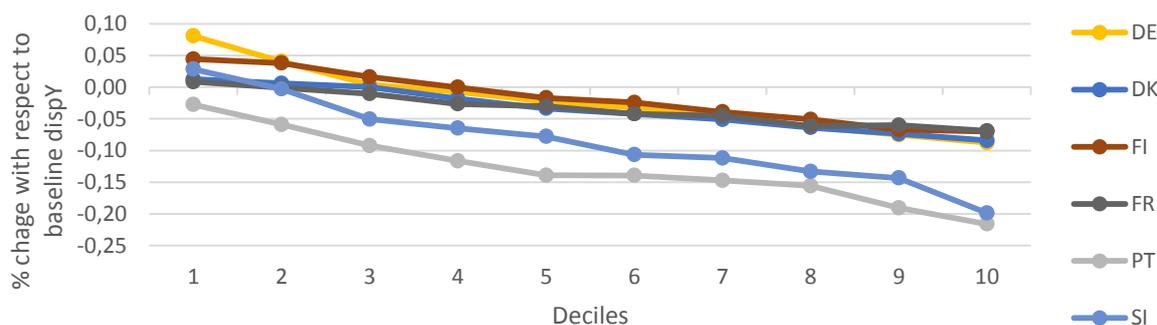
a. Strongest positive effect on the first decile



b. Moderate (intermediate) effect on the first decile



c. Mildest positive effect on the first decile



Note: Plots show the total effect of the energy tax reform and the budget-neutral compensatory measures expressed as the % change in equivalent adjusted disposable income in relation to equivalent household disposable income in the baseline. Households are classified in deciles based on equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income after the subtraction of indirect taxes (VAT and excises). The scaling of y-axis differs across the three groupings. Equivalence scales used are the standard “OECD-modified” ones.

Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Figure 16 % change in adjusted disposable income resulting from ETD revision option 2a: disaggregated effects country by country





Figure 16 shows the disaggregated ‘price’, ‘price and income’ and ‘price, income and compensation’ effects country by country for this reform scenario. There we can note that the reform is progressive when combined with compensation mechanisms. Without compensation, the most affected households tend to be at the bottom and top of the income distribution. The reform is in many countries regressive or shows no clear impact on inequality, with the main exception of Czech Republic, Romania, Slovenia and Slovakia. In these countries, the income effects more than offset the price effects, which makes the overall reform (price + income) progressive.

Option 3a

Figure 17 presents the change in equivalized household adjusted disposable income relative to disposable income, resulting from ETD revision option 3a, and including the compensation mechanism.

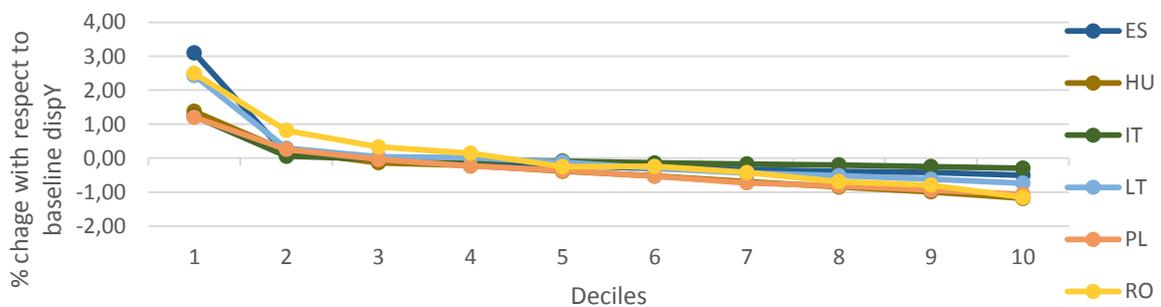
Each figure groups a number of countries, classifying them according to the magnitude of the impact of the reform over the first decile of the income distribution. The figure show the group of countries with strongest impact on the first decile, c the countries with the mildest impact and b those in between.

Results for the 18 Member States suggest:

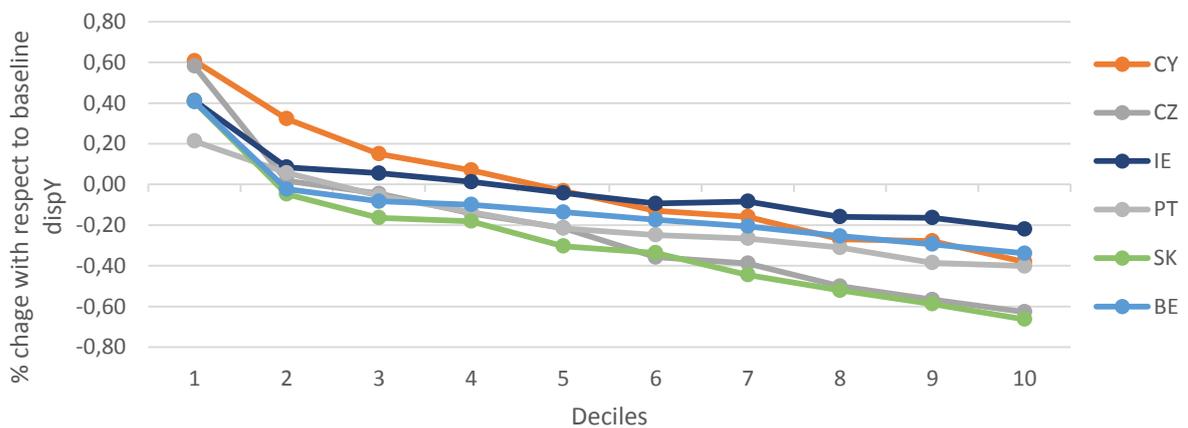
- The impact of this energy tax reform combined with the compensation mechanism on household adjusted disposable income ranges from -1.2% with respect to baseline disposable income (Hungary, tenth decile) to 3.1% (Spain, first decile).
- The impact of the energy tax reform in combination with the lump-sum transfers over household income is positive for all households in the first decile. The larger increase takes place in Lithuania, Romania and Spain, where income increases by more than 2%. For the rest of the households (i.e. second decile of the distribution onwards), the impact is generally small. The largest impact is experienced by Romanian and Polish 10th decile, seeing an income reduction of about 1%.
- Overall, this energy tax reform when combined with the compensation mechanism is progressive.

Figure 17 % change in adjusted disposable income resulting from ETD option 3a, including the lump-sum compensation mechanism

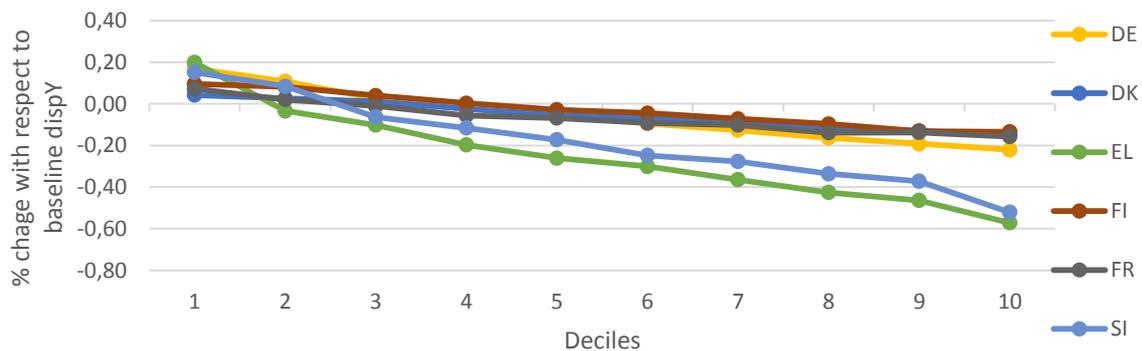
a. Strongest positive effect on the first decile



b. Moderate (intermediate) effect on the first decile



c. Mildest positive effect on the first decile



Note: Plots show the total effect of the energy tax reform and the budget-neutral compensatory measures expressed as the % change in equivalent adjusted disposable income in relation to equivalent household disposable income in the baseline. Households are classified in deciles based on equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income after the subtraction of indirect taxes (VAT and excises). The scaling of y-axis differs across the three groupings. Equivalence scales used are the standard “OECD-modified” ones.

Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Figure 18 shows the disaggregated ‘price’, ‘price and income’ and ‘price, income and compensation’ effects country by country for this reform scenario. There we can note that the reform is progressive when combined with compensation mechanisms. Without compensation, it is either neutral or regressive. Although, again, Romania and Czech Republic represent two important exceptions. Once more, in these countries the income effects more than offset the price effects causing the impact of the reform without compensation mechanisms to be progressive.

Figure 18 % change in adjusted disposable income resulting from ETD revision option 3a: disaggregated effects country by country



Note: Plots show the total effect of the energy tax reform and the budget-neutral compensatory measures expressed as the % change in adjusted disposable income in relation to household disposable income in the baseline. Deciles of equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income after the subtraction of indirect taxes (VAT and excises Equivalence scales used are the standard “OECD-modified” ones. Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Option 3c

Figure 19 presents the change in equivalized household adjusted disposable income relative to disposable income, resulting from ETD option 3c with air pollution component (“wap”), and including the compensation mechanism.

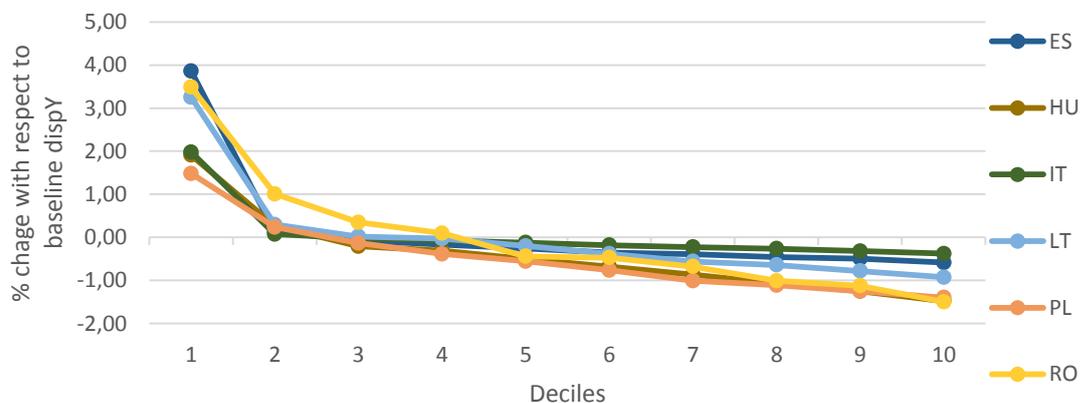
Each figure groups a number of countries, classifying them according to the magnitude of the impact of the reform over the first decile of the income distribution. Figure 68a shows the group of countries with strongest impact on the first decile, 68c the countries with the mildest impact and 68b those in between.

Results for the 18 Member States suggest:

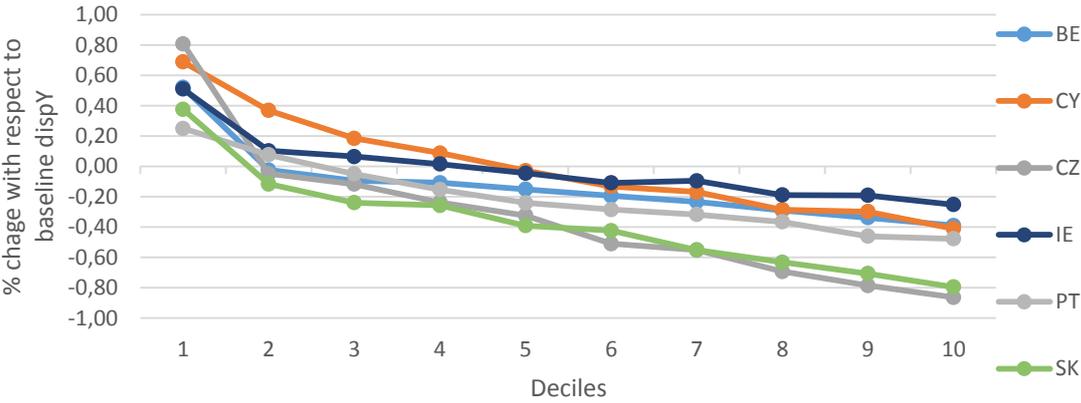
- The impact of this energy tax reform option, combined with the compensation mechanism, over household adjusted disposable income is positive for all households in the first decile. The larger increase is taking place in Lithuania, Romania and Spain, where income increases by more than 3%.
- For the rest of the households (second decile of the distribution onwards) the impact is generally small. The largest impact is experienced by Romanian and Polish 10th decile, seeing an income reduction of about 1.5%.
- Overall, this energy tax reform, when combined with the compensation mechanism, is progressive.

Figure 19. % change in adjusted disposable income resulting from ETD option 3c, including the lump-sum compensation mechanism: country grouping

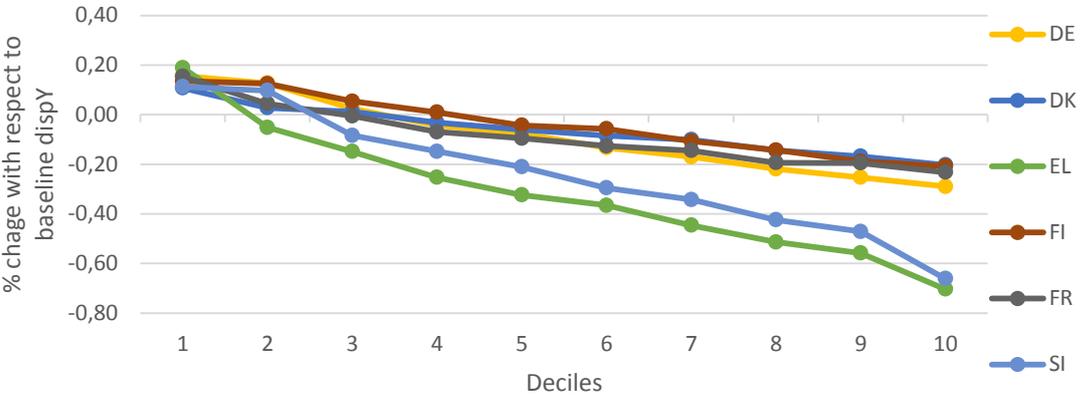
a. Strongest effect on the first decile



b. Moderate (intermediate) effect on the first decile



c. Mildest negative effect on the first decile

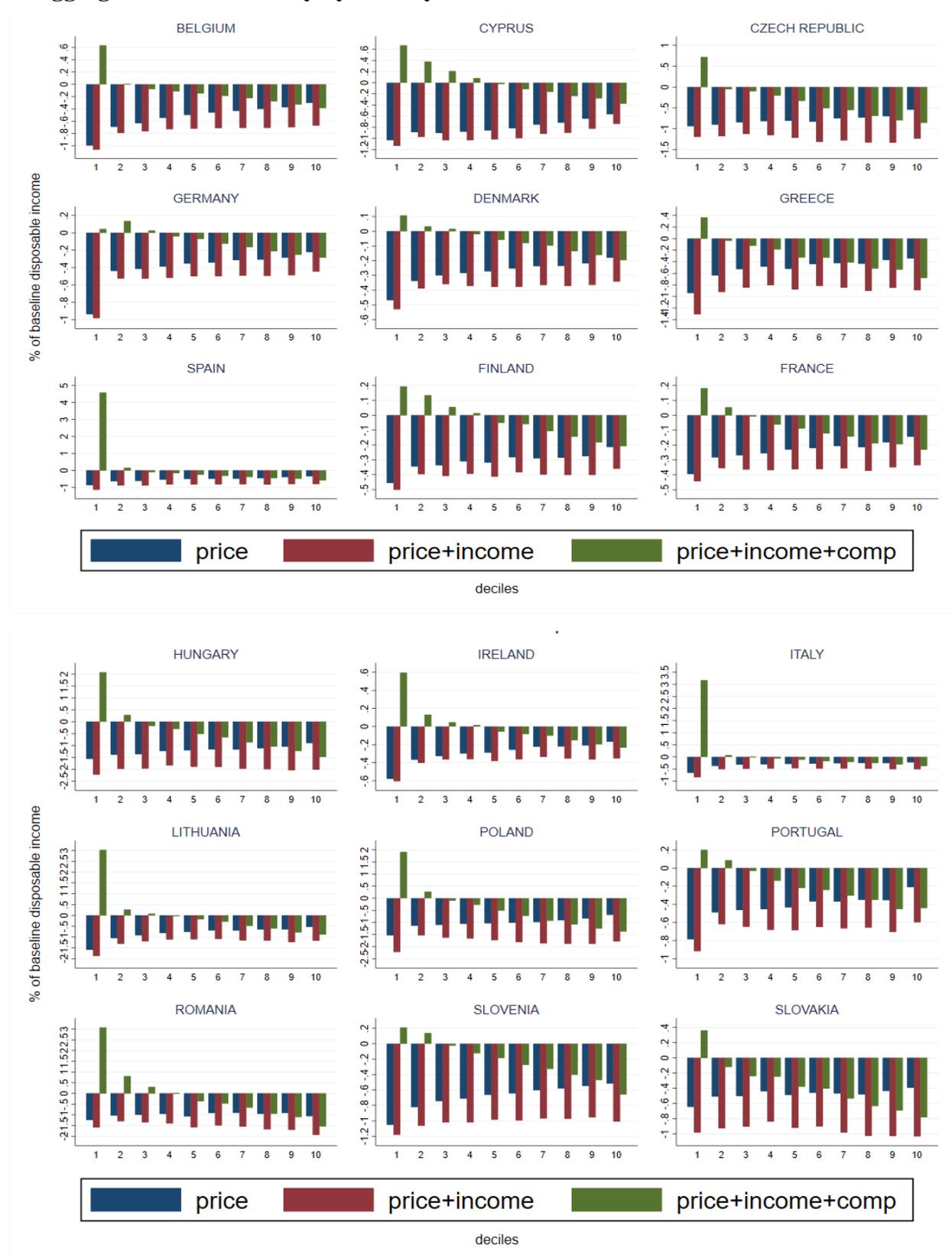


Note: Plots show the total effect of the energy tax reform and the budget-neutral compensatory measures expressed as the % change in equivalent adjusted disposable income in relation to equivalent household disposable income in the baseline. Households are classified in deciles based on equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income after the subtraction of indirect taxes (VAT and excises). The scaling of y-axis differs across the three groupings. Equivalence scales used are the standard “OECD-modified” ones.

Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Figure 20 shows the disaggregated ‘price’, ‘price and income’ and ‘price, income and compensation’ effects country by country for this reform scenario. There we can note that the overall reform is progressive when combined with compensation mechanisms. Without compensation, it is either neutral or regressive. Although, again, this is not true for some countries, such as Romania and Czech Republic where the income effect more than offset the price effect therefore implying that the reform without compensation mechanisms is already progressive.

Figure 20. % change in adjusted disposable income resulting from ETD option 3c.: disaggregated effects country by country



Note: Plots show the total effect of the energy tax reform and the budget-neutral compensatory measures expressed as the % change in adjusted disposable income in relation to household disposable income in the baseline. Deciles of equivalent household disposable income in the baseline. Adjusted disposable income is the residual of household disposable income

after the subtraction of indirect taxes (VAT and excises Equivalence scales used are the standard “OECD-modified” ones.
Source: European Commission’s Joint Research Centre, based on the EUROMOD model.

Table 1 Energy poverty in low income and (lower) middle-income households, by Member State (population shares in % of total population in the Member State)

| | COUNTRY | under 60% of median income | | | between 60% and the median income | | |
|------|---------|----------------------------|-------|-------|-----------------------------------|-------|-------|
| | | N EP | EP | Total | N EP | EP | Total |
| 2019 | AT | 11,8% | 1,4% | 13,2% | 34,9% | 2,2% | 37,1% |
| 2019 | BE | 11,3% | 3,3% | 14,6% | 32,8% | 2,9% | 35,7% |
| 2019 | BG | 7,2% | 15,3% | 22,5% | 13,8% | 14,0% | 27,8% |
| 2019 | CH | 13,9% | 2,0% | 15,9% | 32,5% | 2,0% | 34,4% |
| 2019 | CY | 7,0% | 7,6% | 14,6% | 24,1% | 11,6% | 35,7% |
| 2019 | CZ | 8,7% | 1,4% | 10,0% | 38,5% | 1,8% | 40,3% |
| 2019 | DE | 13,0% | 1,9% | 14,9% | 33,8% | 1,6% | 35,4% |
| 2019 | DK | 10,4% | 2,0% | 12,3% | 35,7% | 2,3% | 38,0% |
| 2019 | EE | 17,6% | 3,9% | 21,5% | 26,2% | 2,6% | 28,8% |
| 2019 | EL | 6,0% | 11,7% | 17,7% | 17,6% | 15,0% | 32,6% |
| 2019 | ES | 14,2% | 6,3% | 20,5% | 25,9% | 3,9% | 29,8% |
| 2019 | FI | 9,2% | 2,3% | 11,5% | 34,1% | 4,7% | 38,8% |
| 2019 | FR | 9,2% | 4,3% | 13,5% | 32,1% | 4,7% | 36,8% |
| 2019 | HR | 11,3% | 6,8% | 18,1% | 25,3% | 6,9% | 32,2% |
| 2019 | HU | 8,7% | 3,5% | 12,2% | 31,8% | 6,4% | 38,2% |
| 2019 | LT | 11,1% | 9,3% | 20,4% | 19,5% | 10,3% | 29,9% |
| 2019 | LU | 15,5% | 1,9% | 17,4% | 31,5% | 1,5% | 33,0% |
| 2019 | LV | 17,2% | 5,5% | 22,7% | 22,1% | 5,5% | 27,6% |
| 2019 | MT | 13,1% | 3,8% | 16,9% | 27,5% | 5,9% | 33,4% |
| 2019 | NL | 11,2% | 1,9% | 13,1% | 35,5% | 1,8% | 37,3% |
| 2019 | NO | 11,5% | 1,0% | 12,5% | 35,6% | 2,2% | 37,8% |
| 2019 | PL | 12,3% | 2,9% | 15,3% | 31,4% | 3,6% | 35,1% |
| 2019 | PT | 9,7% | 7,4% | 17,1% | 24,6% | 8,6% | 33,2% |
| 2019 | RO | 16,4% | 7,2% | 23,6% | 21,7% | 5,0% | 26,6% |
| 2019 | RS | 11,3% | 11,7% | 23,0% | 18,6% | 8,6% | 27,2% |
| 2019 | SE | 15,0% | 1,9% | 16,9% | 32,1% | 1,3% | 33,4% |
| 2019 | SI | 8,9% | 2,8% | 11,8% | 31,8% | 6,8% | 38,6% |
| 2019 | SK | 6,9% | 4,9% | 11,7% | 33,4% | 5,1% | 38,5% |
| 2018 | AT | 11,9% | 1,5% | 13,4% | 34,6% | 1,6% | 36,2% |
| 2018 | BE | 11,4% | 4,0% | 15,4% | 31,1% | 3,0% | 34,1% |
| 2018 | BG | 5,5% | 15,4% | 20,8% | 13,4% | 15,3% | 28,8% |
| 2018 | CH | 11,8% | 1,9% | 13,7% | 33,8% | 2,2% | 36,0% |
| 2018 | CY | 6,6% | 7,9% | 14,5% | 21,8% | 13,3% | 35,2% |
| 2018 | CZ | 7,7% | 1,2% | 9,0% | 38,9% | 1,9% | 40,8% |
| 2018 | DE | 12,9% | 2,1% | 15,0% | 32,5% | 2,1% | 34,6% |
| 2018 | DK | 9,5% | 2,4% | 11,9% | 34,5% | 3,3% | 37,8% |
| 2018 | EE | 18,2% | 2,6% | 20,7% | 25,9% | 2,8% | 28,8% |
| 2018 | EL | 5,5% | 12,0% | 17,5% | 15,5% | 16,6% | 32,1% |
| 2018 | ES | 13,7% | 6,7% | 20,4% | 24,5% | 4,6% | 29,1% |
| 2018 | FI | 9,4% | 1,9% | 11,3% | 34,0% | 4,4% | 38,4% |
| 2018 | FR | 8,6% | 4,0% | 12,6% | 33,0% | 4,2% | 37,1% |
| 2018 | HR | 10,7% | 7,5% | 18,2% | 23,5% | 7,8% | 31,3% |
| 2018 | HU | 7,6% | 4,4% | 12,0% | 30,4% | 7,3% | 37,7% |
| 2018 | IE | 10,3% | 3,8% | 14,0% | 30,8% | 4,7% | 35,6% |
| 2018 | IS | 7,4% | 0,9% | 8,2% | 39,0% | 2,5% | 41,5% |
| 2018 | IT | 12,6% | 6,6% | 19,2% | 25,0% | 5,4% | 30,3% |
| 2018 | LT | 12,6% | 9,2% | 21,8% | 17,9% | 9,9% | 27,8% |
| 2018 | LU | 13,7% | 2,0% | 15,8% | 32,2% | 1,7% | 34,0% |
| 2018 | LV | 15,8% | 6,4% | 22,2% | 22,1% | 5,2% | 27,4% |
| 2018 | MT | 11,9% | 4,0% | 15,9% | 28,6% | 5,2% | 33,8% |
| 2018 | NL | 11,3% | 1,2% | 12,5% | 35,5% | 1,8% | 37,2% |
| 2018 | NO | 10,9% | 1,2% | 12,1% | 35,9% | 1,6% | 37,6% |
| 2018 | PL | 11,1% | 2,9% | 13,9% | 31,5% | 4,2% | 35,7% |
| 2018 | PT | 9,4% | 6,9% | 16,3% | 24,2% | 9,2% | 33,4% |
| 2018 | RO | 15,5% | 6,9% | 22,3% | 21,3% | 5,9% | 27,2% |
| 2018 | RS | 11,0% | 12,1% | 23,0% | 16,3% | 10,1% | 26,4% |
| 2018 | SE | 13,9% | 1,5% | 15,4% | 32,2% | 1,8% | 34,1% |
| 2018 | SI | 8,6% | 3,8% | 12,4% | 30,5% | 6,6% | 37,2% |
| 2018 | SK | 8,2% | 3,2% | 11,4% | 34,1% | 4,0% | 38,1% |
| 2018 | UK | 14,1% | 3,5% | 17,5% | 28,3% | 3,9% | 32,1% |

Source: ESTAT EU-SILC UDB 2019; own calculations.

Note: The table shows the respective population shares (not) in energy poverty by income groups (income below 60% of national median income; and income between 60% and 100% of national median income). Energy poor (EP) households are defined as households that have arrears with utility bills or are unable to keep their home adequately warm.

**ANNEX 10: QUANTIFICATION OF THE INDUSTRIAL ENERGY CONSUMPTION
WITHIN THE SCOPE OF ARTICLE 2 OF THE ENERGY TAXATION
DIRECTIVE**

Contents

1. Introduction

Upon request of the Directorate General for Taxation and Customs (TAXUD), the JRC has estimated, using the most recent and detailed data available, the amount of energy consumed by the industry that is exempt from taxation according to article 2 of the Energy Taxation Directive 2003/96/EC (ETD). In order to estimate these amounts, two questions have to be addressed:

- **How much energy is actually consumed by each industrial sector?**
- **What share of the energy consumed by each industry is exempt from taxation and why?**

As regards the first question, three aspects have to be considered:

- The energy consumed by each industry is reported in the “final non-energy consumption” and “final energy consumption” blocks of EUROSTAT’s energy balances (EUROSTAT, 2020) but the sum of both terms is not the total industrial energy use. The industry also consumes energy for the autoproduction of electricity and heat and those energy inputs are registered partially in the “transformation input” and “energy sector” blocks of the energy balances. These energy inputs are not disaggregated by industry in the energy balances and need to be estimated in order to calculate the total energy used by each sector.
- Some outputs of the energy transformation processes (coke ovens, blast furnaces, and autoproducers’ power plants) are fed back into autoproduction and final energy and non-energy consumption, but those energy flows should be deducted in order to prevent double counting of the taxed energy.
- The consumption of energy for non-energy uses accounts for a significant share of the total energy use in the industry (26% for the EU in 2018, 87 061 ktoe of 329 288 ktoe, varying between 4% and 55% depending on the MS) but it is not disaggregated by industry in the energy balances.
- A small, but non-negligible part of the industrial energy consumption is reported as “not elsewhere specified” (3.8% for the EU in 2018, 12 580 ktoe out of 329 288 ktoe).

With respect to the second question, article 2 of the ETD establishes a series of energy carriers and energy uses that are out of the scope of the directive:

- Fuel wood, wood charcoal, and peat.
- Energy products used for “purposes other than as motor fuels or as heating fuels”.
- “Dual use of energy products”, including chemical reduction, electrolytic, and metallurgical processes.
- Electricity used for chemical reduction, electrolytic, and metallurgical processes.
- Electricity when it accounts for more than 50% of the cost of a product.
- Energy used in mineralogical processes for the manufacture of non-metallic mineral products.

However the ETD does not define further those exceptions nor provide any list of chemical reduction, electrolytic, metallurgical and mineralogical processes. Therefore, additional

information and assumptions (subject to interpretation) are needed to determine the amounts of energy within the scope of the ETD.

The remainder of the report is structured as follows:

- Section 1 describes the four steps followed to estimate the results, detailing the assumptions made and the limitations of this approach.
- Section 2 contains summary tables with the results for each industry in each EU MS.
- Section 3 closes with some conclusions and recommendations for further work.

2. Methodology

The estimations are calculated in four main steps, described in the following sub-sections:

- Section 1: Disaggregation of the inputs for autoproduction in the energy balances of 2018 for the 12 industrial sectors considered in EUROSTAT's energy balances (listed in Table 1).
- Section 2.2: Disaggregation of the inputs for non-energy uses consumed by each industry in 2018.
- Section 2.3: Estimation of the total energy used (net inputs) by each industry in 2018.
- Section 2.4: Breakdown of the total energy use of each industry into in and out of scope categories.

The analysis described in this annex provides a plausible quantification of the amounts of energy consumed by the industry (detailed by groups of energy products) that can be considered within the scope of article 2 of the ETD. These results cover all the industrial sectors considered in EUROSTAT's energy balances, including non-energy uses of energy product, and are consistent with the latest data available.

Note that the methodology described in this annex is limited by the level of detail of EUROSTAT's energy balances, and the ambiguities of the definitions of the ETD categories (e.g. definition of motor and heating fuels, definition of metallurgical processes, etc.) and the processes listed in JRC-IDEES (e.g. electric mechanical processes in the wood and wood products industry), which are open to interpretation.

Table 1: Industrial sectors considered in the analysis

| Industry | Description |
|-----------------------------|---|
| Iron and steel | NACE Rev. 2 Groups 24.1, 24.2 and 24.3; and NACE Rev. 2 Classes 24.51 and 24.52 ¹⁶ C241: Manufacture of basic iron and steel and of ferroalloys C242: Manufacture of tubes, pipes, hollow profiles and related fittings, of steel C2451: Casting of iron C2452: Casting of steel |
| Chemical and petrochemical | NACE Rev. 2 Divisions 20 and 21 C201: Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms C202: Manufacture of pesticides and other agrochemical products C203: Manufacture of paints, varnishes and similar coatings, printing ink and mastics C204: Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations C205: Manufacture of other chemical products C206: Manufacture of man-made fibres C21: Manufacture of basic pharmaceutical products and pharmaceutical preparations |
| Non-ferrous metals | NACE Rev. 2 Group 24.4; and NACE Rev. 2 Classes 24.53 and 24.54 C244: Manufacture of basic precious and other non-ferrous metals C2453: Casting of light metals C2454: Casting of other non-ferrous metals |
| Non-metallic minerals | NACE Rev. 2 Division 23 C231: Manufacture of glass and glass products C232: Manufacture of refractory products C233: Manufacture of clay building materials C234: Manufacture of other porcelain and ceramic products C235: Manufacture of cement, lime and plaster C236: Manufacture of articles of concrete, cement and plaster C237: Cutting, shaping and finishing of stone C239: Manufacture of abrasive products and non-metallic mineral products n.e.c. |
| Transport equipment | NACE Rev. 2 Divisions 29 and 30 C29: Manufacture of motor vehicles, trailers and semi-trailers C30: Manufacture of other transport equipment |
| Machinery | NACE Rev. 2 Divisions 25, 26, 27 and 28 C25: Manufacture of fabricated metal products, except machinery and equipment C26: Manufacture of computer, electronic and optical products C27: Manufacture of electrical equipment C28: Manufacture of machinery and equipment n.e.c. |
| Mining and quarrying | NACE Rev. 2 Divisions 07 (excluding 07.21: mining of uranium and thorium ores) and 08 (excluding 08.92: extraction of peat), NACE Rev. 2 Group 09.9 B07: Mining of metal ores B08: Other mining and quarrying B099: Support activities for other mining and quarrying |
| Food, beverages and tobacco | NACE Rev. 2 Divisions 10, 11 and 12 C10: Manufacture of food products C11: Manufacture of beverages C12: Manufacture of tobacco products |
| Paper, pulp and printing | NACE Rev. 2 Divisions 17 and 18 C171: Manufacture of pulp, paper and paperboard C172: Manufacture of articles of paper and paperboard C18: Printing and reproduction of recorded media |
| Textile and leather | NACE Rev. 2 Divisions 13, 14 and 15 C13: Manufacture of textiles C14: Manufacture of wearing apparel |

¹⁶ In the calculations the energy used in coke ovens and blast furnaces is attributed to the iron and steel industry, although they are considered part of the energy sector in EUROSTAT energy balances. The latter is done to better represent energy flows in the energy statistics, but the raison d'être of coke ovens and blast furnaces is to produce coke and pig iron, not to produce manufactured gases.

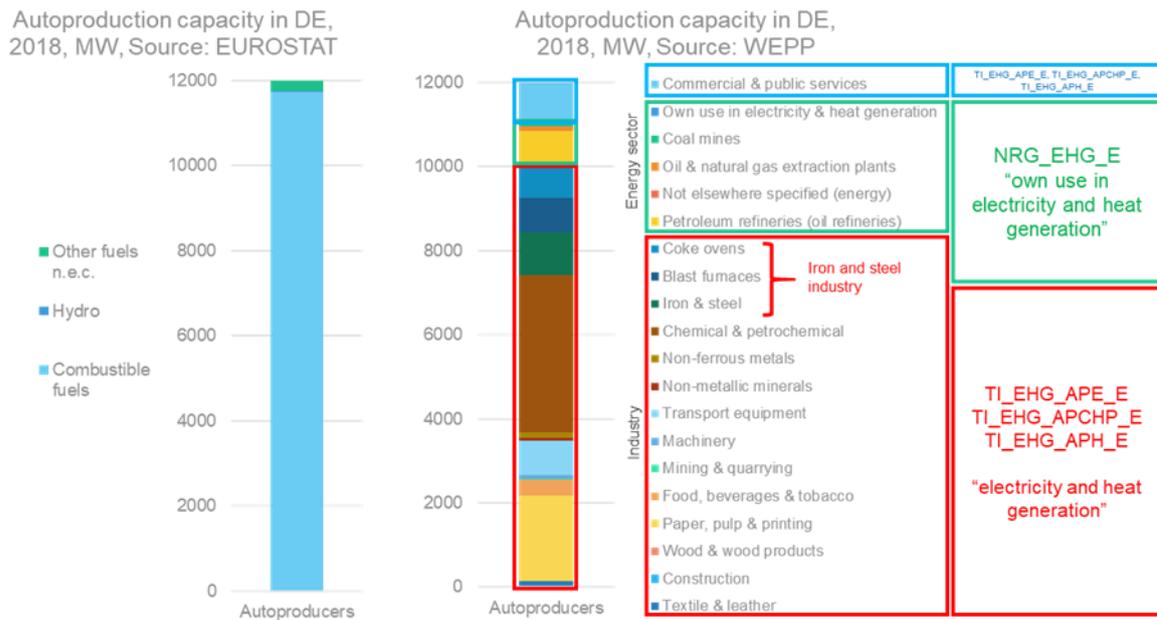
| Industry | Description |
|------------------------|--|
| | C15: Manufacture of leather and related products |
| Construction | NACE Rev. 2 Division 41, 42 and 43 F41: Construction of buildings F42: Civil engineering F43: Specialised construction activities |
| Wood and wood products | NACE Rev. 2 Division 16 C161: Sawmilling and planing of wood C162: Manufacture of products of wood, cork, straw and plaiting materials |

Source: JRC, 2020

2.1 Disaggregation of the autoproduction blocks in the energy balances

The transformation inputs reported in EUROSTAT’s energy balances for the autoproduction of “electricity and heat generation” (items TI_EHG_APE_E, TI_EHG_APCHP_E, and TI_EHGAPH_E in the energy balances) and the “own use in electricity and heat generation” (item NRG_EHG_E) are broken down by industry according to the installed capacities reported by S&P Global Platts “World Electric Power Plant Database” (WEPP) (S&P Global Platts, 2019)¹⁷. Autoproducers related to coke ovens and blast furnaces are considered part of the iron and steel industry.

Figure 1. Disaggregation of the autoproduction capacity



Source: JRC, 2020

To this purpose, the business types used in WEPP are matched with the sectors included in the energy balances of EUROSTAT, considering only the capacities of industrial autoproducers (see Table 2) to estimate the additional energy inputs not included as final energy consumption or non-energy use. The correspondences between WEPP and EUROSTAT are further refined depending on whether WEPP reports the power plants as CHP or not, as autoproducers or utilities, the fuel types used, or the owning company.

¹⁷ Similarly to coke ovens and blast furnaces, EUROSTAT considers the energy inputs necessary for the autoproduction of electricity and heat in the transformation and own use blocks of the energy balances, in order to better represent the energy flows in the statistics. However, the energy bills (and the corresponding taxes) of industrial autoproducers are paid by the industry they belong to, and therefore the energy consumed by industrial autoproducers is allocated to the corresponding sector.

Table 2. Correspondences between WEPP business types and EUROSTAT sectors

| WEPP's business type | EUROSTAT sector |
|---|---|
| Commercial: Agriculture | Commercial & public services |
| Commercial: Leisure/recreation centres & swimming pools | Commercial & public services |
| Commercial: Greenhouse | Commercial & public services |
| Commercial: Hospitals & nursing homes | Commercial & public services |
| Commercial: Hotels & resorts | Commercial & public services |
| Commercial: Laundry & dry cleaning | Commercial & public services |
| Commercial: Media/publishing/book vendor | Commercial & public services |
| Commercial: Misc | Commercial & public services |
| Commercial: Misc commercial/industrial autoproducers | Commercial & public services |
| Commercial: Misc services | Commercial & public services |
| Commercial: Retailing | Commercial & public services |
| Commercial: Sugar Mill or Plant | Commercial & public services |
| Commercial: Trade/holding/diversified/conglomerate | Commercial & public services |
| Energy: DSM & energy services (ESCO) | Own use in electricity & heat generation |
| Energy exchanges | Own use in electricity & heat generation |
| Energy: Operating services company (non-utility) | Own use in electricity & heat generation |
| Energy: PUC/regulatory body | Own use in electricity & heat generation |
| Energy: Trading/brokers/marketers (electric power and/or gas) | Own use in electricity & heat generation |
| Fuels: Coal | Coke ovens Coal mines Patent fuel plants BKB & PB plants Coal liquefaction plants |
| Fuels: Gas | Oil & natural gas extraction plants Gas works |
| Fuels: Gas and oil | Oil & natural gas extraction plants |
| Fuels: Gas and/or oil | Oil & natural gas extraction plants |
| Fuels: Other | Nuclear industry Liquefaction & regasification plants (LNG) Gasification plants for biogas Gas-to-liquids (GTL) plants Charcoal production plants |
| Fuels: Petroleum refinery | Petroleum refineries (oil refineries) |
| Fuels: ZZ (unspecified) | Not elsewhere specified (energy) |
| Fuels: Uranium mining & milling | Mining & quarrying |
| Govt: National | Commercial & public services |
| Govt: Regional (local/municipal/state) | Commercial & public services |
| Govt: Regional (County/District) | Commercial & public services |
| Govt: Regional (Local/Municipal) | Commercial & public services |
| Govt: Regional (State) | Commercial & public services |
| Mfg: Cement | Non-metallic minerals |
| Mfg: Chemicals & fertilizers | Chemical & petrochemical |
| Mfg: Equipment/Misc | Machinery Transport equipment |
| Mfg: Food products | Food, beverages & tobacco |
| Mfg: Metals & mining & smelters | Iron & steel Blast furnaces Non-ferrous metals Mining & quarrying |
| Mfg: Pulp & paper & forest products | Paper, pulp & printing |

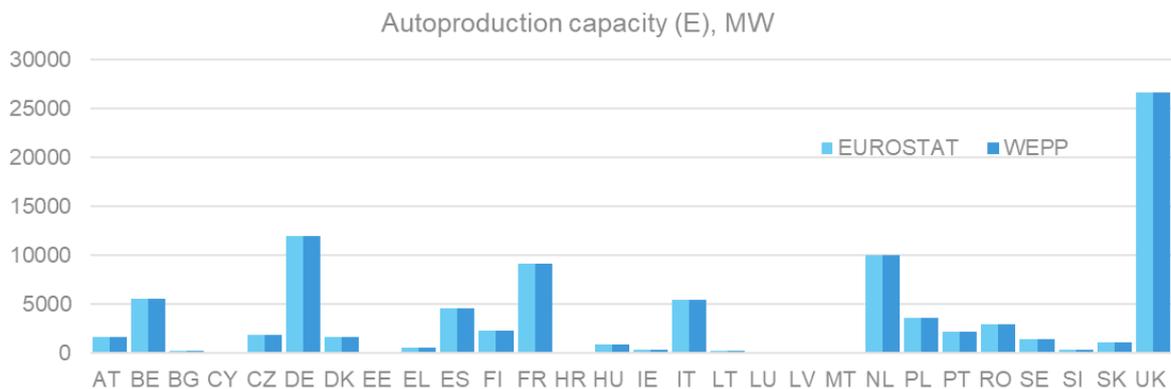
| WEPP's business type | EUROSTAT sector |
|---|--|
| | Wood & wood products |
| Mfg: Textiles & clothing | Textile & leather |
| Mfg: ZZ/Unspecified | Construction Not elsewhere specified (industry) |
| Services: University/academic/library/laboratory | Commercial & public services |
| Services: Architect/Engineer/Constructor | Commercial & public services |
| Services: Association | Commercial & public services |
| Services: Association (Electric) | Commercial & public services |
| Trade groups and other types of membership organizations | Commercial & public services |
| Trade groups and other types of membership organizations | Commercial & public services |
| Trade groups and other types of membership organizations | Commercial & public services |
| Services: Association (Trade) | Commercial & public services |
| Services: Consulting | Commercial & public services |
| Services: Environmental | Commercial & public services |
| Services: Banking/finance/accounting/insurance | Commercial & public services |
| Services: Banking & finance (Banking) | Commercial & public services |
| Services: Banking & finance (Insurance) | Commercial & public services |
| Merchant transmission companies | Commercial & public services |
| Services: Waste to energy companies/plants | Commercial & public services |
| Trade groups and other types of membership organizations | Commercial & public services |
| Services: Private power project development | Commercial & public services |
| Services: Power plant services | Commercial & public services |
| Services: Real Estate | Commercial & public services |
| Services: Railroad/shipping/ports/airports | Commercial & public services |
| Services: Telecommunications and information technology | Commercial & public services |
| Util Other: Gas | Own use in electricity & heat generation |
| Util Other: Heating (Steam) | Own use in electricity & heat generation |
| Util Other: Telecommunications | Commercial & public services |
| Util Other: Water and wastewater | Commercial & public services |
| Elec Util & Comb: Cooperative ownership (US=Rural Elec Coops) | Own use in electricity & heat generation |
| District heating and/or cooling utility | Commercial & public services |
| Elec Util & Comb: Government ownership | Commercial & public services |
| Elec Util & Comb: Government ownership (County) | Commercial & public services |
| Elec Util & Comb: Government ownership (Irrigation District) | Commercial & public services |
| Elec Util & Comb: Government ownership (Local/Municipal) | Commercial & public services |
| Elec Util & Comb: Government ownership (Federal/Provincial) | Commercial & public services |
| Elec Util & Comb: Government ownership (Public Power/Public Utility District) | Commercial & public services |
| Elec Util & Comb: Government ownership (Regional) | Commercial & public services |
| Elec Util & Comb: Government ownership (State) | Commercial & public services |
| Elec Util & Comb: Holding | Commercial & public services |
| Elec Util & Comb: Investor/private ownership (IOU) | Commercial & public services |
| Elec Util & Comb: Operating service company (regulated utility) | Commercial & public services |

Source: JRC, 2020

In bold: industrial sectors

The result of this process allows matching fairly well the amount of autoproduction capacity reported by EUROSTAT for each EU MS (Figure 2).

Figure 2. Comparison of the autoproduction capacity in EUROSTAT and WEPP

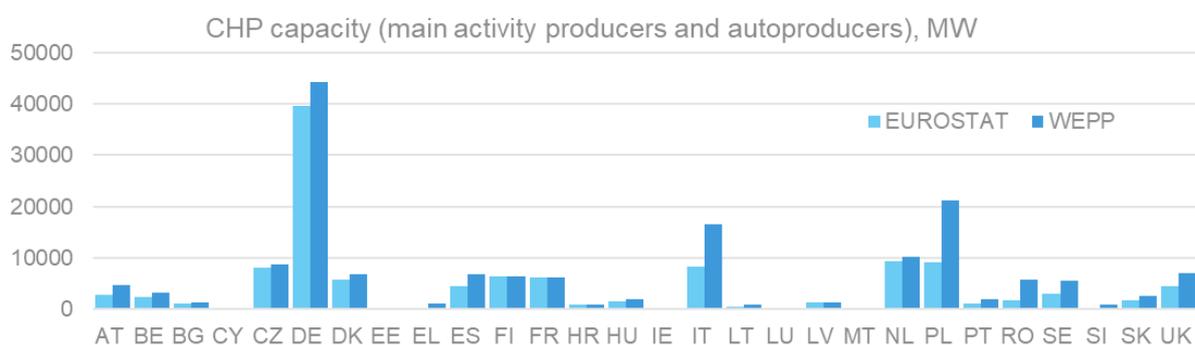


Source: JRC, 2020

However, the following caveats need to be taken into account:

- The disaggregation of the energy balances by industry should be based on activity-based indicators, but there are no data on the utilisation rates of these autoproduction facilities. The resulting capacity-based disaggregation of the energy balances is therefore only a plausible approximation built upon the available information.
- There are mismatches between the operational status of autoproducers in WEPP and EUROSTAT. While EUROSTAT reports 69 GW of autoproduction capacity, only 61 GW were operational according to WEPP. If that were taken into account, the disaggregation of the autoproduction would yield different results, especially in some industries where the amount of energy used for autoproduction represents a noticeable share of the total energy use (e.g. pulp, paper and printing, 12% on average for the EU).
- CHP data do not match in some countries (WEPP reports higher capacities in some countries, notably PL, IT, DE, RO, SE) (Figure 3). The calculations are based on WEPP's data.
- There are no data on the capacities of autoproducers of heat only, thus it is assumed that the capacity of autoproduction of heat follows the same distribution as the CHP capacity.

Figure 3. Comparison of the CHP capacity in EUROSTAT and WEPP.



Source: JRC, 2020

2.2 Disaggregation of non-energy use by industry

Energy products are used as feedstocks for different purposes (Table 3). The consumption of energy for non-energy uses accounts for a significant share of the total energy use in the industry (between 4% and 55% depending on the MS, 28% on average for the EU) but it is not disaggregated by industry in EUROSTAT's energy balances. The disaggregation by

industrial sector has been done according to the “memo items” available from the IEA’s Extended World Energy Balances (International Energy Agency, 2020).

Table 3. Possible non-energy uses of energy carriers (non-exhaustive)

| Energy carrier | Purpose |
|---|--|
| Gas/diesel oil | Ammonia, petrochemicals |
| LPG | Petrochemicals |
| Naphtha | Ethylene, petrochemicals |
| Lubricants, solvents, paraffin waxes, greases | All industrial sectors |
| Oil products | Ammonia |
| Coke, coal | Titanium dioxide, carbide, aluminium, ferroalloys |
| Coke | Lead, zinc, food and beverages |
| Natural gas | Ammonia, methanol, carbon black, nitric acid, petrochemicals, hydrogen |
| Bitumen | Construction |
| Refinery gas | Petrochemicals |
| Petroleum coke | Carbide production |

Source: JRC, 2020, adapted from Annex 8A.2, Table 2.12, in (Eggleson et al., 2006).

3.3 Estimation of the total energy use by industry

Once all the blocks of the energy balances are fully disaggregated it is possible to estimate the total amount of energy used by each industrial sector. This is done by subtracting the feedbacks from coke ovens¹⁸, blast furnaces¹⁹, and power plants²⁰ from the total amount of energy inputs²¹. Only the inputs from external sources are considered to be taxable. The feedbacks of energy carriers that are produced internally are considered exempt from additional taxation.

Figure 4 and Figure 5 illustrate this approach with the examples of the energy balances of the German iron and steel and chemical and petrochemical industries in 2018.

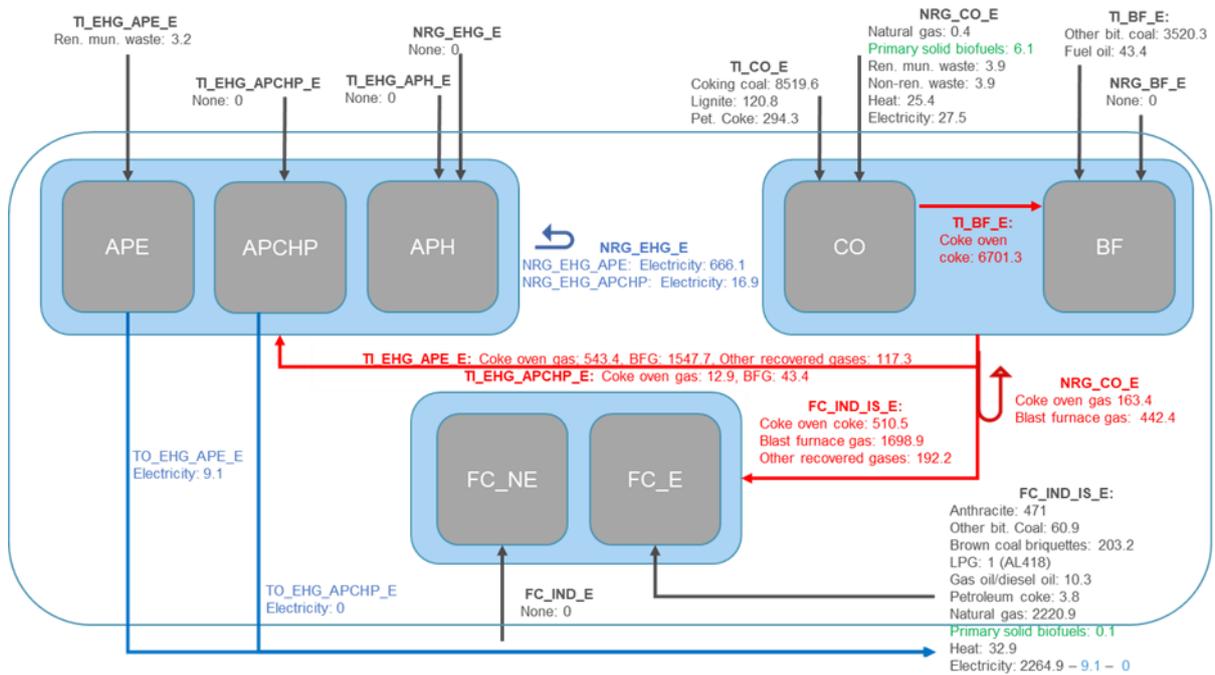
¹⁸ Columns “coke oven coke”, “coal tar” and “coke oven gas” in the final energy consumption block.

¹⁹ Columns “blast furnace gas” and “other recovered gases” in the final energy consumption block.

²⁰ Column “electricity” from autoproducers of electricity and heat.

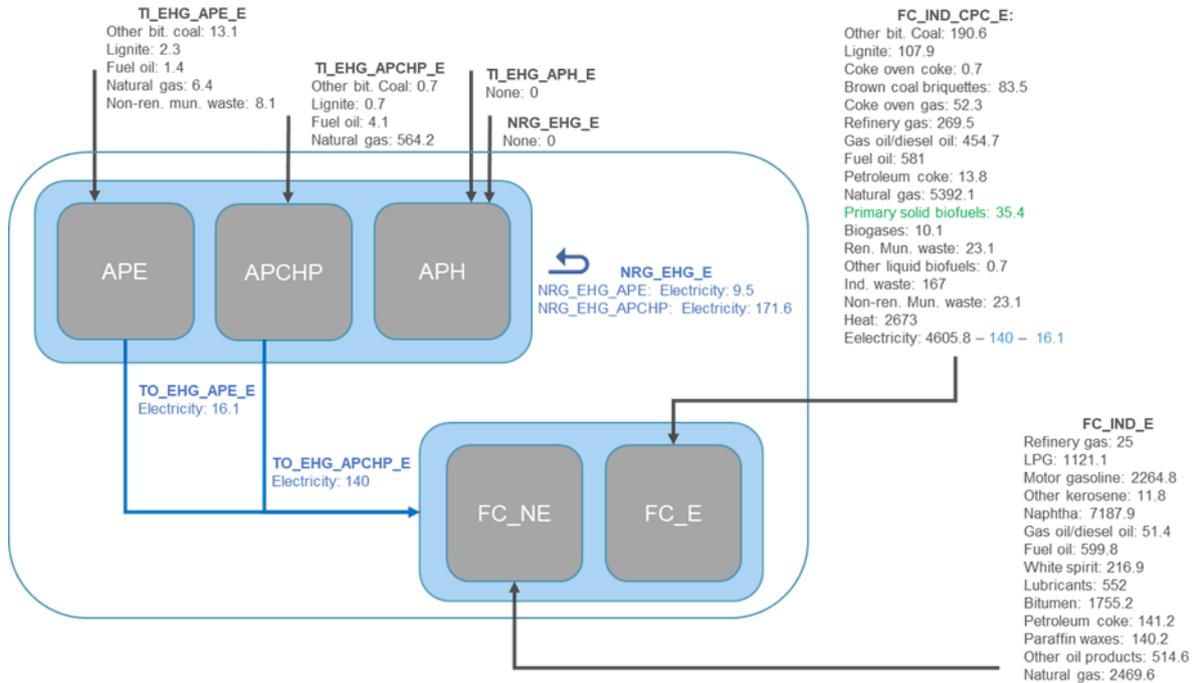
²¹ Rows TI_EHG_APE_E, TI_EHG_APCHP_E, TI_EHG_APH_E (transformation inputs for the autoproduction of electricity, CHP, and heat); TI_CO_E (transformation inputs into coke ovens), TI_BF_E (transformation inputs into blast furnaces), NRG_EHG_E (own consumption of autoproducers), FC_IND_NE (non-energy use in industry), and FC_IND_E (final energy consumption in industry) in the energy balances.

Figure 4. Energy balance of the German iron and steel industry in 2018



Source: JRC, 2020 with data from EUROSTAT

Figure 5. Energy balance of the German chemical and petrochemical industry in 2018



Source: JRC, 2020 with data from EUROSTAT

All figures in ktoe. Colour legend:

Inputs from external sources: taxes may be applied on these items only

Feedbacks of coke oven coke, coal tar, and coke oven gas from coke ovens: produced internally, not taxed

Feedbacks of blast furnace gas and other recovered gases from blast furnaces produced internally, not taxed

Feedbacks of electricity from autoproducers of electricity and CHP: produced internally, not taxed

Wood and wood products, peat not taxed according to article 2 ETD

2.4 Breakdown of the total energy use by industry

The total energy used by each industry is split into in/out of scope categories according to the shares resulting from assigning the processes included in the detailed energy balances of JRC-IDEES 2015 to the categories considered in the ETD. The shares calculated in this process are assumed to be valid for 2018.

The assignments and the shares are corrected with more detailed information at facility level whenever available (only in the cases of the chemical and petrochemical (Boulamanti and Moya, 2017); pulp, paper and printing (Moya and Pavel, 2018); and iron and steel industries (Pardo et al., 2012)). The assignments also take into account relevant rulings of the Court of Justice of the European Union (CJEU) interpreting article 2 of the ETD (see Table 4).

According to the ETD some energy carriers and processes can be considered out of scope:

- **Chemical reduction:** in the calculations part of the energy used for the production of hydrogen, ammonia and methanol in the chemical and petrochemical industry, and the inputs to blast furnaces would fall under this category.
- **Electrolysis:** the use of electricity for the production of chlorine in the chemical and petrochemical industry and for the smelting of aluminium in the non-ferrous metals industry.
- **Metallurgical processes** in the iron and steel and the non-ferrous metal industries. This includes shaping processes (such as casting, forging, rolling, extrusion, machining, cutting, or bending), heat treatments (annealing, tempering, or quenching), and surface treatments (plating, shot peening or thermal spraying). Therefore, the “products finishing”, “thermal foundries” and “thermal and electric connections” processes listed in JRC-IDEES are considered as metallurgical processes.
- **Mineralogical processes.** This category includes all processes in the non-metallic minerals industries (as specified in article 2 of the ETD), as well as the production of lime within the pulp, paper and printing industry.
- **Other dual uses** would include the consumption of energy products used as process feedstocks.
- **Wood and wood products:** this is the consumption of products CN-4401 and CN-4402²², as stipulated in article 2.4.a of the ETD, which is estimated as the consumption of “primary solid biofuels” and charcoal, which are used as proxy due to the lack of better data. The actual amount of wood and wood products would be a fraction of this value.
- **Peat:** according to article 2.3 of the ETD, the amounts of “peat” and “peat products” recorded in the energy balances.
- **Electricity:** when it accounts for 50% of the cost of a product, but this is not estimated due to lack of data.
- **Uses other than motor or heating fuels:** these would include diverse processes (such as lighting or cooling). Electricity is considered as a motor fuel when it can be replaced by another energy product.

Any other uses not explicitly included in the above list have been considered by default within the scope of the ETD.

²² Combined nomenclature codes, Commission Regulation (EC) No 2031/2001 of 6 August 2001, amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff

The following tables (Table 6 to Table 17) summarise how the processes used in JRC-IDEES are considered to be in/out of scope of the ETD.

Table 4. CJEU rulings interpreting article 2 of the ETD.

| Ruling | Summary |
|---|---|
| CJEU-606/13, OKG AB, ECLI:EU:C:2015 | The case concerns the taxation of thermal power of nuclear reactors. The scope of the ETD, defined by Art.2, does not include the thermal power of a nuclear reactor, hence it cannot be considered an “energy product”. The definition of “electricity” in Art.2.2, defined by CN code 22716, means that the thermal power of a nuclear reactor does not come within the definition of “electricity”. |
| CJEU-517/07, Afton Chemical Limited, ECLI:EU:C:2008 | The case concerns whether fuel additives which are themselves not designed to power vehicles (they are cleaning agents, solvents, demulsifiers, etc.) should be taxed under the ETD. The court case itself states that the wording is unclear and imprecise. The ruling shows that any additive to a fuel should be taxed to the same extent as the motor fuel (Art.2.3). |
| CJEU-43/13 and C-44/13, Kronos Titan GmbH, ECLI:EU:C:2014 | The case concerns how the equivalent taxes for energy products that are not directly specified in the ETD should be determined (should they be taxed as heating fuels or motor fuels based on its use or its closest energy product listed in the ETD). In this case, a producer of titanium dioxide powder needs a temperature of 1 650 degrees to produce the chemical reaction desired. To do so, they burn toluene spraying into an oxygen stream. Another manufacturer of surface coatings burns white spirit for a thermal treatment process. The court rules that the equivalent rate of taxation, is first determined based on its use as either as a heating fuel or motor fuel (in both cases above they are heating fuels), before identifying for which of the motor or heating fuels in Annex I is closest to it |
| CJEU-426/12, X, ECLI:EU:C:2014 | The case concerns a sugar producer who argues that the use of coal as a fuel in the lime kiln, and the use of the resulting CO ₂ to produce lime-kiln gas (indispensable for the purification of raw juice) and the subsequent absorption of CO ₂ into earth form (sold as fertiliser to the agricultural sector), corresponds to dual-use under Art.2.4.b, and should be exempt under the ETD. A product has “dual use” under Art.2.4.b when it is used both as heating fuel and for purposes other than as motor fuel and heating fuel. In the case of sugar production, the gas which is needed for purification can only be obtained by using coal (due to impurities), so coal can be considered both as a heating fuel and as a raw material (to produce CO ₂). The court ruled that in this case, using coal as the heating fuel and then using the generated CO ₂ from the combustion within the same production process does constitute “dual use”. However, the use of gas as a residue that is then recycled to produce chemical fertiliser (which is then used as a primary material in a separate manufacturing process) does not constitute “dual use”. From the ruling: “... there may be dual use of an energy product burned in a manufacturing process where ... that process cannot be completed without a substance that can be generated only by the combustion of that energy product”. |
| CJEU-529/14, YARA Brunsbüttel GmbH, ECLI:EU:C:2015 | This case concerns an ammonia producer, who uses natural gas in a superheater mixed with the “poor” waste gases of the ammonia production. The heat used fulfilled multiple functions: heating and drying of vapour; chemical decomposition of waste gas; evacuation of waste gases. The producer argues that the natural gas should be considered “dual use” (and thus exempt under the ETD), as it is partly used as a heating fuel (steam for the ammonia production) but also in the waste-gas treatment (decomposition of waste-gas). An expert stated that the ammonia production could take place without the natural gas (sufficient heat from the waste gases) and that its purpose was to evacuate waste-gases (to be in agreement with environmental regulations). The court ruled that it does not constitute dual use, for two reasons: i. First, the production process could be completed without the natural gas. ii. Even if it could not be, vapour is not a substance that can be generated only using natural gas (does this mean that any steam production is automatically in scope?). It is implicit in both the sugar and ammonia case “that the energy product could only benefit from the ‘dual use’ exception to the extent that it had been physically transformed and contributed in that altered state to the production process”. |
| CJEU-465/15, Hüttenwerke Krupp Mannesmann | The case concerns a steel producer, who argues that the electricity used to power turbo blowers which compress air that is then injected into the blast furnace to trigger the reduction of iron ore should be exempt under Art.2.4.b (“electricity used principally for |

| Ruling | Summary |
|-------------------------|---|
| GmbH, ECLI:EU:C:2017 | the purposes of chemical reduction”). The court rules that this is not the case. It argues that if the turbo blowers were operated with diesel instead of electricity, the diesel would not be exempt from the ETD (it would not fall under the “dual use” concept), since it would solely be a motor fuel. As the ETD aims to tax energy products and electricity to the same extent when they are interchangeable, it means that in this case the electricity is also not exempt. “If, however, the turbo blower had operated not with electricity, but rather by using an energy product such as diesel, the latter would not fall within the concept of ‘dual use’ of Art.2.4.b, since the use of the energy product concerned would only serve to produce a driving force, which would therefore correspond to use as a fuel”. |

Source: JRC, 2020

Specific assumptions for the chemical and petrochemical industry

In the case of the chemical and petrochemical industry, additional data at facility level (Boulamanti and Moya, 2017) have been used to determine how much of the energy consumed in each of the main production processes is in scope of the ETD, or used for chemical reduction or electrolysis.

Table 5 shows the 45 main processes used in the chemical industry across the EU (Boulamanti and Moya, 2017). The processes are split into three types: “electrolysis”, “redox”, and “other”. In a “redox” reaction the oxidation states of the atoms change (oxidation: increment of the oxidation state, reduction: decrease of the oxidation state), while they do not in “other” reactions. The shares of thermal and electric energy necessary for each process are assigned to “electrolysis”, “reduction” (when at least one of the elements of the main product is reduced and the others do not change their oxidation state), or “in scope” (when the elements of the main product are only oxidized, reduced and oxidized, or do not change at all).

The breakdown of the energy uses in the chemical and petrochemical industry at national level is shown in Table 6. These values result from the data for each process (Table 5) with the available information at facility level (Boulamanti and Moya, 2017). They are used when there is not a straightforward allocation of processes from JRC-IDEES to the ETD categories (processes “steam processing”, “generic electric processes”, and “high enthalpy processing”, which appear under different ETD categories in Table 7).

The dataset provides a snapshot of the chemical and petrochemical industry in 2013 that accounts for a share of its final energy consumption in that year. For that reason it has been assumed that the uncovered share of final energy consumption is considered in scope by default since the same structure cannot be extrapolated to the whole industry. The resulting distribution of the energy uses is then applied to the 2018 energy balances of the chemical and petrochemical industry. It is also assumed that the database includes all the production capacity of chlorine, the only product that requires electrolysis, in 2018.

Table 5. Types of production processes in the chemical and petrochemical industry

| Process | Product | Reaction(s) | Type | Electricity share | | | Thermal energy share | | |
|--------------------------------|------------------------|---|--------------|-------------------|---------|-------|----------------------|---------|-------|
| | | | | Elec. | C. red. | I. S. | Elec. | C. red. | I. S. |
| Ammonoxidation (Sohio process) | Propylene | $C_6H_{14} (-2.33,+1) \rightarrow 2 C_3H_6 (-2,+1) + H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| | Acrylonitrile | $C_3H_6 (-2,+1) + NH_3 (-3,+1) + 1.5 O_2 (0) \rightarrow C_3H_3N (-2,+1,+3) + 3 H_2O (+1,-2)$ | | | | | | | |
| Chloralkali diaphragm cell | Chlorine | | Electrolysis | 100 | 0 | 0 | 0 | 0 | 100 |
| Chloralkali membrane cell | Chlorine | | Electrolysis | 100 | 0 | 0 | 0 | 0 | 100 |
| Chloralkali mercury cell | Chlorine | | Electrolysis | 100 | 0 | 0 | 0 | 0 | 100 |
| Cyclohexane KA oxidation | Adipic acid | $C_6H_{10}O (-1.33,+1,-2) + C_6H_{12}O (-1.67,+1,-2) + x HNO_3 (+1,+5,-2) \rightarrow 2 C_6H_{10}O_4 (-0.33,+1,-2) + y N_2O (+1,-2) + z H_2O (+1,-2)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Direct chlorination | Ethylene dichloride | $C_2H_4 (-2,+1) + Cl_2 (0) \rightarrow C_2H_4Cl_2 (-1,+1,-1)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Direct oxidation | Ethylene oxide | $C_2H_4 (-2,+1) + 0.5 O_2 (0) \rightarrow C_2H_4O (-1,+1,-2)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| EDC cracking | Vinyl chloride monomer | $C_2H_4Cl (-1,+1,-1) \rightarrow C_2H_3Cl (-1,+1,-1) + HCl (+1,-1)$ | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| Emulsion polymerisation | PVC-e | $n C_2H_3Cl (-1,+1,-1) \rightarrow (C_2H_3Cl)_n (-1,+1,-1)$ | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| ETB dehydrogenation | Styrene | $C_8H_{10} (-1.25,+1) \rightarrow C_8H_8 (-1,+1) + H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Fluid catalytic cracking | Propylene | $C_6H_{14} (-2.33,+1) \rightarrow 2 C_3H_6 (-2,+1) + H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Friedel crafts | Ethylbenzene | $C_6H_6 (-1,+1) + C_2H_4 (-2,+1) \rightarrow C_6H_5CH_2CH_3 (-0.83,+1,-2,+1,-3,+1)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Furnace black | Carbon black | $C_xH_y (-y/x,+1) + z O_2 (0) \rightarrow x C (0) + H_2O (+1,-2)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Heavy oil partial oxidation | Methanol | $C_xH_y (-y/x,+1) + z O_2 (0) \rightarrow x CH_4O (-2,+1,-2) + z H_2O (+1,-2)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Heavy residue based ammonia | Hydrogen | $C_xH_y (-y/x,+1) + 0.5x O_2 (0) \rightarrow 0.5y H_2 (0) + x CO (+2,-2)$ | Redox | 0 | 26.8 | 73.2 | 0 | 93 | 7 |
| | | $C (0) + H_2O (+1,-2) \rightarrow H_2 (0) + CO (+2,-2)$ | | | | | | | |
| | | $C (0) + 0.5 O_2 (0) \rightarrow CO (+2,-2)$ | | | | | | | |
| | Ammonia | $N_3 (0) + 3 H_2 (0) \rightarrow 2 NH_3 (-3,+1)$ | | | | | | | |
| Hydration | Monoethylene glycol | $C_2H_4O (-1,+1,-2) + H_2O (+1,-2) \rightarrow C_2H_6O_2 (-1,+1,-2)$ | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| Naphtha based - benzene | Benzene | $C_6H_{14} (-2.33,+1) \rightarrow C_6H_6 (-1,+1) + 4 H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Naphtha based - only benzene | Benzene | $C_6H_{14} (-2.33,+1) \rightarrow C_6H_6 (-1,+1) + 4 H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Naphtha based - toluene | Toluene | $7 C_6H_{14} (-2.33,+1) \rightarrow 6 C_7H_8 (1.14,+1) + 25 H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Naphtha based - xylenes | Xylenes | $6 C_6H_{14} (-2.33,+1) \rightarrow 3 C_8H_{10} (-1.25,+1) + 13 H_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Naphtha reforming | Hydrogen | Steam cracking | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Natural gas based ammonia | Nitrogen, hydrogen | $CH_4 (-4,+1) + H_2O (+1,-2) \rightarrow 3 H_2 (0) + CO (+2,-2)$ | Redox | 0 | 37.7 | 62.3 | 0 | 67.7 | 32.3 |
| | | $CO (+2,-2) + H_2O (+1,-2) \rightarrow H_2 (0) + CO_2 (+4,-2)$ | | | | | | | |
| | | $CH_4 (-4,+1) + air (0) \rightarrow 2 N_2 (0) + CO (+2,-2) + 2 H_2 (0)$ | | | | | | | |
| Ostwald: dual pressure | Nitric acid | $N_3 (0) + 3 H_2 (0) \rightarrow 2 NH_3 (-3,+1)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| | | $NH_3 (-3,+1) + 5 O_2 (0) \rightarrow 4 NO (+2,-2) + 6 H_2O (+1,-2)$ | | | | | | | |
| | | $2 NO (+2,-2) + O_2 (0) \rightarrow 2 NO_2 (+4,-2)$ | | | | | | | |
| Ostwald: single pressure | Nitric acid | $3 NO_2 (+4,-2) + H_2O (+1,-2) \rightarrow 2 HNO_3 (+1,+5,-2) + NO (+2,-2)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| | | $NH_3 (-3,+1) + 5 O_2 (0) \rightarrow 4 NO (+2,-2) + 6 H_2O (+1,-2)$ | | | | | | | |
| | | $2 NO (+2,-2) + O_2 (0) \rightarrow 2 NO_2 (+4,-2)$ | | | | | | | |
| | | $3 NO_2 (+4,-2) + H_2O (+1,-2) \rightarrow 2 HNO_3 (+1,+5,-2) + NO (+2,-2)$ | | | | | | | |

| Process | Product | Reaction(s) | Type | Electricity share | | | Thermal energy share | | |
|------------------------------|---------------------|--|-------|-------------------|---------|-------|----------------------|---------|-------|
| | | | | Elec. | C. red. | I. S. | Elec. | C. red. | I. S. |
| Oxychlorination | Ethylene dichloride | $2 \text{C}_2\text{H}_4 (-2,+1) + 4 \text{HCl} (+1,-1) + \text{O}_2 (0) \rightarrow \text{C}_2\text{H}_4\text{Cl}_2 (-1,+1,-1) + \text{H}_2\text{O} (+1,-2)$ | Redox | 0 | 100 | 0 | 0 | 100 | 0 |
| Partial oxidation | Hydrogen | Heavy oil partial oxidation | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Phenol KA oxidation | Adipic acid | $2 \text{C}_6\text{H}_6\text{O} (-0.67,+1,-2) + 4 \text{H}_2\text{O} (+1,-2) + \text{O}_2 (0) \rightarrow 2 \text{C}_6\text{H}_{10}\text{O}_4 (-0.33,+1,-2)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| PVC - mechanical recycling | PVC recycled | | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| Pygas based - benzene | Benzene | $\text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow \text{C}_6\text{H}_6 (-1,+1) + 4 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Pygas based - only benzene | Benzene | $\text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow \text{C}_6\text{H}_6 (-1,+1) + 4 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Pygas based - toluene | Toluene | $7 \text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow 6 \text{C}_7\text{H}_8 (1.14,+1) + 25 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Pygas based - xylenes | Xylenes | $6 \text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow 3 \text{C}_8\text{H}_{10} (-1.25,+1) + 13 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Solvay | Soda ash | $2 \text{Na}_3\text{H}(\text{CO}_3)_2 (+1,+1,+4,-2) \rightarrow 3 \text{Na}_2\text{CO}_3 (+1,+4,-2) + \text{H}_2\text{O} (+1,-2) + \text{CO}_2 (+4,-2)$ | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| | Soda ash | $\text{NaCl} (+1,-1) + \text{CaCO}_3 (+2,+4,-2) \rightarrow \text{Na}_2\text{CO}_3 (+1,+4,-2) + \text{CaCl}_2 (+2,-1)$ | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam cracking ethane-based | Ethylene | $\text{C}_2\text{H}_6 (-3,+1) \rightarrow \text{C}_2\text{H}_4 (-2,+1) + \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam cracking gas oil-based | Ethylene | $2 \text{C}_n\text{H}_{(2n+2)} (-(2n+2)/n,+1) \rightarrow n \text{C}_2\text{H}_4 (-2,+1) + 2 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam cracking naphtha-based | Butadiene | $2 \text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow 3 \text{C}_4\text{H}_6 (-1.5,+1) + 5 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam cracking naphtha-based | Butenes | $2 \text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow 3 \text{C}_4\text{H}_8 (-2,+1) + 2 \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam cracking naphtha-based | Ethylene | $\text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow 3 \text{C}_2\text{H}_4 (-2,+1) + \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam cracking naphtha-based | Propylene | $\text{C}_6\text{H}_{14} (-2.33,+1) \rightarrow 2 \text{C}_3\text{H}_6 (-2,+1) + \text{H}_2 (0)$ | Redox | 0 | 0 | 100 | 0 | 0 | 100 |
| Steam reforming | Hydrogen | $\text{CH}_4 (-4,+1) + \text{H}_2\text{O} (+1,-2) \rightarrow 3 \text{H}_2 (0) + \text{CO} (+2,-2)$ | Redox | 00 | 100 | 0 | 0 | 100 | 0 |
| | | $\text{CO} (+2,-2) + \text{H}_2\text{O} (+1,-2) \rightarrow \text{H}_2 (0) + \text{CO}_2 (+4,-2)$ | | | | | | | |
| | | $\text{CH}_4 (-4,+1) + \text{air} (0) \rightarrow 2 \text{H}_2 (0) + \text{CO} (+2,-2) + 2 \text{N}_2 (0)$ | | | | | | | |
| Steam reforming - methanol | Hydrogen | $\text{CH}_4 (-4,+1) + \text{H}_2\text{O} (+1,-2) \rightarrow 3 \text{H}_2 (0) + \text{CO} (+2,-2)$ | Redox | 0 | 22.6 | 77.4 | 0 | 12.5 | 87.5 |
| | | $\text{CO} (+2,-2) + \text{H}_2\text{O} (+1,-2) \rightarrow \text{H}_2 (0) + \text{CO}_2 (+4,-2)$ | | | | | | | |
| | | $\text{CH}_4 (-4,+1) + \text{air} (0) \rightarrow 2 \text{H}_2 (0) + \text{CO} (+2,-2) + 2 \text{N}_2 (0)$ | | | | | | | |
| | Methanol | $\text{CO} (+2,-2) + 2 \text{H}_2 (0) \rightarrow \text{CH}_3\text{O} (-2,+1,-2)$ | | | | | | | |
| | | $\text{CO}_2 (+4,-2) + 3 \text{H}_2 (0) \rightarrow \text{CH}_3\text{O} (-2,+1,-2) + \text{H}_2\text{O} (+1,-2)$ | | | | | | | |
| | | $\text{CH}_4 (-4,+1) + 0.5 \text{O}_2 (0) \rightarrow \text{CH}_3\text{O} (-2,+1,-2) + 2 \text{H}_2 (0) + \text{CO} (+2,-2)$ | | | | | | | |
| Suspension polymerisation | PVC-S | $n \text{C}_2\text{H}_3\text{Cl} (-1,+1,-1) \rightarrow (\text{C}_2\text{H}_3\text{Cl})_n (-1,+1,-1)$ | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| Urea synthesis | Ammonia | See ammonia processes | Other | 0 | 0 | 100 | 0 | 0 | 100 |
| | Urea | $\text{NH}_3 (-3,+1) + \text{CO}_2 (+4,-2) \rightarrow \text{CH}_4\text{N}_2\text{O} (+4,+1,-3,-2) + \text{H}_2\text{O} (+1,-2)$ | | | | | | | |

Source: JRC, 2020

1: Main product in bold

2: Colour code: red = oxidation, green = reduction, blue = oxidation and reduction

3: Numbers within brackets show the oxidation states

4: Elec.: electrolysis

5: C. red.: chemical reduction

6: I. S.: in scope

Table 6. Breakdown of the energy uses in the chemical and petrochemical industry from (Boulamanti and Moya, 2017)

| Country | FEC ¹ (2013, ktoe) | | FEC coverage ³ | "In scope" by default | Electricity shares ⁴ | | | Thermal energy shares ⁴ | | |
|---------|-------------------------------|-----------------------|---------------------------|-----------------------|---------------------------------|--------------------|----------|------------------------------------|---------------------|----------|
| | EUROSTAT | Database ² | | | Electrolysis | Chemical reduction | In scope | Electrolysis | Chemical reduction. | In scope |
| AT | 995 | 111.1 | 11.2% | 88.8% | 3% | 3% | 93% | 0% | 8% | 92% |
| BE | 4201 | 1792.7 | 42.7% | 57.3% | 11% | 3% | 86% | 0% | 7% | 93% |
| BG | 781 | 408.0 | 52.3% | 47.7% | 0% | 1% | 99% | 0% | 8% | 92% |
| CY | 3 | 0.0 | 1.2% | 98.8% | 0% | 0% | 100% | 0% | 0% | 0% |
| CZ | 1039 | 349.6 | 33.7% | 66.3% | 12% | 0% | 88% | 0% | 0% | 100% |
| DE | 14232 | 6200.4 | 43.6% | 56.4% | 18% | 3% | 79% | 0% | 6% | 94% |
| DK | 268 | 0.6 | 0.2% | 99.8% | 0% | 0% | 100% | 0% | 0% | 100% |
| EE | 75 | 26.6 | 35.7% | 64.3% | 0% | 2% | 98% | 0% | 32% | 68% |
| EL | 111 | 30.4 | 27.3% | 72.7% | 8% | 1% | 90% | 0% | 25% | 75% |
| ES | 4075 | 1080.0 | 26.5% | 73.5% | 21% | 5% | 74% | 0% | 2% | 98% |
| FI | 1055 | 78.8 | 7.5% | 92.5% | 6% | 1% | 93% | 0% | 0% | 100% |
| FR | 4753 | 2271.1 | 47.8% | 52.2% | 15% | 2% | 82% | 0% | 7% | 93% |
| HR | 137 | 119.7 | 87.2% | 12.8% | 0% | 4% | 96% | 0% | 40% | 60% |
| HU | 1048 | 435.9 | 41.6% | 58.4% | 21% | 1% | 79% | 0% | 6% | 94% |
| IE | 228 | 3.9 | 1.7% | 98.3% | 1% | 0% | 99% | 0% | 0% | 100% |
| IT | 4137 | 1155.0 | 27.9% | 72.1% | 2% | 2% | 95% | 0% | 5% | 95% |
| LT | 362 | 71.5 | 19.7% | 80.3% | 0% | 0% | 100% | 0% | 15% | 85% |
| LU | 70 | 0.1 | 0.2% | 99.8% | 0% | 0% | 100% | 0% | 0% | 100% |
| LV | 25 | 0.0 | 0.1% | 99.9% | 0% | 0% | 100% | 0% | 0% | 100% |
| MT | 3 | 0.0 | 0.4% | 99.6% | 0% | 0% | 100% | 0% | 0% | 0% |
| NL | 7232 | 2584.7 | 35.7% | 64.3% | 14% | 4% | 81% | 0% | 7% | 93% |
| PL | 2790 | 1137.9 | 40.8% | 59.2% | 4% | 0% | 96% | 0% | 15% | 85% |
| PT | 495 | 62.4 | 12.6% | 87.4% | 11% | 1% | 88% | 0% | 1% | 99% |
| RO | 1645 | 716.8 | 43.6% | 56.4% | 32% | 2% | 66% | 0% | 17% | 83% |
| SE | 536 | 524.9 | 97.9% | 2.1% | 8% | 3% | 89% | 0% | 4% | 96% |
| SI | 150 | 4.1 | 2.7% | 97.3% | 5% | 0% | 95% | 0% | 0% | 100% |
| SK | 295 | 113.1 | 38.3% | 61.7% | 17% | 0% | 83% | 0% | 22% | 78% |
| EU | 50742 | 14003 | 38.0% | 62.0% | 13% | 3% | 84% | 0% | 7% | 93% |

Source: JRC. 2020

1: FEC: final energy consumption

2: Source: (Boulamanti and Moya, 2017)

3: Ratio Database / EUROSTAT. Low values in the "FEC coverage" column correspond to countries where the chemical and petrochemical industry is fairly small.

4: These shares are used to allocate the JRC-IDEES processes "steam processing", "generic electric processes", and "high enthalpy processing" to ETD categories in Table 7.

Table 7. Chemical and petrochemical processes

| In scope | Out of scope | | | | | | |
|---|--|---|-------------------------|------------------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | Production of hydrogen, ammonia, and methanol | | Production of chlorine | | Feedstocks | Wood and wood products |
| Low enthalpy heat | Process cooling (based on natural gas, steam or electricity) | Steam processing ¹ | | | | | Peat |
| Air compressors | | Generic electric processes ¹ | | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| Steam processing ¹ | | | | | | | |
| Thermal and electric furnaces | | | | | | | |
| Generic electric processes ¹ | | | | | | | |
| High enthalpy heat processing | | | | | | | |

Source: JRC. 2020

1: This corresponds to the share not covered in (Boulamanti and Moya, 2017) that cannot be identified explicitly as out of scope, according to Table 5.

Table 8. Pulp, paper and printing.

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|-------------------------|--------------|------------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | | | Lime production ¹ | Feedstocks | Wood and wood products |
| Low enthalpy heat | Wood preparation and grinding | | | | | | Peat |
| Air compressors | Stock preparation (electricity) | | | | | | |
| Motor drives | Paper machine (electricity) | | | | | | |
| Fans and pumps | Electric pulping | | | | | | |
| Thermal pulping | Cleaning | | | | | | |
| Stock preparation (thermal energy) | Product finishing | | | | | | |
| Paper machine (thermal energy) | | | | | | | |

Source: JRC, 2020

1: From (Moya and Pavel, 2018)

Table 9. Iron and steel

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--|--------------------------------|--------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | Blast furnaces and basic oxygen furnaces | Sinter and pellet making | | | Feedstocks | Wood and wood products |
| Low enthalpy heat | | | Furnaces, refining and rolling | | | | Peat |
| Air compressors | | | Products finishing | | | | |
| Motor drives | | | Electric arc | | | | |
| Fans and pumps | | | | | | | |

Source: JRC, 2020

Table 10. Non-metallic minerals

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|-------------------------|--------------|--------------------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | | | | | All processes (article 2 of the ETD) | Feedstocks | Wood and wood products |
| | | | | | | | Peat |

Source: JRC, 2020

Table 11. Non-ferrous metals

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|--|--------------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | Alumina refining | Aluminium smelting | | Feedstocks | Wood and wood products |
| Low enthalpy heat | | | Aluminium processing and finishing | | | | Peat |
| Air compressors | | | Metal production, processing and finishing | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| High enthalpy heat | | | | | | | |

Source: JRC, 2020

Table 12. Food, beverages and tobacco

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|-------------------------|--------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | | | | Feedstocks | Wood and wood products |
| Low enthalpy heat | Cooling | | | | | | Peat |
| Air compressors | Electric machinery | | | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| Direct heat | | | | | | | |
| Process heat | | | | | | | |
| Steam processing | | | | | | | |
| Drying processes | | | | | | | |

Source: JRC, 2020

Table13. Machinery equipment

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|---------------------------------|--------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | Products finishing | | | Feedstocks | Wood and wood products |
| Low enthalpy heat | General machinery | | Thermal foundries | | | | Peat |
| Air compressors | | | Thermal and electric connection | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| Heat treatment | | | | | | | |
| Steam processing | | | | | | | |

Source: JRC, 2020

Table 14. Textiles and leather

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|-------------------------|--------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | | | | Feedstocks | Wood and wood products |
| Low enthalpy heat | Product finishing | | | | | | Peat |
| Air compressors | Electric machinery | | | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| Pre-treatment with steam | | | | | | | |
| Wet processing with steam | | | | | | | |
| Drying processes | | | | | | | |

Source: JRC, 2020

Table 15. Transport equipment

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|---------------------------------|--------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | Thermal foundries | | | Feedstocks | Wood and wood products |
| Low enthalpy heat | Product finishing | | Thermal and electric connection | | | | Peat |
| Air compressors | General machinery | | | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| Heat treatment | | | | | | | |
| Steam processing | | | | | | | |

Source: JRC, 2020

Table 16. Wood and wood products

| In scope | Out of scope | | | | | | |
|--|---------------------------------------|--------------------|-------------------------|--------------|-------------------------|-----------------|--------------------------|
| | Uses other than motor or heating fuel | Chemical reduction | Metallurgical processes | Electrolysis | Mineralogical processes | Other dual uses | Excluded energy carriers |
| Autoproduction of electricity and heat | Lighting | | | | | Feedstocks | Wood and wood products |
| Low enthalpy heat | Products finishing | | | | | | Peat |
| Air compressors | Electric mechanical processes | | | | | | |
| Motor drives | | | | | | | |
| Fans and pumps | | | | | | | |
| Specific processes with steam | | | | | | | |
| Drying processes | | | | | | | |

Source: JRC, 2020

3. *Results*

The analysis of the results shows that the chemical and petrochemical industry accounts for one third of the total energy used by the EU industry (Table 17) 123517 ktoe out of 361020 ktoe). The chemical and petrochemical sector is followed by the iron and steel industry (which uses 18.93% of the energy, 66122 ktoe), the pulp, paper and printing industry (9.8 %, 35247 ktoe)), the non-metallic minerals account (10.29.5 %, 34187 ktoe), the food, beverages and tobacco industry (7.8 %, 28239 ktoe), construction (5.7 %, 20634), and the machinery industry (5.0%, 17957 ktoe). These seven industries account for 90.3 % of total industrial energy use. The remaining industries use less than 3% each.

Most of the energy products, 60.7% (219004 ktoe), are used for energy purposes within the industries. Again the chemical and petrochemical sector explains the largest share (22%, 48193 ktoe). The non-metallic minerals, the pulp, paper and printing, and the food, beverages, and tobacco account for similar shares (15.3% - 33563 ktoe, 13.9% - 30483 ktoe, and 12.4% - 27069 ktoe respectively), followed by the iron and steel industry (9.1%, 19911 ktoe), and the machinery industry (7.9%, 17320 ktoe).

Non-energy use of energy products accounts for 23.4% of the total energy use in the EU, 84534 ktoe. Most of the non-energy use takes place also in the chemical and petrochemical sector (84.9%, 71754 ktoe) and the construction industry (13.6%, 11502 ktoe).

Finally, about 3.2% (11620 ktoe) of the total energy use is needed for the autoproduction of electricity and heat. Approximately 40.7 % (4727 ktoe) of this energy is used by autoproducers within the pulp, paper and printing industry, followed by the chemical and petrochemical sector (30.7%, 3570 ktoe), and the food, beverage and tobacco (9.8 %, 1134 ktoe).

In terms of out of scope categories, one third of the total energy use (33.2%, 120010 ktoe) is considered to have a dual use, especially in the chemical and petrochemical industry (59.8% of the energy excluded, 71754 ktoe), and the iron and steel industry (29.6%, 35523 ktoe).

Mineralogical processes require about 9.3 % of the total energy use, 33719 ktoe. Almost all the energy used in mineralogical processes is consumed in the non-metallic minerals sector (96.6 %, 32579 ktoe), and the rest in the pulp, paper and printing (3.4 %, 1140 ktoe).

Energy used for metallurgical processes account for 8.7% of the total energy use, 31341 ktoe. Most of the energy for metallurgical processes is used by the iron and steel (59.1%, 18513 ktoe), the non-ferrous metals (23.5%, 7375 ktoe), the machinery (14.4%, 4508 ktoe), and the transport industries (3%, 945 ktoe).

About 7.2 % (25908 ktoe) of the total energy use is for uses other than motor or heating fuel, especially in the food, beverages and tobacco (22.3 %, 5776 ktoe), pulp, paper and printing (18.0 %, 4652 ktoe), machinery (15.9 %, 4117 ktoe), and chemical and petrochemical industry (15.4 %, 3990 ktoe).

Wood and wood products represent 6.3 % of the total energy use, 22568 ktoe. They are mostly used in the pulp, paper and printing industry (66.8 %, 15083 ktoe) and the wood and wood products industry (22.0 %, 4976 ktoe).

The energy used for chemical reduction accounts only for 3.3 % of the total energy use, 11971 ktoe. 86.7 % of the energy use in reduction processes is used by the iron and steel industry (10380 ktoe), while the rest (13.3 %, 1591 ktoe) is used in the chemical and petrochemical sector.

Electrolysis requires 0.4% of total energy use (1437 ktoe of electricity) and it is used only in the non-ferrous metals industry (92.7 %, 1333 ktoe), and the chemical industry (7.3 %, 104 ktoe).

Finally, peat represents only 0.05% of the total energy use, 174 ktoe, mostly in the pulp, paper and printing industry (94.2%, 164 ktoe) and in a very few MS.

The results are also provided per group of energy product (described in Table 18), defined in agreement with TAXUD). The categories most used by all the EU industries are “natural gas” (Table 19), 27.9 % of the total energy use), 100680 ktoe), “not taxed” products (21.5 %, 77516 ktoe), electricity (20 %, 72094 ktoe), coal (15.6 %, 56202 ktoe). The “out of scope” group accounts for 6.3% to total energy use, 22749 ktoe. The other groups are used in much smaller amounts. Most of the “not taxed” products (52437 ktoe), gasoline (2684 ktoe), kerosene (233 ktoe), and LPG (11377 ktoe) have a non-energy use.

The aggregate results per industry for each MS are shown in Table 20 to Table 31.

Table 17. Overview of the EU results per industry

| | | Chemical & petrochemical | Iron & Steel | Paper, pulp & printing | Non-metallic minerals | Food, beverages & tobacco | Machinery | Non-ferrous metals | Construction | Wood & wood products | Transport equipment | Mining & quarrying | Textile & leather | EU |
|--|--------------------------------------|--------------------------|--------------|------------------------|-----------------------|---------------------------|--------------|--------------------|--------------|----------------------|---------------------|--------------------|-------------------|---------------|
| Net inputs | Energy use | 51763 | 66076 | 35210 | 33853 | 28203 | 17677 | 10029 | 9131 | 8524 | 7744 | 4277 | 3999 | 276486 |
| | Autoproducers E | 187 | 40 | 376 | 14 | 33 | 91 | 45 | 19 | 0 | 15 | 88 | 1 | 909 |
| | Autoproducers CHP | 3353 | 230 | 4258 | 276 | 1065 | 251 | 68 | 97 | 1 | 149 | 393 | 354 | 10495 |
| | Autoproducers H | 29 | 33 | 93 | 1 | 37 | 15 | 1 | 1 | 1 | 2 | 3 | 1 | 217 |
| | Coke ovens | 0 | 35482 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35482 |
| | Blast furnaces | 0 | 10380 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10380 |
| | Final energy consumption | 48193 | 19911 | 30483 | 33563 | 27069 | 17320 | 9915 | 9014 | 8522 | 7578 | 3794 | 3643 | 219004 |
| Non-energy use | 71754 | 47 | 36 | 334 | 36 | 280 | 444 | 11502 | 20 | 23 | 35 | 23 | 84534 | |
| Total energy use | 123517 | 66122 | 35247 | 34187 | 28239 | 17957 | 10473 | 20634 | 8544 | 7767 | 4311 | 4022 | 361020 | |
| Out of scope | Out of scope | 77732 | 64510 | 21075 | 33897 | 6751 | 9048 | 9194 | 14179 | 5258 | 3195 | 1370 | 918 | 247128 |
| | Chemical reduction | 1591 | 10380 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11971 |
| | Electrolysis | 104 | 0 | 0 | 0 | 0 | 0 | 1333 | 0 | 0 | 0 | 0 | 0 | 1437 |
| | Metallurgical processes | 0 | 18513 | 0 | 0 | 0 | 4508 | 7375 | 0 | 0 | 945 | 0 | 0 | 31341 |
| | Minerological processes | 0 | 0 | 1140 | 32579 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33719 |
| | Dual use | 71754 | 35523 | 36 | 334 | 36 | 280 | 444 | 11502 | 20 | 23 | 35 | 23 | 120010 |
| | Wood and wood products | 290 | 14 | 15083 | 983 | 938 | 143 | 2 | 59 | 4976 | 13 | 47 | 20 | 22568 |
| | Peat | 3 | 0 | 164 | 1 | 1 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 174 |
| Uses other than motor or heating fuel | 3990 | 80 | 4652 | 0 | 5776 | 4117 | 40 | 2618 | 256 | 2215 | 1288 | 875 | 25908 | |
| In scope | Uses as motor or heating fuel | 45785 | 1613 | 14172 | 291 | 21488 | 8909 | 1279 | 6454 | 3286 | 4572 | 2941 | 3104 | 113892 |
| | Final energy consumption | 42271 | 1310 | 11876 | 0 | 20419 | 8594 | 1164 | 6353 | 3286 | 4406 | 2458 | 2748 | 104885 |
| | Autoproducers E | 186 | 40 | 118 | 14 | 23 | 89 | 45 | 6 | 0 | 15 | 88 | 1 | 625 |
| | Autoproducers CHP | 3300 | 230 | 2147 | 276 | 1023 | 219 | 68 | 95 | 0 | 149 | 393 | 354 | 8253 |
| | Autoproducers H | 29 | 33 | 30 | 1 | 22 | 8 | 1 | 0 | 0 | 2 | 3 | 1 | 130 |
| Ratio (in scope / total energy use) | 37.1% | 2.4% | 40.2% | 0.9% | 76.1% | 49.6% | 12.2% | 31.3% | 38.5% | 58.9% | 68.2% | 77.2% | 31.5% | |

Source: JRC, 2020

Table 18. Groups of energy products

| Energy products used in EUROSTAT's energy balances | Group of energy products | Products listed in article 2 of the ETD | |
|--|---------------------------|---|--|
| | | CN code | Description |
| Anthracite | Coal | 2701 | Coal; briquettes, ovoids and similar solid fuels manufactured from coal |
| Coking coal | | | |
| Other bituminous coal | | | |
| Sub-bituminous coal | | | |
| Lignite | | 2702 | Lignite, whether or not agglomerated, excluding jet |
| Patent fuel | | 2704 | Coke and semi-coke of coal, of lignite or of peat, whether or not agglomerated; retort carbon |
| Coke oven coke | | | |
| Gas coke | | | |
| Coal tar | | 2706 | Tar distilled from coal, from lignite or from peat, and other mineral tars, whether or not dehydrated or partially distilled, including reconstituted tars |
| Brown coal briquettes | | 2701 | Coal; briquettes, ovoids and similar solid fuels manufactured from coal |
| Gas works gas | Natural gas ¹ | 2705 | Coal gas, water gas, producer gas and similar gases, other than petroleum gases and other gaseous hydrocarbons |
| Coke oven gas | | | |
| Blast furnace gas | | | |
| Other recovered gases | | | |
| Peat | Out of scope ² | 2703 | Peat (including peat litter), whether or not agglomerated |
| Peat products | | | |
| Oil shale and oil sands | Coal | 2714 | Bitumen and asphalt, natural; bituminous or oil-shale and tar sands; asphaltites and asphaltic rocks |
| Crude oil | Not taxed | 2709 | Petroleum oils and oils obtained from bituminous minerals, crude |
| Natural gas liquids | | | |
| Refinery feedstocks | | | |
| Additives and oxygenates (excluding biofuel portion) | Additives | 3811 | Anti-knock preparations, oxidation inhibitors, gum inhibitors, viscosity improvers, anticorrosive preparations and other prepared additives, for mineral oils (including gasoline) or for other liquids used for the same purposes as mineral oils |
| | | 3817 | Mixed alkylbenzenes and mixed alkylnaphthalenes, other than those of heading 2707 or 2902 |
| | | 3824 | Prepared binders for foundry moulds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included |
| Other hydrocarbons | Not taxed | 2901 | Acyclic hydrocarbons |
| | | 2902 | Cyclic hydrocarbons |
| | | 2905 11 00 | Methanol (Methyl Alcohol) |
| | | 2707 ⁵ | Oils and other products of the distillation of high temperature coal tar; similar products in which the weight of the aromatic constituents exceeds that of the nonaromatic constituents |
| Refinery gas | Natural gas ¹ | 2711 | Petroleum gases and other gaseous hydrocarbons |
| Ethane | | | |

| Energy products used in EUROSTAT's energy balances | Group of energy products | Products listed in article 2 of the ETD | |
|---|--------------------------|---|--|
| | | CN code | Description |
| Liquefied petroleum gases | | | |
| Motor gasoline (excluding biofuel portion) | Gasoline | 2710 | Petroleum oils and oils obtained from bituminous minerals, other than crude; preparations not elsewhere specified or included, containing by weight 70 % or more of petroleum oils or of oils obtained from bituminous minerals, these oils being the basic constituents of the preparations; waste oils |
| Aviation gasoline | | | |
| Gasoline-type jet fuel | | | |
| Kerosene-type jet fuel (excluding biofuel portion) | Kerosene | | |
| Other kerosene | | | |
| Naphtha ³ | Not taxed | | |
| Gas oil and diesel oil (excluding biofuel portion) | Diesel | | |
| Fuel oil | Heavy fuel | | |
| White spirit and special boiling point industrial spirits | Not taxed | | |
| Lubricants | | | |
| Bitumen | | 2715 | Bituminous mixtures based on natural asphalt, on natural bitumen, on petroleum bitumen, on mineral tar or on mineral tar pitch (for example, bituminous mastics, cutbacks) |
| Petroleum coke | | 2713 | Petroleum coke, petroleum bitumen and other residues of petroleum oils or of oils obtained from bituminous minerals |
| | | 2708 | Pitch and pitch coke, obtained from coal tar or from other mineral tars |
| Paraffin waxes | | 2712 | Petroleum jelly; paraffin wax, microcrystalline petroleum wax, slack wax, ozokerite, lignite wax, peat wax, other mineral waxes, and similar products obtained by synthesis or by other processes, whether or not coloured |
| Other oil products | | 3824 90 99 | Other |
| Natural gas | Natural gas | 2711 | Petroleum gases and other gaseous hydrocarbons |
| Hydro | Not taxed ⁴ | 2716 | Electricity |
| Tide, wave, ocean | | | |

| Energy products used in EUROSTAT's energy balances | Group of energy products | Products listed in article 2 of the ETD | |
|--|---------------------------|---|---|
| | | CN code | Description |
| Wind | | | |
| Solar photovoltaic | | | |
| Solar thermal | | | |
| Geothermal | | | |
| Primary solid biofuels | Out of scope ² | 4401 | Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms |
| Charcoal | | 4402 | Wood charcoal (including shell or nut charcoal), whether or not agglomerated |
| Biogases | Natural gas ¹ | | |
| Renewable municipal waste | Not taxed | | |
| Pure biogasoline | Gasoline | 1507 | Soya-bean oil and its fractions, whether or not refined, but not chemically modified |
| Blended biogasoline | | | Ground-nut oil and its fractions, whether or not refined, but not chemically modified |
| Pure biodiesels | Diesel | 1508 | Olive oil and its fractions, whether or not refined, but not chemically modified |
| Blended biodiesels | | 1509 | Other oils and their fractions, obtained solely from olives, whether or not refined, but not chemically modified, including blends of these oils or fractions with oils or fractions of heading 1509 |
| Pure bio jet kerosene | Kerosene | 1510 | Palm oil and its fractions, whether or not refined, but not chemically modified |
| Blended bio jet kerosene | | 1511 | Sunflower-seed, safflower or cotton-seed oil and fractions thereof, whether or not refined, but not chemically modified |
| Other liquid biofuels | Diesel | 1512 | Coconut (copra), palm kernel or babassu oil and fractions thereof, whether or not refined, but not chemically modified |
| | | 1513 | Rape, colza or mustard oil and fractions thereof, whether or not refined, but not chemically modified |
| | | 1514 | Other fixed vegetable fats and oils (including jojoba oil) and their fractions, whether or not refined, but not chemically modified |
| | | 1515 | Animal or vegetable fats and oils and their fractions, partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared |
| | | 1516 | Margarine; edible mixtures or preparations of animal or vegetable fats or oils or of fractions of different fats or oils of this Chapter, other than edible fats or oils or their fractions of heading |
| | | 1517 | Animal or vegetable fats and oils and their fractions, boiled, oxidised, dehydrated, sulphurised, blown, polymerised by heat in vacuum or in inert gas or otherwise chemically modified, excluding those of heading |
| | | 1518 | 1516; inedible mixtures or preparations of animal or vegetable fats or oils or of fractions of different fats or oils of this chapter, not elsewhere specified or included |
| Ambient heat (heat pumps) | Not taxed | | |
| Industrial waste (non-renewable) | Not taxed | | |

| Energy products used in EUROSTAT's energy balances | Group of energy products | Products listed in article 2 of the ETD | |
|--|--------------------------------|---|-------------|
| | | CN code | Description |
| Non-renewable municipal waste | Not taxed | | |
| Nuclear heat | Not taxed ⁴ | | |
| Heat | Not taxed | | |
| Electricity | Electricity | 2716 | Electricity |

Source: JRC, 2020

1: products that can replace natural gas.

2: out of scope according to article 2 of the ETD.

3: normally used as a feedstock.

4: electricity or heat that only appears in the supply blocks of the energy balances.

5: this group includes hydrogen.

Table 19: Overview of the EU results for all industries per group of energy products

| | | Total | Coal | Gasoline | Kerosene | Diesel | Heavy fuel | Additives | LPG | Natural gas | Electricity | Out of scope | Not taxed |
|---------------------------------------|--|---------------|--------------|-------------|--------------|-------------|-------------|--------------|---------------|--------------|--------------|--------------|--------------|
| Net inputs | Energy use | 276486 | 56202 | 252 | 94 | 8899 | 3572 | 0 | 2510 | 85035 | 72094 | 22749 | 25079 |
| | Autoproducers E | 909 | 67 | 0 | 0 | 4 | 29 | 0 | 0 | 244 | 0 | 284 | 280 |
| | Autoproducers CHP | 10495 | 225 | 0 | 0 | 22 | 591 | 0 | 3 | 6889 | 0 | 2247 | 517 |
| | Autoproducers H | 217 | 48 | 0 | 0 | 0 | 1 | 0 | 4 | 66 | 0 | 88 | 9 |
| | Coke ovens | 35482 | 34807 | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 130 | 6 | 410 |
| | Blast furnaces | 10380 | 10086 | 0 | 0 | 1 | 43 | 0 | 0 | 99 | 122 | 0 | 29 |
| | Final energy consumption | 219004 | 10968 | 252 | 94 | 8871 | 2907 | 0 | 2502 | 77609 | 71842 | 20123 | 23835 |
| Non-energy use | 84534 | 0 | 2684 | 233 | 1183 | 975 | 0 | 11377 | 15645 | 0 | 0 | 0 | 52437 |
| Total energy use | 361020 | 56202 | 2936 | 327 | 10083 | 4546 | 0 | 13887 | 100680 | 72094 | 22749 | 77516 | |
| Out of scope | Out of scope | 247128 | 51520 | 2737 | 265 | 4063 | 2177 | 0 | 12446 | 51928 | 34147 | 22742 | 65103 |
| | Chemical reduction | 11971 | 10225 | 3 | 0 | 20 | 78 | 0 | 19 | 799 | 526 | 0 | 302 |
| | Electrolysis | 1437 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1437 | 0 | 0 |
| | Metallurgical processes | 31341 | 1637 | 6 | 2 | 327 | 280 | 0 | 473 | 12341 | 15435 | 0 | 840 |
| | Minerological processes | 33719 | 3977 | 1 | 9 | 513 | 453 | 0 | 221 | 13408 | 6092 | 0 | 9044 |
| | Dual use | 120010 | 34807 | 2684 | 233 | 1184 | 975 | 0 | 11377 | 15773 | 130 | 0 | 52847 |
| | Wood and wood products | 22568 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22568 | 0 |
| | Peat | 174 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 174 | 0 |
| Uses other than motor or heating fuel | 25908 | 874 | 43 | 21 | 2019 | 391 | 0 | 356 | 9607 | 10527 | 0 | 2070 | |
| In scope | Uses as motor or heating fuel | 113892 | 4682 | 200 | 62 | 6020 | 2369 | 0 | 1441 | 48752 | 37947 | 6 | 12413 |
| | Final energy consumption | 104885 | 4342 | 199 | 62 | 5993 | 1748 | 0 | 1434 | 41552 | 37947 | 0 | 11607 |
| | Autoproducers E | 625 | 67 | 0 | 0 | 4 | 29 | 0 | 0 | 244 | 0 | 0 | 280 |
| | Autoproducers CHP | 8253 | 225 | 0 | 0 | 22 | 591 | 0 | 3 | 6889 | 0 | 6 | 517 |
| | Autoproducers H | 130 | 48 | 0 | 0 | 0 | 1 | 0 | 4 | 66 | 0 | 0 | 9 |
| | Ratio (in scope / total energy use) | 32% | 8% | 7% | 19% | 60% | 52% | 0% | 10% | 48% | 53% | 0% | 16% |

Source: JRC, 2020

Table 20. Results for the chemical and petrochemical industry

| | Chemical & petrochemical | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU | |
|----------------|---------------------------------------|------|-------|------|------|-------|-------|-----|-----|------|------|------|-------|------|------|------|------|------|-----|-----|-------|-------|------|------|------|------|-----|-------|--------|-----|
| Net inputs | Energy use | 1172 | 4181 | 871 | 7 | 1100 | 15129 | 340 | 33 | 292 | 3762 | 1096 | 3971 | 155 | 1144 | 267 | 3851 | 417 | 46 | 30 | 4 | 7157 | 3425 | 636 | 1522 | 508 | 152 | 494 | 51763 | |
| | Autoproducers E | 28 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 116 | 0 | 9 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 |
| | Autoproducers CHP | 116 | 34 | 40 | 0 | 82 | 570 | 39 | 0 | 171 | 416 | 0 | 121 | 0 | 3 | 0 | 604 | 8 | 0 | 4 | 0 | 196 | 562 | 264 | 94 | 9 | 0 | 22 | 3353 | |
| | Autoproducers H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 7 | 12 | 0 | 0 | 0 | 0 | 0 | 29 | |
| | Final energy consumption | 1028 | 4147 | 831 | 7 | 1018 | 14528 | 301 | 33 | 122 | 3230 | 1096 | 3833 | 155 | 1141 | 267 | 3245 | 408 | 46 | 27 | 4 | 6953 | 2851 | 372 | 1428 | 499 | 152 | 472 | 48193 | |
| Non-energy use | 1288 | 7194 | 226 | 0 | 1800 | 17474 | 1 | 0 | 730 | 3612 | 1163 | 9670 | 363 | 1996 | 0 | 5444 | 934 | 0 | 1 | 0 | 12538 | 3785 | 483 | 392 | 1700 | 11 | 950 | 71754 | | |
| petrochemical | Total energy use | 2460 | 11375 | 1097 | 7 | 2900 | 32603 | 341 | 33 | 1023 | 7374 | 2258 | 13641 | 518 | 3140 | 267 | 9296 | 1350 | 46 | 31 | 4 | 19694 | 7210 | 1119 | 1914 | 2207 | 164 | 1444 | 123517 | |
| Out of scope | Out of scope | 1485 | 7686 | 313 | 1 | 1894 | 19077 | 47 | 8 | 752 | 3934 | 1267 | 10208 | 392 | 2141 | 31 | 5807 | 1009 | 5 | 7 | 0 | 13379 | 4266 | 523 | 646 | 1769 | 43 | 1042 | 77732 | |
| | Chemical reduction | 37 | 129 | 41 | 0 | 2 | 337 | 0 | 4 | 14 | 32 | 1 | 106 | 10 | 39 | 0 | 58 | 36 | 0 | 0 | 0 | 304 | 245 | 2 | 136 | 6 | 0 | 51 | 1591 | |
| | Electrolysis | 1 | 4 | 0 | 0 | 2 | 50 | 0 | 0 | 0 | 3 | 2 | 22 | 0 | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 4 | 1 | 1 | 2 | 3 | 0 | 1 | 104 | |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Dual use | 1288 | 7194 | 226 | 0 | 1800 | 17474 | 1 | 0 | 730 | 3612 | 1163 | 9670 | 363 | 1996 | 0 | 5444 | 934 | 0 | 1 | 0 | 12538 | 3785 | 483 | 392 | 1700 | 11 | 950 | 71754 | |
| | Wood and wood products | 76 | 14 | 7 | 0 | 0 | 35 | 13 | 0 | 5 | 6 | 67 | 0 | 1 | 0 | 3 | 11 | 0 | 4 | 0 | 0 | 3 | 4 | 4 | 19 | 18 | 0 | 290 | | |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | |
| | Uses other than motor or heating fuel | 84 | 345 | 39 | 1 | 90 | 1180 | 33 | 4 | 7 | 281 | 96 | 343 | 19 | 100 | 31 | 299 | 29 | 5 | 2 | 0 | 532 | 232 | 33 | 113 | 38 | 13 | 40 | 3990 | |
| | Uses as motor or heating fuel | 975 | 3690 | 784 | 6 | 1005 | 13527 | 294 | 25 | 270 | 3440 | 991 | 3433 | 126 | 1000 | 235 | 3489 | 342 | 40 | 25 | 4 | 6316 | 2944 | 596 | 1268 | 439 | 121 | 402 | 45785 | |
| In scope | Final energy consumption | 867 | 3666 | 745 | 6 | 924 | 12925 | 255 | 25 | 100 | 2908 | 991 | 3295 | 126 | 997 | 235 | 2884 | 333 | 40 | 21 | 4 | 6112 | 2369 | 332 | 1174 | 436 | 121 | 380 | 42271 | |
| | Autoproducers E | 28 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 116 | 0 | 9 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 186 | |
| | Autoproducers CHP | 80 | 23 | 40 | 0 | 82 | 570 | 39 | 0 | 171 | 416 | 0 | 121 | 0 | 3 | 0 | 604 | 8 | 0 | 4 | 0 | 196 | 562 | 264 | 94 | 3 | 0 | 22 | 3300 | |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 7 | 12 | 0 | 0 | 0 | 0 | 0 | 29 | |
| petrochemical | Ratio (in scope / total energy use) | 40% | 32% | 71% | 81% | 35% | 41% | 86% | 75% | 26% | 47% | 44% | 25% | 24% | 32% | 88% | 38% | 25% | 88% | 79% | 89% | 32% | 41% | 53% | 66% | 20% | 74% | 28% | 37% | |

Source: JRC, 2020

Table 21. Results for the construction industry

| | Construction | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|-------------------------------------|---------------------------------------|-----|-----|-----|-----|------|------|-----|-----|------|------|------|------|-----|-----|------|------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-------|-------|
| Net inputs | Energy use | 318 | 205 | 66 | 10 | 275 | 1652 | 176 | 53 | 153 | 1226 | 409 | 1909 | 103 | 311 | 6 | 359 | 44 | 30 | 32 | 3 | 698 | 195 | 152 | 334 | 338 | 39 | 39 | 9131 |
| | Autoproducers E | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 10 | 0 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 19 |
| | Autoproducers CHP | 1 | 0 | 0 | 0 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 | 97 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Final energy consumption | 316 | 204 | 66 | 10 | 192 | 1651 | 176 | 53 | 153 | 1216 | 409 | 1901 | 103 | 309 | 6 | 358 | 44 | 30 | 32 | 3 | 693 | 195 | 152 | 333 | 338 | 39 | 33 | 9014 |
| Non-energy use | 494 | 303 | 155 | 35 | 496 | 1846 | 189 | 54 | 105 | 894 | 149 | 2521 | 79 | 126 | 196 | 1084 | 162 | 17 | 63 | 5 | 102 | 1294 | 180 | 329 | 451 | 52 | 122 | 11502 | |
| Total energy use | 812 | 507 | 221 | 45 | 771 | 3497 | 364 | 107 | 258 | 2120 | 558 | 4430 | 182 | 437 | 202 | 1443 | 206 | 47 | 95 | 8 | 800 | 1489 | 331 | 662 | 789 | 91 | 161 | 20634 | |
| Out of scope | Out of scope | 592 | 372 | 186 | 38 | 549 | 2260 | 238 | 67 | 168 | 1236 | 247 | 3026 | 98 | 233 | 199 | 1330 | 185 | 34 | 71 | 6 | 240 | 1382 | 229 | 402 | 585 | 69 | 137 | 14179 |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 494 | 303 | 155 | 35 | 496 | 1846 | 189 | 54 | 105 | 894 | 149 | 2521 | 79 | 126 | 196 | 1084 | 162 | 17 | 63 | 5 | 102 | 1294 | 180 | 329 | 451 | 52 | 122 | 11502 |
| | Wood and wood products | 6 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 24 | 0 | 6 | 0 | 4 | 0 | 2 | 2 | 0 | 2 | 0 | 4 | 1 | 0 | 2 | 0 | 2 | 0 | 59 |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Uses other than motor or heating fuel | 92 | 69 | 31 | 3 | 50 | 414 | 50 | 12 | 62 | 318 | 97 | 499 | 19 | 103 | 3 | 243 | 21 | 17 | 6 | 1 | 134 | 88 | 49 | 72 | 134 | 15 | 15 | 2618 |
| | Uses as motor or heating fuel | 220 | 136 | 35 | 8 | 221 | 1237 | 126 | 40 | 90 | 884 | 312 | 1404 | 84 | 204 | 3 | 114 | 21 | 13 | 24 | 2 | 560 | 107 | 102 | 260 | 204 | 22 | 24 | 6454 |
| In scope | Final energy consumption | 219 | 135 | 35 | 8 | 139 | 1236 | 126 | 40 | 90 | 883 | 312 | 1401 | 84 | 202 | 3 | 114 | 21 | 13 | 24 | 2 | 555 | 107 | 102 | 260 | 204 | 22 | 18 | 6353 |
| | Autoproducers E | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 6 | |
| | Autoproducers CHP | 1 | 0 | 0 | 0 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 | 95 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ratio (in scope / total energy use) | 27% | 27% | 16% | 17% | 29% | 35% | 35% | 38% | 35% | 42% | 56% | 32% | 46% | 47% | 1% | 8% | 10% | 27% | 25% | 25% | 70% | 7% | 31% | 39% | 26% | 24% | 15% | 31% | |

Source: JRC, 2020

Table 22. Results for the food, beverages and tobacco industry

| Food, beverages & tobacco | | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|---------------------------|---------------------------------------|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|------|-----|-----|-----|------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|-------|
| Net inputs | Energy use | 528 | 1618 | 251 | 40 | 574 | 5253 | 600 | 56 | 462 | 2589 | 426 | 5157 | 199 | 663 | 521 | 2847 | 193 | 22 | 83 | 6 | 2247 | 2259 | 493 | 539 | 347 | 79 | 150 | 28203 |
| | Autoproducers E | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 6 | 2 | 1 | 0 | 0 | 0 | 0 | 33 |
| | Autoproducers CHP | 0 | 40 | 0 | 0 | 1 | 93 | 1 | 0 | 3 | 503 | 0 | 88 | 1 | 1 | 43 | 69 | 0 | 0 | 0 | 0 | 145 | 6 | 65 | 1 | 0 | 0 | 3 | 1065 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 37 |
| | Final energy consumption | 522 | 1571 | 251 | 40 | 573 | 5160 | 599 | 56 | 459 | 2077 | 425 | 5046 | 198 | 661 | 478 | 2777 | 193 | 22 | 83 | 6 | 2084 | 2251 | 427 | 537 | 347 | 79 | 147 | 27069 |
| Non-energy use | 2 | 1 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 36 |
| ages & tobacco | Total energy use | 530 | 1619 | 251 | 40 | 574 | 5258 | 601 | 56 | 462 | 2614 | 426 | 5157 | 199 | 663 | 521 | 2847 | 193 | 22 | 83 | 6 | 2247 | 2260 | 493 | 540 | 347 | 79 | 150 | 28239 |
| Out of scope | Out of scope | 133 | 363 | 95 | 9 | 106 | 1140 | 155 | 17 | 182 | 732 | 93 | 1218 | 53 | 207 | 140 | 649 | 54 | 10 | 29 | 4 | 342 | 541 | 129 | 144 | 146 | 21 | 39 | 6751 |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mineralogical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 2 | 1 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 36 |
| | Wood and wood products | 8 | 59 | 25 | 2 | 3 | 40 | 0 | 0 | 105 | 222 | 8 | 200 | 6 | 61 | 24 | 37 | 12 | 0 | 11 | 0 | 30 | 33 | 26 | 23 | 2 | 2 | 938 | |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Uses other than motor or heating fuel | 122 | 303 | 71 | 7 | 103 | 1095 | 154 | 17 | 77 | 484 | 86 | 1017 | 47 | 147 | 116 | 611 | 42 | 10 | 19 | 4 | 342 | 511 | 96 | 117 | 123 | 19 | 37 | 5776 |
| In scope | Uses as motor or heating fuel | 398 | 1256 | 156 | 32 | 467 | 4118 | 446 | 39 | 280 | 1882 | 333 | 3940 | 146 | 455 | 381 | 2198 | 138 | 12 | 54 | 2 | 1905 | 1719 | 364 | 396 | 201 | 59 | 111 | 21488 |
| | Final energy consumption | 391 | 1210 | 155 | 32 | 466 | 4025 | 446 | 39 | 277 | 1389 | 332 | 3874 | 145 | 454 | 337 | 2129 | 138 | 12 | 54 | 2 | 1742 | 1710 | 298 | 394 | 201 | 59 | 108 | 20419 |
| | Autoproducers E | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 | 1 | 0 | 0 | 0 | 0 | 23 |
| | Autoproducers CHP | 0 | 40 | 0 | 0 | 1 | 93 | 1 | 0 | 3 | 493 | 0 | 57 | 1 | 1 | 43 | 69 | 0 | 0 | 0 | 0 | 145 | 6 | 65 | 1 | 0 | 0 | 3 | 1023 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 22 |
| ages & tobacco | Ratio (in scope / total energy use) | 75% | 78% | 62% | 79% | 81% | 78% | 74% | 70% | 61% | 72% | 78% | 76% | 73% | 69% | 73% | 77% | 72% | 54% | 65% | 34% | 85% | 76% | 74% | 73% | 58% | 74% | 74% | 76% |

Source: JRC, 2020

Table 23. Results for the iron and steel industry

| Iron & Steel | | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|----------------|---------------------------------------|------|------|-----|----|------|-------|----|-----|-----|------|------|------|----|------|------|------|----|-----|----|----|------|-------|-----|-----|------|-----|------|-------|
| Net inputs | Energy use | 2498 | 3116 | 126 | 0 | 3089 | 17829 | 90 | 194 | 130 | 3942 | 1726 | 6791 | 24 | 1179 | 163 | 5043 | 0 | 284 | 1 | 0 | 3436 | 10677 | 193 | 816 | 2000 | 145 | 2583 | 66076 |
| | Autoproducers E | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 1 | 0 | 0 | 0 | 40 |
| | Autoproducers CHP | 0 | 28 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 163 | 1 | 0 | 0 | 0 | 0 | 4 | 10 | 0 | 0 | 0 | 0 | 19 | 230 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 33 |
| | Coke ovens | 1224 | 1106 | 0 | 0 | 2378 | 9002 | 0 | 194 | 0 | 1407 | 840 | 3141 | 0 | 984 | 0 | 1709 | 0 | 0 | 0 | 0 | 1870 | 9088 | 0 | 0 | 1037 | 0 | 1502 | 35482 |
| | Blast furnaces | 618 | 1093 | 0 | 0 | 199 | 3564 | 0 | 0 | 0 | 567 | 262 | 1777 | 0 | 42 | 0 | 256 | 0 | 0 | 0 | 0 | 1055 | 215 | 0 | 0 | 252 | 0 | 479 | 10380 |
| | Final energy consumption | 654 | 889 | 126 | 0 | 507 | 5260 | 90 | 0 | 130 | 1966 | 623 | 1871 | 24 | 152 | 0 | 3077 | 0 | 284 | 1 | 0 | 477 | 1333 | 193 | 815 | 711 | 145 | 582 | 19911 |
| Non-energy use | 3 | 3 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 14 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 47 | |
| ages & tobacco | Total energy use | 2501 | 3118 | 127 | 0 | 3090 | 17829 | 91 | 194 | 130 | 3956 | 1726 | 6797 | 24 | 1179 | 163 | 5043 | 0 | 298 | 1 | 0 | 3436 | 10680 | 194 | 817 | 2000 | 146 | 2583 | 66122 |
| Out of scope | Out of scope | 2455 | 3033 | 121 | 0 | 3041 | 17471 | 87 | 194 | 122 | 3846 | 1693 | 6647 | 23 | 1166 | 0 | 4850 | 0 | 283 | 1 | 0 | 3361 | 10554 | 182 | 769 | 1960 | 141 | 2511 | 64510 |
| | Chemical reduction | 618 | 1093 | 0 | 0 | 199 | 3564 | 0 | 0 | 0 | 567 | 262 | 1777 | 0 | 42 | 0 | 256 | 0 | 0 | 0 | 0 | 1055 | 215 | 0 | 0 | 252 | 0 | 479 | 10380 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 607 | 828 | 120 | 0 | 461 | 4883 | 86 | 0 | 122 | 1852 | 588 | 1713 | 23 | 138 | 0 | 2874 | 0 | 268 | 1 | 0 | 433 | 1244 | 180 | 766 | 669 | 140 | 519 | 18513 |
| | Mineralogical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 1227 | 1109 | 1 | 0 | 2379 | 8996 | 1 | 194 | 0 | 1421 | 840 | 3147 | 0 | 984 | 0 | 1709 | 0 | 14 | 0 | 0 | 1870 | 9090 | 1 | 1 | 1037 | 1 | 1502 | 35523 |
| | Wood and wood products | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 14 |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Uses other than motor or heating fuel | 3 | 4 | 0 | 0 | 3 | 22 | 0 | 0 | 0 | 6 | 2 | 9 | 0 | 1 | 0 | 10 | 0 | 1 | 0 | 0 | 3 | 5 | 1 | 3 | 3 | 0 | 4 | 80 |
| In scope | Uses as motor or heating fuel | 47 | 86 | 6 | 0 | 49 | 357 | 4 | 0 | 8 | 110 | 34 | 150 | 1 | 13 | 163 | 193 | 0 | 15 | 0 | 0 | 76 | 126 | 12 | 48 | 40 | 6 | 72 | 1613 |
| | Final energy consumption | 45 | 58 | 6 | 0 | 43 | 354 | 4 | 0 | 8 | 108 | 34 | 149 | 1 | 13 | 0 | 193 | 0 | 15 | 0 | 0 | 42 | 83 | 12 | 46 | 40 | 5 | 53 | 1310 |
| | Autoproducers E | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 1 | 0 | 0 | 0 | 40 |
| | Autoproducers CHP | 0 | 28 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 163 | 1 | 0 | 0 | 0 | 0 | 4 | 10 | 0 | 0 | 0 | 0 | 19 | 230 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 33 |
| ages & tobacco | Ratio (in scope / total energy use) | 2% | 3% | 5% | 0% | 2% | 2% | 4% | 0% | 6% | 3% | 2% | 2% | 2% | 1% | 100% | 4% | 0% | 5% | 4% | 0% | 2% | 1% | 6% | 6% | 2% | 4% | 3% | 2% |

Source: JRC, 2020

Table 24. Results for the machinery industry

| | Machinery | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|--|---------------------------------------|------------|------------|------------|------------|-------------|-------------|------------|------------|------------|------------|-------------|-------------|------------|------------|-------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|--------------|
| Net inputs | Energy use | 586 | 336 | 136 | 3 | 694 | 5272 | 213 | 38 | 66 | 918 | 322 | 1877 | 70 | 465 | 330 | 3512 | 32 | 11 | 18 | 10 | 528 | 801 | 179 | 427 | 339 | 210 | 284 | 17677 |
| | Autoproducers E | 0 | 42 | 0 | 0 | 1 | 7 | 0 | 0 | 0 | 1 | 0 | 7 | 0 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 1 | 0 | 0 | 0 | 91 |
| | Autoproducers CHP | 1 | 8 | 0 | 0 | 1 | 29 | 1 | 0 | 1 | 33 | 0 | 21 | 1 | 2 | 3 | 49 | 0 | 0 | 0 | 0 | 55 | 0 | 40 | 0 | 0 | 0 | 5 | 251 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| | Final energy consumption | 585 | 286 | 136 | 3 | 685 | 5236 | 212 | 38 | 64 | 883 | 322 | 1841 | 69 | 445 | 326 | 3462 | 32 | 11 | 18 | 10 | 460 | 801 | 139 | 426 | 339 | 210 | 279 | 17320 |
| Non-energy use | 9 | 1 | 5 | 0 | 2 | 1 | 4 | 0 | 0 | 24 | 0 | 0 | 6 | 1 | 13 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 2 | 0 | 0 | 280 | |
| Total energy use | 595 | 337 | 141 | 3 | 696 | 5272 | 217 | 38 | 66 | 942 | 322 | 1877 | 76 | 466 | 343 | 3714 | 32 | 11 | 18 | 10 | 528 | 809 | 181 | 430 | 339 | 210 | 284 | 17957 | |
| Out of scope | Out of scope | 328 | 81 | 86 | 2 | 352 | 2504 | 113 | 16 | 15 | 427 | 128 | 1096 | 34 | 258 | 159 | 1953 | 21 | 5 | 9 | 7 | 223 | 432 | 72 | 246 | 185 | 121 | 177 | 9048 |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 136 | 33 | 33 | 1 | 153 | 1489 | 46 | 9 | 12 | 242 | 71 | 476 | 12 | 51 | 81 | 986 | 6 | 0 | 2 | 3 | 126 | 183 | 33 | 106 | 85 | 50 | 83 | 4508 |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 9 | 1 | 5 | 0 | 2 | 1 | 4 | 0 | 0 | 24 | 0 | 0 | 6 | 1 | 13 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 2 | 0 | 0 | 280 |
| | Wood and wood products | 8 | 7 | 0 | 0 | 3 | 53 | 15 | 1 | 0 | 1 | 1 | 27 | 0 | 3 | 0 | 3 | 1 | 0 | 3 | 0 | 0 | 1 | 0 | 6 | 0 | 3 | 5 | 143 |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Uses other than motor or heating fuel | 175 | 40 | 47 | 1 | 194 | 963 | 48 | 6 | 3 | 160 | 55 | 593 | 15 | 202 | 65 | 762 | 14 | 5 | 3 | 4 | 97 | 240 | 37 | 132 | 99 | 68 | 89 | 4117 |
| Uses as motor or heating fuel | 267 | 256 | 55 | 1 | 344 | 2768 | 104 | 23 | 51 | 515 | 195 | 781 | 42 | 208 | 184 | 1761 | 11 | 6 | 9 | 4 | 305 | 377 | 109 | 183 | 154 | 89 | 108 | 8909 | |
| Final energy consumption | 267 | 212 | 55 | 1 | 335 | 2742 | 103 | 23 | 50 | 481 | 195 | 768 | 42 | 188 | 180 | 1712 | 11 | 6 | 9 | 4 | 237 | 377 | 69 | 183 | 154 | 89 | 102 | 8594 | |
| Autoproducers E | 0 | 42 | 0 | 0 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 89 | |
| Autoproducers CHP | 0 | 3 | 0 | 0 | 1 | 19 | 1 | 0 | 1 | 33 | 0 | 5 | 1 | 2 | 3 | 49 | 0 | 0 | 0 | 0 | 55 | 0 | 40 | 0 | 0 | 0 | 5 | 219 | |
| Autoproducers H | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | |
| Ratio (in scope / total energy use) | 45% | 76% | 39% | 39% | 49% | 52% | 48% | 59% | 77% | 55% | 60% | 42% | 56% | 45% | 54% | 47% | 35% | 52% | 49% | 35% | 58% | 47% | 60% | 43% | 45% | 42% | 38% | 50% | |

Source: JRC, 2020

Table 25 . Results for the mining and quarrying industry

| | Mining & quarrying | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|--|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|
| Net inputs | Energy use | 359 | 52 | 126 | 6 | 337 | 535 | 85 | 10 | 115 | 453 | 164 | 403 | 15 | 35 | 113 | 120 | 6 | 1 | 8 | 1 | 127 | 460 | 71 | 39 | 544 | 23 | 68 | 4277 |
| | Autoproducers E | 0 | 0 | 0 | 0 | 0 | 64 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 |
| | Autoproducers CHP | 0 | 0 | 0 | 0 | 256 | 117 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 8 | 393 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 3 | |
| | Final energy consumption | 359 | 52 | 126 | 6 | 81 | 354 | 85 | 10 | 115 | 452 | 164 | 379 | 15 | 35 | 113 | 120 | 6 | 1 | 8 | 1 | 127 | 448 | 71 | 39 | 544 | 23 | 59 | 3794 |
| Non-energy use | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 4 | 19 | 0 | 6 | 1 | 1 | 0 | 0 | 35 | |
| Total energy use | 359 | 52 | 127 | 6 | 337 | 535 | 87 | 10 | 117 | 457 | 183 | 403 | 15 | 35 | 113 | 120 | 6 | 1 | 8 | 1 | 127 | 466 | 72 | 39 | 544 | 23 | 68 | 4311 | |
| Out of scope | Out of scope | 106 | 18 | 60 | 2 | 22 | 94 | 50 | 2 | 49 | 124 | 59 | 102 | 3 | 12 | 63 | 82 | 3 | 1 | 2 | 1 | 25 | 208 | 24 | 11 | 216 | 9 | 27 | 1370 |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 4 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 1 | 0 | 0 | 0 | 35 |
| | Wood and wood products | 0 | 0 | 0 | 0 | 0 | 7 | 33 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 47 |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Uses other than motor or heating fuel | 106 | 18 | 59 | 2 | 21 | 87 | 15 | 2 | 47 | 120 | 39 | 99 | 3 | 12 | 63 | 82 | 3 | 1 | 1 | 1 | 25 | 202 | 23 | 8 | 216 | 9 | 27 | 1288 |
| Uses as motor or heating fuel | 253 | 35 | 67 | 5 | 315 | 441 | 37 | 8 | 68 | 333 | 124 | 301 | 13 | 23 | 50 | 38 | 3 | 1 | 6 | 1 | 102 | 258 | 48 | 29 | 328 | 14 | 41 | 2941 | |
| Final energy consumption | 253 | 35 | 67 | 5 | 59 | 260 | 37 | 8 | 68 | 333 | 124 | 277 | 13 | 23 | 50 | 38 | 3 | 1 | 6 | 1 | 102 | 246 | 48 | 29 | 328 | 14 | 32 | 2458 | |
| Autoproducers E | 0 | 0 | 0 | 0 | 0 | 64 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | |
| Autoproducers CHP | 0 | 0 | 0 | 0 | 256 | 117 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 8 | 393 | |
| Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | | |
| Ratio (in scope / total energy use) | 70% | 66% | 53% | 75% | 94% | 82% | 43% | 77% | 58% | 73% | 68% | 75% | 81% | 66% | 45% | 32% | 46% | 42% | 75% | 60% | 81% | 55% | 67% | 73% | 60% | 59% | 60% | 68% | |

Source: JRC, 2020

Table 26. Results for the non-ferrous metals industry

| | | Non-ferrous metals | | | | | | | | | | | | | | | | | | | | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|--------------------------|---------------------------------------|-------------------------------|-----|-----|------|-----|------|-----|----|-----|------|-----|------|-----|-----|-----|-----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-------|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Net inputs | Energy use | 234 | 326 | 179 | 0 | 93 | 2341 | 0 | 1 | 714 | 1297 | 262 | 1161 | 20 | 127 | 502 | 709 | 0 | 0 | 0 | 0 | 0 | 0 | 293 | 520 | 31 | 470 | 331 | 165 | 253 | 10029 | | | | | | | | | | | | | | | | | | |
| | Autoproducers E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | | | | | | | | | | | | | | | | | | |
| | Autoproducers CHP | 0 | 4 | 2 | 0 | 0 | 27 | 0 | 0 | 8 | 9 | 0 | 15 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68 | | | | | | | | | | | | | | | | | | | |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | |
| | Final energy consumption | 234 | 322 | 177 | 0 | 93 | 2314 | 0 | 1 | 706 | 1288 | 262 | 1101 | 20 | 127 | 502 | 706 | 0 | 0 | 0 | 0 | 0 | 0 | 293 | 520 | 31 | 470 | 331 | 165 | 253 | 9915 | | | | | | | | | | | | | | | | | | |
| Non-energy use | 1 | 0 | 0 | 0 | 1 | 140 | 1 | 0 | 0 | 123 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 69 | 0 | 28 | 56 | 444 | | | | | | | | | | | | | | | | | | | |
| ic metals | Total energy use | 235 | 326 | 180 | 0 | 94 | 2481 | 1 | 1 | 714 | 1420 | 262 | 1184 | 20 | 127 | 502 | 709 | 0 | 0 | 0 | 0 | 0 | 294 | 520 | 31 | 538 | 331 | 194 | 309 | 10473 | | | | | | | | | | | | | | | | | | | |
| Out of scope | Out of scope | 231 | 312 | 175 | 0 | 93 | 2208 | 1 | 1 | 577 | 1181 | 255 | 960 | 19 | 105 | 349 | 690 | 0 | 0 | 0 | 0 | 0 | 0 | 288 | 510 | 31 | 470 | 324 | 190 | 227 | 9194 | | | | | | | | | | | | | | | | | | |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 357 | 0 | 0 | 105 | 145 | 0 | 325 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 89 | 109 | 54 | 100 | 1333 | | | | | | | | | | | | | | | | | | | |
| | Metallurgical processes | 228 | 311 | 174 | 0 | 91 | 1708 | 0 | 1 | 471 | 911 | 254 | 610 | 19 | 105 | 348 | 689 | 0 | 0 | 0 | 0 | 0 | 0 | 237 | 508 | 31 | 312 | 215 | 107 | 46 | 7375 | | | | | | | | | | | | | | | | | | |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | |
| | Dual use | 1 | 0 | 0 | 0 | 1 | 140 | 1 | 0 | 123 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 69 | 0 | 28 | 56 | 444 | | | | | | | | | | | | | | | | | | | |
| | Wood and wood products | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | | | | | | | | | | | | | | | | | | | |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | |
| | Uses other than motor or heating fuel | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 25 | 40 | | | | | | | | | | | | | | | | | | | |
| | In scope | Uses as motor or heating fuel | 4 | 14 | 5 | 0 | 1 | 273 | 0 | 0 | 137 | 239 | 7 | 225 | 0 | 22 | 153 | 19 | 0 | 0 | 0 | 0 | 0 | 7 | 11 | 1 | 68 | 7 | 4 | 82 | 1279 | | | | | | | | | | | | | | | | | | |
| Final energy consumption | | 4 | 11 | 3 | 0 | 1 | 246 | 0 | 0 | 129 | 230 | 7 | 164 | 0 | 22 | 153 | 16 | 0 | 0 | 0 | 0 | 0 | 7 | 11 | 1 | 68 | 7 | 4 | 82 | 1164 | | | | | | | | | | | | | | | | | | | |
| Autoproducers E | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | | | | | | | | | | | | | | | | | | | |
| Autoproducers CHP | | 0 | 4 | 2 | 0 | 0 | 27 | 0 | 0 | 8 | 9 | 0 | 15 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68 | | | | | | | | | | | | | | | | | | | |
| Autoproducers H | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | |
| ic metals | Ratio (in scope / total energy use) | 2% | 4% | 3% | 100% | 1% | 11% | 0% | 2% | 19% | 17% | 3% | 19% | 1% | 17% | 31% | 3% | 0% | 0% | 0% | 0% | 2% | 2% | 2% | 13% | 2% | 27% | 12% | | | | | | | | | | | | | | | | | | | | | |

Source: JRC, 2020

Table 27. Results for the non-metallic minerals industry

| | | Non-metallic minerals | | | | | | | | | | | | | | | | | | | | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|--------------------------|---------------------------------------|-------------------------------|------|-----|-----|------|------|-----|-----|-----|------|-----|------|-----|-----|-----|------|-----|-----|-----|----|-----|------|------|------|-----|-----|-----|-------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Net inputs | Energy use | 929 | 1390 | 572 | 153 | 1171 | 6890 | 491 | 110 | 650 | 4166 | 314 | 3857 | 375 | 575 | 453 | 4319 | 155 | 144 | 170 | 0 | 625 | 3107 | 1106 | 1129 | 384 | 205 | 413 | 33853 | | | | | | | | | | | | | | | | | | | | |
| | Autoproducers E | 0 | 13 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | | | | | | | | | | | | | | | | | | | | |
| | Autoproducers CHP | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 187 | 0 | 1 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 50 | 0 | 0 | 0 | 276 | | | | | | | | | | | | | | | | | | | | |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | |
| | Final energy consumption | 929 | 1376 | 572 | 153 | 1171 | 6886 | 491 | 109 | 650 | 3979 | 314 | 3855 | 375 | 575 | 453 | 4291 | 155 | 144 | 170 | 0 | 619 | 3107 | 1056 | 1129 | 384 | 205 | 413 | 33563 | | | | | | | | | | | | | | | | | | | | |
| Non-energy use | 2 | 1 | 23 | 0 | 1 | 6 | 2 | 0 | 1 | 5 | 0 | 33 | 11 | 52 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 24 | 1 | 141 | 0 | 6 | 18 | 334 | | | | | | | | | | | | | | | | | | | | |
| ic minerals | Total energy use | 931 | 1390 | 595 | 153 | 1172 | 6896 | 493 | 110 | 651 | 4171 | 314 | 3890 | 386 | 628 | 453 | 4319 | 161 | 144 | 170 | 0 | 625 | 3132 | 1107 | 1270 | 384 | 211 | 431 | 34187 | | | | | | | | | | | | | | | | | | | | |
| Out of scope | Out of scope | 931 | 1377 | 595 | 153 | 1172 | 6892 | 493 | 109 | 651 | 3984 | 314 | 3888 | 386 | 628 | 453 | 4291 | 161 | 144 | 170 | 0 | 619 | 3131 | 1057 | 1270 | 384 | 211 | 431 | 33897 | | | | | | | | | | | | | | | | | | | | |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | |
| | Minerological processes | 874 | 1239 | 569 | 151 | 1170 | 6744 | 489 | 109 | 646 | 3750 | 309 | 3719 | 372 | 556 | 451 | 4159 | 143 | 139 | 165 | 0 | 619 | 3102 | 979 | 1127 | 384 | 205 | 413 | 32579 | | | | | | | | | | | | | | | | | | | | |
| | Dual use | 2 | 1 | 23 | 0 | 1 | 6 | 2 | 0 | 1 | 5 | 0 | 33 | 11 | 52 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 24 | 1 | 141 | 0 | 6 | 18 | 334 | | | | | | | | | | | | | | | | | | | | |
| | Wood and wood products | 55 | 138 | 3 | 2 | 2 | 142 | 2 | 0 | 4 | 229 | 5 | 136 | 4 | 20 | 2 | 133 | 11 | 5 | 5 | 0 | 0 | 5 | 77 | 2 | 0 | 0 | 983 | | | | | | | | | | | | | | | | | | | | | |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | |
| | Uses other than motor or heating fuel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | |
| | In scope | Uses as motor or heating fuel | 0 | 13 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 187 | 0 | 1 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 6 | 0 | 50 | 0 | 0 | 0 | 0 | 291 | | | | | | | | | | | | | | | | | | | |
| Final energy consumption | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | |
| Autoproducers E | | 0 | 13 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | | | | | | | | | | | | | | | | | | | | |
| Autoproducers CHP | | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 187 | 0 | 1 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 50 | 0 | 0 | 0 | 276 | | | | | | | | | | | | | | | | | | | | |
| Autoproducers H | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | |
| ic minerals | Ratio (in scope / total energy use) | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 4% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 5% | 0% | 0% | 0% | 0% | 1% | | | | | | | | | | | | | | | | | | | | |

Source: JRC, 2020

Table 28. Results for the paper, pulp, and printing industry

| | Paper, pulp & printing | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU | |
|--------------|---------------------------------------|------|-----|-----|-----|-----|------|-----|-----|-----|------|------|------|-----|-----|-----|------|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-------|----|
| Net inputs | Energy use | 2072 | 727 | 218 | 2 | 682 | 6068 | 68 | 77 | 54 | 2081 | 6850 | 2291 | 68 | 228 | 28 | 2307 | 52 | 6 | 6 | 2 | 616 | 1853 | 1845 | 197 | 6003 | 186 | 619 | 35210 | |
| | Autoproducers E | 82 | 5 | 0 | 0 | 0 | 72 | 0 | 0 | 0 | 24 | 120 | 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 16 | 0 | 0 | 0 | 0 | 376 | |
| | Autoproducers CHP | 206 | 54 | 18 | 0 | 96 | 615 | 1 | 0 | 0 | 932 | 412 | 139 | 0 | 0 | 0 | 360 | 0 | 1 | 0 | 0 | 44 | 111 | 568 | 49 | 486 | 11 | 153 | 4258 | |
| | Autoproducers H | 5 | 0 | 5 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 22 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 8 | 0 | 0 | 10 | 93 | |
| | Final energy consumption | 1780 | 668 | 195 | 2 | 571 | 5382 | 68 | 77 | 54 | 1125 | 6296 | 2075 | 68 | 228 | 28 | 1947 | 52 | 5 | 5 | 2 | 568 | 1739 | 1261 | 140 | 5517 | 175 | 456 | 30483 | |
| | Non-energy use | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 5 | 0 | 0 | 0 | 0 | 36 | |
| & printing | Total energy use | 2074 | 728 | 219 | 2 | 682 | 6068 | 69 | 77 | 54 | 2092 | 6850 | 2291 | 69 | 228 | 28 | 2307 | 52 | 6 | 6 | 2 | 632 | 1854 | 1850 | 197 | 6003 | 186 | 619 | 35247 | |
| | Out of scope | 1201 | 454 | 154 | 1 | 469 | 2356 | 34 | 45 | 27 | 889 | 5262 | 1065 | 25 | 92 | 15 | 591 | 35 | 1 | 3 | 1 | 218 | 1253 | 1295 | 111 | 4896 | 75 | 504 | 21075 | |
| Out of scope | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minerological processes | 41 | 20 | 8 | 0 | 50 | 36 | 0 | 14 | 0 | 23 | 344 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 148 | 55 | 0 | 333 | 0 | 18 | 1140 | |
| | Dual use | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 5 | 0 | 0 | 0 | 0 | 36 |
| | Wood and wood products | 916 | 340 | 136 | 0 | 364 | 811 | 10 | 5 | 3 | 709 | 4285 | 622 | 2 | 22 | 0 | 0 | 19 | 0 | 0 | 0 | 1 | 941 | 1180 | 55 | 4169 | 19 | 473 | 15083 | |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 163 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 164 | |
| | Uses other than motor or heating fuel | 242 | 93 | 10 | 1 | 55 | 1509 | 23 | 26 | 24 | 146 | 470 | 393 | 22 | 70 | 15 | 591 | 17 | 1 | 2 | 1 | 202 | 163 | 55 | 55 | 394 | 56 | 13 | 4652 | |
| In scope | Uses as motor or heating fuel | 873 | 274 | 64 | 1 | 213 | 3712 | 35 | 33 | 27 | 1203 | 1589 | 1226 | 44 | 136 | 13 | 1716 | 17 | 5 | 3 | 1 | 413 | 600 | 555 | 86 | 1107 | 110 | 115 | 14172 | |
| | Final energy consumption | 771 | 258 | 60 | 1 | 202 | 3309 | 35 | 32 | 27 | 394 | 1537 | 1065 | 44 | 136 | 13 | 1356 | 17 | 4 | 3 | 1 | 366 | 564 | 288 | 83 | 1107 | 107 | 96 | 11876 | |
| | Autoproducers E | 35 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 10 | 10 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 118 | |
| | Autoproducers CHP | 63 | 10 | 4 | 0 | 4 | 400 | 0 | 0 | 0 | 799 | 32 | 104 | 0 | 0 | 0 | 360 | 0 | 1 | 0 | 0 | 43 | 34 | 267 | 3 | 0 | 3 | 19 | 2147 | |
| | Autoproducers H | 4 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 9 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 30 | |
| & printing | Ratio (in scope / total energy use) | 42% | 38% | 29% | 41% | 31% | 61% | 51% | 42% | 50% | 57% | 23% | 54% | 64% | 60% | 45% | 74% | 33% | 80% | 54% | 44% | 65% | 32% | 30% | 44% | 18% | 59% | 19% | 40% | |

Source: JRC, 2020

Table 29. Results for the textile and leather industry

| | Textile & leather | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU | |
|--------------|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----|
| Net inputs | Energy use | 63 | 189 | 66 | 0 | 126 | 487 | 17 | 9 | 101 | 365 | 23 | 320 | 24 | 43 | 15 | 1147 | 34 | 36 | 8 | 3 | 136 | 99 | 452 | 148 | 21 | 18 | 46 | 3999 | |
| | Autoproducers E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | Autoproducers CHP | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 2 | 69 | 0 | 5 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 24 | 37 | 144 | 0 | 0 | 0 | 22 | 354 | |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | Final energy consumption | 63 | 189 | 66 | 0 | 126 | 457 | 17 | 9 | 99 | 296 | 23 | 315 | 24 | 43 | 15 | 1127 | 34 | 36 | 8 | 3 | 112 | 63 | 308 | 148 | 21 | 18 | 24 | 3643 | |
| | Non-energy use | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 23 | |
| ather | Total energy use | 64 | 190 | 66 | 0 | 126 | 487 | 17 | 9 | 101 | 384 | 23 | 320 | 24 | 43 | 15 | 1147 | 34 | 36 | 8 | 3 | 136 | 99 | 453 | 150 | 21 | 18 | 46 | 4022 | |
| | Out of scope | 18 | 63 | 22 | 0 | 36 | 97 | 7 | 4 | 34 | 104 | 5 | 66 | 8 | 11 | 5 | 256 | 9 | 2 | 1 | 2 | 22 | 16 | 76 | 33 | 10 | 5 | 6 | 918 | |
| Out of scope | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 23 |
| | Wood and wood products | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 9 | 1 | 0 | 0 | 0 | 20 | |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Uses other than motor or heating fuel | 17 | 62 | 20 | 0 | 36 | 96 | 6 | 4 | 34 | 81 | 5 | 66 | 7 | 11 | 5 | 256 | 9 | 2 | 1 | 2 | 22 | 16 | 66 | 29 | 10 | 4 | 5 | 875 | |
| In scope | Uses as motor or heating fuel | 46 | 127 | 44 | 0 | 90 | 389 | 10 | 5 | 67 | 281 | 18 | 254 | 17 | 31 | 10 | 891 | 25 | 33 | 7 | 1 | 114 | 84 | 377 | 117 | 11 | 14 | 41 | 3104 | |
| | Final energy consumption | 45 | 127 | 44 | 0 | 89 | 360 | 10 | 5 | 65 | 212 | 18 | 249 | 17 | 31 | 10 | 871 | 25 | 33 | 6 | 1 | 90 | 47 | 233 | 117 | 11 | 14 | 18 | 2748 | |
| | Autoproducers E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | Autoproducers CHP | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 2 | 69 | 0 | 5 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 24 | 37 | 144 | 0 | 0 | 0 | 22 | 354 | |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| ather | Ratio (in scope / total energy use) | 72% | 67% | 67% | 29% | 71% | 80% | 60% | 57% | 67% | 73% | 79% | 79% | 68% | 73% | 66% | 78% | 72% | 93% | 82% | 27% | 84% | 84% | 83% | 78% | 52% | 75% | 88% | 77% | |

Source: JRC, 2020

Table 30. Results for the transport equipment industry

| Transport equipment | | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|--------------------------|---------------------------------------|-------------------------------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Net inputs | Energy use | 148 | 125 | 19 | 0 | 484 | 2996 | 14 | 12 | 22 | 595 | 60 | 1113 | 13 | 241 | 27 | 426 | 5 | 2 | 8 | 2 | 122 | 469 | 79 | 298 | 214 | 34 | 217 | 7744 |
| | Autoproducers E | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| | Autoproducers CHP | 1 | 0 | 0 | 0 | 0 | 101 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 149 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | Final energy consumption | 148 | 122 | 19 | 0 | 484 | 2895 | 14 | 12 | 22 | 595 | 60 | 1077 | 13 | 241 | 27 | 403 | 5 | 2 | 8 | 2 | 122 | 467 | 79 | 298 | 214 | 34 | 217 | 7578 |
| Non-energy use | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 0 | 0 | 23 | |
| Equipment | Total energy use | 149 | 125 | 19 | 0 | 484 | 2996 | 15 | 12 | 22 | 610 | 60 | 1113 | 13 | 241 | 27 | 426 | 5 | 2 | 8 | 2 | 122 | 471 | 81 | 300 | 214 | 34 | 217 | 7767 |
| Out of scope | Out of scope | 67 | 69 | 7 | 0 | 208 | 1044 | 6 | 6 | 9 | 292 | 12 | 481 | 5 | 139 | 15 | 144 | 2 | 1 | 3 | 1 | 52 | 210 | 38 | 138 | 113 | 18 | 117 | 3195 |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 21 | 15 | 3 | 0 | 38 | 336 | 2 | 1 | 2 | 96 | 7 | 162 | 2 | 33 | 1 | 37 | 1 | 0 | 1 | 0 | 19 | 63 | 12 | 28 | 24 | 5 | 34 | 945 |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 0 | 0 | 23 |
| | Wood and wood products | 1 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Uses other than motor or heating fuel | 44 | 53 | 4 | 0 | 169 | 703 | 3 | 5 | 7 | 181 | 5 | 314 | 3 | 105 | 13 | 107 | 2 | 0 | 2 | 1 | 33 | 145 | 23 | 108 | 89 | 13 | 83 | 2215 |
| | In scope | Uses as motor or heating fuel | 82 | 56 | 12 | 0 | 276 | 1952 | 9 | 6 | 13 | 318 | 48 | 633 | 8 | 102 | 12 | 282 | 3 | 1 | 5 | 1 | 70 | 261 | 43 | 162 | 101 | 16 | 100 |
| Final energy consumption | | 82 | 53 | 12 | 0 | 276 | 1851 | 9 | 6 | 13 | 318 | 48 | 596 | 8 | 102 | 12 | 259 | 3 | 1 | 5 | 1 | 70 | 259 | 43 | 162 | 101 | 16 | 100 | 4406 |
| Autoproducers E | | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| Autoproducers CHP | | 1 | 0 | 0 | 0 | 0 | 101 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 149 |
| Autoproducers H | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Equipment | Ratio (in scope / total energy use) | 55% | 45% | 63% | 48% | 57% | 65% | 62% | 48% | 59% | 52% | 80% | 57% | 62% | 42% | 46% | 66% | 53% | 64% | 64% | 42% | 57% | 55% | 54% | 54% | 47% | 48% | 46% | 59% |

Source: JRC, 2020

Table 31. Results for the wood and wood products industry

| Wood & wood products | | AT | BE | BG | CY | CZ | DE | DK | EE | EL | ES | FI | FR | HR | HU | IE | IT | LT | LU | LV | MT | NL | PL | PT | RO | SE | SI | SK | EU |
|--------------------------|---------------------------------------|-------------------------------|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|
| Net inputs | Energy use | 640 | 233 | 71 | 1 | 217 | 1802 | 114 | 67 | 38 | 497 | 573 | 671 | 76 | 124 | 174 | 488 | 90 | 13 | 486 | 0 | 42 | 1034 | 36 | 344 | 589 | 52 | 53 | 8524 |
| | Autoproducers E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Autoproducers CHP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Autoproducers H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Final energy consumption | 640 | 233 | 71 | 1 | 217 | 1802 | 114 | 67 | 38 | 497 | 573 | 671 | 76 | 122 | 174 | 488 | 90 | 13 | 486 | 0 | 42 | 1034 | 36 | 344 | 589 | 52 | 53 | 8522 |
| Non-energy use | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 6 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 20 | |
| Wood products | Total energy use | 641 | 233 | 71 | 1 | 217 | 1802 | 114 | 67 | 38 | 505 | 573 | 671 | 76 | 124 | 174 | 488 | 91 | 13 | 492 | 0 | 42 | 1035 | 38 | 344 | 589 | 52 | 53 | 8544 |
| Out of scope | Out of scope | 349 | 182 | 46 | 0 | 142 | 1220 | 91 | 10 | 17 | 337 | 230 | 410 | 23 | 76 | 133 | 236 | 47 | 11 | 320 | 0 | 32 | 655 | 33 | 180 | 413 | 33 | 30 | 5258 |
| | Chemical reduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Electrolysis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Metallurgical processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minerological processes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dual use | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 6 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 20 |
| | Wood and wood products | 324 | 181 | 43 | 0 | 140 | 1199 | 89 | 6 | 15 | 321 | 214 | 378 | 13 | 70 | 129 | 167 | 40 | 11 | 311 | 0 | 31 | 639 | 31 | 167 | 397 | 52 | 29 | 4976 |
| | Peat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| | Uses other than motor or heating fuel | 25 | 1 | 2 | 0 | 2 | 21 | 1 | 4 | 2 | 7 | 11 | 33 | 10 | 6 | 3 | 69 | 6 | 0 | 3 | 0 | 1 | 16 | 1 | 13 | 16 | 2 | 1 | 256 |
| | In scope | Uses as motor or heating fuel | 292 | 51 | 25 | 0 | 75 | 581 | 23 | 56 | 21 | 169 | 343 | 260 | 53 | 48 | 42 | 252 | 44 | 3 | 172 | 0 | 10 | 380 | 5 | 164 | 176 | 18 | 23 |
| Final energy consumption | | 292 | 51 | 25 | 0 | 75 | 581 | 23 | 56 | 21 | 169 | 343 | 260 | 53 | 48 | 42 | 252 | 44 | 3 | 172 | 0 | 10 | 380 | 5 | 164 | 176 | 18 | 23 | 3286 |
| Autoproducers E | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Autoproducers CHP | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Autoproducers H | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood products | Ratio (in scope / total energy use) | 45% | 22% | 35% | 71% | 35% | 32% | 20% | 84% | 55% | 33% | 60% | 39% | 69% | 39% | 24% | 52% | 49% | 20% | 35% | 0% | 23% | 37% | 12% | 48% | 30% | 36% | 43% | 38% |

Source: JRC, 2020

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