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IMPACT ASSESSMENT

Accompanying document to the

Proposal for a

COUNCIL DIRECTIVE

amending Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity

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1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

Lead Directorate-General: DG TAXUD

Other Commission Directorates General involved in the inter-service group: SG, LS, CLIMA, ENV, ENER, MOVE, ENTR, ECFIN, COMP, EMPL and AGRI.

Agenda planning: 2008/TAXUD/003

1.1. Background

In its Green paper on market based instruments for environment and related policy purposes of March 2007 (further referred to as "the green paper")[1], the Commission, inter alia, outlined potential ways forward for a revision of the Energy Taxation Directive[2] (hereafter also called "ETD") to better reflect the basic reasoning behind energy taxation: revenue generation and energy savings on the one hand, environmental considerations on the other.

1.2. Organisation and timing

The work on the impact assessment was carried out in the period 2008 – 2010. The Commission's Impact Assessment Board (IAB) issued an opinion on a first version of the Impact Assessment report on 16 September 2008. Following the Commission orientation debate of 23 June 2010 on an outline of a possible revision of the ETD, the report has been updated in various respects, notably as regards the potential effects of the economic and financial crisis on the possible revision of the ETD. Other Commission services were involved in this work and a meeting of the IA Steering Group with participation of AGRI, CLIMA, COMP, ECFIN, ENER, ENTR, ENV, MOVE, SG and SJ was held on 13 October 2010. The IAB issued its opinion on this updated version on 15 November 2010.

1.3. Response to the opinion of the Impact Assessment Board

The report has been drastically reviewed following the opinion of the Impact Assessment Board of 15 November 2010. It now presents more clearly the problem definition, the objectives, the policy options and the analysis of their impacts, clarifying in particular the link between them.

The main recommendations of the opinion have been taken into account as follows:

(1) The description of the policy options has been made clearer and a summary table has been added showing the rates in the units that are used in the current ETD, to allow comparing the rates used in the various options with the current rates and the rates proposed on the commercial diesel proposal (Chapter 4.2.). The preferred policy set resulting from the assessment of the policy options has been added and is assessed in Chapter 7.2.

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1 COM(2007) 140, 28.3.2007.

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

(2) The most significant distributional impacts at Member State level have been presented in the report rather than in an annex (Chapter 5.5.), providing clear links to the underlying data in the annexes. The same was done for the sectoral impacts (Chapter 5.6.).

(3) Chapter 6.3., second paragraph explains why it is not considered necessary to introduce specific measures in the ETD for small installations in ETS sectors not prone to carbon leakage similar to measures for small installations in ETS sectors at risk of carbon leakage.

(4) The report explains more in detail why the proposed alignment of the petrol and diesel minimum excise duty levels is compatible with the existing strategy to reduce carbon emission from cars (see Chapter 5.7.). The extent to which diesel is currently under-taxed appears clearly from Table 1 in point 2.2.2. showing the level of the current minimum rates expressed in €/GJ and in €/tCO2. Demand price elasticities have been taken into account in the modelling of the impact of the options on the evolution of the market share of diesel and petrol.

(5) The link between the presentation of the results in the report and the underlying data in the annexes has been improved and all annexes have been grouped in a single set of annexes. Clear explanations of the content of each annex have been added in the text of the report. The main findings of the modelling have been included in the text (see point (2) above). The report has been shortened as much as possible, avoiding duplication. The reasons for not including maritime and aircraft fuels in this initiative have been clarified in point 1.4.1. of the report.

(6) Chapter 4.2 explains what would have been the impact on minimum rates as well as Member States' national tax levels if a higher level of CO2 tax of 30 €/tCO2 had been taken under option 3A, taking as an example gas oil and natural gas used for heating. An explanation is also added for the reasoning about the alignment to the current minima for gas oil used for heating instead of an alignment to the current tax rates applicable to natural gas and coal.

(7) In chapter 5.7 clarifications and references were added on the difference in the average engine power and mass of a petrol and diesel car and on different vehicle use patterns. In Chapter 7.1 it was clarified further that the alignment in the rates of transport fuels might be achieved through an increase in diesel rates as well as via a reduction in petrol rates.

(8) In Annex 2 additional explanations were provided on the transport-specific modelling, in particular as to how elasticities and substitution effects are taken into account. A reference to the full model description was also added.

1.4. External consultation

1.4.1. Consultation on the green paper

The results of the public consultation were published on the Commission website[3]. Furthermore, the Environment Council adopted conclusions on the green paper in June 2007[4].

[3] SEC(2009) 53.

[4] Council Conclusions on "New IMPETUS for EU Environmental Policy", ENVIRONMENT Council meeting, Luxembourg, 28 June 2007.

The European Parliament[5] and the Economic and Social Committee[6] have adopted an opinion on the green paper. Two discussions with tax experts of Member States have also taken place as well as one discussion with environment and economic affairs experts.

There was no uniform support for the revision of the ETD. The business sector in general welcomes the revision as long as it would alleviate the burden imposed by several Community instruments. Several Member States welcome the revision as a possibility to clarify interaction between emission trading and energy taxation, to better reflect environmental considerations and to revise the EU tax minima. Moreover, several Member States stressed that it should always be borne in mind that the main objective of taxation is to generate revenue.

A division of the EU minima into an element based on energy content and an element based on CO2 emissions was, in principle, welcomed as a means to integrate environmental and non-environmental objectives of energy taxation in the ETD and to respond to the calls for more cost-effective environmental policies coming from the business sector, experts and Member States. This would also allow for some restructuring of policy instruments to resolve the claimed “double regulation” or "overlap" issue when energy taxes and emission trading are applied to the same operator at the same time. Concerns about possible complications for the tax systems were raised as well.

Most replies to the public consultation argued that environmental aspects of energy taxation should concentrate on CO_2 emissions. There was also a clear indication that for economic and fairness reasons, the CO_2 part of the tax should be similar across the EU and should create a price signal similar to the one implied by the EU emission trading scheme ("EU ETS"), set out in Directive 2003/87/EC[7] ("EU ETS Directive"). However, not all Member States agree that changes to the tax system are needed to alleviate the burden imposed by the EU on energy intensive users already included in the EU emission trading scheme.

The creation of an environmental component which would not be applied to biofuels was generally considered to be a sufficient and desirable way to promote biofuels. An environmental tax on electricity was not considered necessary as long as the externalities from electricity generation are addressed properly by other instruments, such as the EU ETS.

Furthermore, some respondents insisted on the need to remove the exemption for fuel used in air travel and shipping (Article 14(1), (b) and (c) of the ETD). This issue is however not covered in this impact assessment as the current treatment is based on international conventions and agreements and extends to customs duty and VAT as well. Applying excise duty on fuel supplied within the EU (which is what would be the effect of removing the exemption) also raises a number of practical problems and would, in particular in international shipping, lead to taxation of fuel consumed outside the EU and put fuel suppliers within the EU at a competitive disadvantage. Hence, excise legislation would currently not seem to be the most appropriate way to address emissions in these sectors. Moreover, air

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5 European Parliament resolution of 24 April 2008 on the Green Paper on market-based instruments for environment and related policy purposes (2007/2203(INI)).

6 Opinion of the European Economic and Social Committee on the ‘Green Paper on market-based instruments for environment and related policy purposes’ (OJ C 120, 16.5.2008).

7 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 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. 32–46).

travel will become part of ETS in 2013 and discussions are ongoing on including maritime transport.

1.4.2. Consultations with stakeholders and Member States

In the course of 2009 DG TAXUD carried out a series of technical consultations with a group of stakeholders representing EU-wide associations of business, citizens and NGOs, in particular those that already contributed to the consultation on the ETD revision as part of the green paper. The technical consultations were carried out on the basis of a draft outline of the approach to the ETD revision and concentrated on the main subjects of concern and interest for the stakeholders. As far as Member States are concerned, the consultations took form of regular meetings of the Commission working party on indirect taxes other than VAT. The working party analysed in detail the draft outline of a possible legislative proposal in order to discuss its legal, practical and tax administration related aspects. These discussions allowed removing concerns about possible complications of the tax system expressed in response to the consultation on the Green paper (see also Chapter 5.11).

2. POLICY CONTEXT, PROBLEM DEFINITION AND EU RIGHT TO ACT

2.1. Policy context

Taxation of energy

Taxes on energy products are an important source of revenue for EU Member States[8] (see Annex 1 for more details per Member State). They are also particularly suitable to serve other policy objectives (such as energy efficiency and environmental objectives) because of their direct impact on price and thus on consumer behaviour. Given that they are levied as a fixed amount on the quantity of energy products released for final consumption, they are also particularly suitable for introducing the polluter pays principle and can indeed serve as a targeted environmental instrument or for internalising some other external costs in the energy price (e.g. to address security of supply). In the field of climate change, taxes on energy consumption can serve as the closest proxy of the theoretical carbon tax which, together with a cap-and-trade system, is the main market-based instrument to address the externality or costs to society caused by carbon emissions.

The Energy Taxation Directive

The main objective behind the ETD has been to avoid distortions of competition between energy sources and energy consumers and suppliers on the internal market.

In general, the ETD makes energy products used as motor fuel or heating fuel (i.e. to move engines or to produce heat) as well as electricity consumed in similar situations subject to taxation. Other uses of energy products and electricity (e.g. energy products used as raw material in certain production processes) are out of scope of the ETD. The Directive also defines what exceptions are allowed and under which conditions. Mandatory exemptions

[8] According to the latest Eurostat/TAXUD publication "Taxation trends in the European Union" (2010 edition) *revenue from energy taxes* represents on average 1.7% of GDP of EU-27 and 4.4% of total taxes and social security contributions in 2008. Energy taxes are by far the most significant component of environmental taxation, representing around three quarters of environmental tax receipts.

apply in particular to energy products and electricity used to produce electricity. Optional exemptions apply in particular in favour of energy-intensive business.

The Directive also sets minimum levels of taxation for energy products used as motor or heating fuel and for electricity. Above the minima Member States are free to set their national rates as they see fit. These rates reflect historic levels of taxation in force in Member States.

Energy taxation in Member States

In general, two groups of Member States can be distinguished:

– A group of "low-taxing Member States". These are typically taxing at rates close to the minima and have often, although not in all cases, introduced taxation only as a consequence of the existence of common minimum rates. Many of the new Member States are in this group (Slovenia is one exception).

– 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. The Nordic countries are among the highest taxing Member States, especially for heating fuels.

Member States are also split between those who make use of the possibility to differentiate between business and domestic use for heating fuels and others who do not. In all circumstances "high taxing Member States" ensure that the rates applicable to business use are closer to the EU minima, to avoid distortions of competition.

Some of the Member States (SE, DK, FI, SI, IE) have already introduced taxation based on CO2. Other Member States (DE, NL, UK) enacted an environmental tax reforms in several steps, using energy taxation for environmental reasons but without introducing an explicit CO2-related component.

2.2. Problem definition: reasons for revising the Energy Taxation Directive

2.2.1. The need for a new policy framework for energy taxes

Since the adoption of the ETD, the underlying policy framework has changed radically. More efficient and cleaner energy consumption has become a key factor for long-term sustainability of our economies. The EU has now very clear policy objectives in the areas of energy and climate change and has committed itself to achieve ambitious targets by 2020 under the Climate Change Package of 2008.

In the context of the recent discussion about the EU increasing its overall emission reduction target from 20% to 30% (in case an international agreement could be reached), the Commission explicitly emphasised that "the analysis indicates that this [CO2 component in the ETD] could make an important contribution to meet stepped up targets"[9].

The recent financial and economic crisis has changed the overall picture somewhat. Lower industrial activity and lower energy demand have already led to a reduction of CO2

[9] COM(2010) 265 (in particular the text on taxation, p. 6).

emissions, without additional tax measures or other changes being enacted. Moreover, any future changes to the structure of the ETD might be perceived to have different economic effects than expected before the economic crisis. It would be a fallacy, however, to believe that these temporary phenomena have a lasting effect as economic fluctuations are a normal feature of the policy context or problem definition of the ETD revision. Furthermore, irrespective of the policy context, it should be observed that the current ETD creates in various respects an unsustainable structural situation, conflicts with the proper functioning of the ETS and creates a double burden in some situations (for more details, see points 2.2.2 and 2.2.4).

2.2.2. Weaknesses of the Energy Taxation Directive in the new policy context

The minimum rates set in the ETD (see column 2 of Table 1) are most commonly based on the volume of energy products and electricity consumed. Columns 3 and 4 of Table 1 show the value of these minima for the various energy sources recalculated to common denominators taking into account, respectively, the energy content and the CO2 emissions they generate.

Table 1: Minimum rates of taxation laid down in the ETD (1 January 2010)

	Minima as set in the ETD		
	In current units	**in €/GJ**	**in €/tonne $C0_2$**
(1)	(2)	(3)	(4)
Motor fuel use			
Petrol	359 €/1000 litres	11	159
gas oil	330 €/1000 litres	8.9	120
kerosene	330 €/1000 litres	9.5	132
LPG	125 €/1000 kg	2.7	43
natural gas	2.6 €/GJ	2.6	46
Motor non-fuel use (certain commercial and industrial uses)			
gas oil	21 €/1000 litres	0.6	8
kerosene	21 €/1000 litres	0.6	9
LPG	41 €/1000 kg	0.9	14
natural gas	0.3 €/GJ	0.3	5
Heating use (non-business use)			
gas oil	21 €/1000 litres	0.6	8
heavy fuel oil	15 €/1000 kg	0.4	5
kerosene	0	0	0
LPG	0	0	0
natural gas	0.3 €/GJ	0.3	5
Coal	0.3 €/GJ	0.3	3
electricity	1.0 €/MWh	0.3	
Heating use (business use)			
gas oil	21 €/1000 litres	0.6	8
heavy fuel oil	15 €/1000 kg	0.4	5
kerosene	0	0	0
LPG	0	0	0
natural gas	0.15 €/GJ	0.15	2.7
Coal	0.15 €/GJ	0.15	1.6
Electricity	0.5 €/MWh	0.15	

Source: Own calculations based on emission factors set in Commission Decision 2007/589/EC[10] and energy content of the energy products set in Directive 2006/32/EC[11]

The table clearly shows that there is no consistent treatment of energy sources in the ETD.

The minima for *motor fuels*, taking into account the CO2 emitted during combustion, translate into a CO2 price signal ranging from 159 per tonne of CO2 in the case of petrol to 43 euro per tonne of CO2 in the case of LPG. Taking into account their energy content, taxation levels vary from 2,6€/GJ for natural gas to 11 €/GJ for petrol. Comparing the taxation levels of the most commonly used motor fuels, petrol and diesel, it appears that the minimum rate for diesel is lower, both in terms of CO2 emissions and energy content, which is also reflected in the rates applied by most Member States. This implies a subsidy for diesel drivers and further reinforces the natural advantage that diesel has due to its higher energy content as compared to petrol. The existing minimum rates of taxation allow a diesel driver to drive 24%[12] longer compared to the driver of a petrol car if both pay the same amount of tax. Equally, for the same amount of tax paid, a diesel driver can emit 32%[13] more CO_2 emissions as compared to the petrol driver.

Biofuels used as motor fuel are taxed at the rate of the motor fuel they replace, even though they have a smaller greenhouse gas impact than fossil fuels and generally have a lower energy content that the conventional fuel to which they are added or which they replace. That means, for example, that bio-ethanol having lower energy content than petrol is taxed at the same rate per litre as petrol meaning that it is taxed much higher than petrol if its energy content is taken into account (cf. Table 11 in point 5.8.1) and that no account is taken of the fact that it has zero-CO2 emission factor[14].

The minima for *heating fuel* (for business as well as non-business use), taking into account the CO2 emitted during combustion, translate into a CO2 price signal ranging from 1.6 euro per tonne of CO2 in the case of coal to 8 euro per tonne of CO2 in the case of gas oil, meaning that the lowest rate applies to the most polluting energy source (coal). Taking into account their energy content, taxation levels vary from 0 €/GJ for LPG and kerosene, over 0,3 €/GL for coal to 0,6 €/GJ for gas oil. This leads to a different treatment of energy consumers depending on the energy source used. For business consumers, they create

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10 Commission Decision 2007/589/EC of 18 July 2007 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council (OJ L 229, 31.8.2007, p. 1).

11 Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (OJ L 114, 27.4.2006, p. 64).

12 Taking into account energy content, a petrol car consumes 8 litres per 100 km, whereas a diesel car consumes 7 litres (taking the same energy consumption for petrol and diesel cars). Under the current minima a diesel car could consume 8.7 litres per 100 km, assuming the same costs as for a petrol car. The existing minimum rates of taxation allow diesel drivers to drive 24% kilometres more and still pay the same amount of tax as petrol drivers for 100km driven.

13 For a petrol car consuming 8 litres per 100 km, in theory, a diesel car emitting the same emissions will consume 6.6 litres per 100 km. Under the current minima a diesel car could consume 8.7 litres per 100 km, assuming the same costs as for a petrol car. Therefore, at the same cost, a petrol car drives 100 km and a diesel car drives 132 km, emitting 32% more emissions.

14 Member States may of course correct this effect by reducing the taxation of biofuels on the basis of Article 16 of the ETD, subject to State aid approval, in the same way as Member States may correct the other distortive incentives described by applying national rates above the minima. However, the point here is about the effect of the minimum rates as laid down in current legislation.

distortions of competition because, in practice, economic operators can be better off compared to others depending on the energy source they use (an example would be a coal consuming business as compared to a business that consumes mainly oil). The comments in the previous paragraph on biofuels equally apply to renewable energy sources used as heating fuel.

This tax rate differentiation described above (in current ETD units or effectively when the energy content or CO2 emissions are taken into account) leads to inefficient energy use and distortions in the internal market. It also creates incentives that are contradictory to the EU energy and climate change goals promoting, for instance, the use of coal which is the energy product with the highest CO2 content. Such misleading incentives also undermine the effects of targeted energy or climate change instruments and can even contradict the EU 2020 objectives and can make their achievement more costly. Moreover, the current taxation rules discriminate against renewable energies and any correction needed is left to the discretion of Member States.

It can therefore be concluded that the ETD is not adapted to the new climate change and energy policy framework and contains several shortcomings from the perspective of the good functioning of the internal market and in relation to the needs of the underlying EU policies.

It is therefore necessary to correct these shortcomings providing for a consistent treatment of energy products and electricity taking into account their energy content and/or the CO2 emissions they generate. This impact assessment examines various options that could achieve this objective.

2.2.3. Special treatment of particular energy consumers in the ETD

At two occasions the Community legislator allowed for special treatment of certain energy consumers.

Article 9(2) of the ETD sets the minimum levels of taxation for heating gas oil at 10 €/1000 l (instead of 21€/1000 l) for BE, LU and DK. The provision is not time-limited. A revision clause in the ETD states that it shall be examined in the light of the possible trade distortions between the Member States caused by the level of the reduced rate. This provision adds to the inconsistencies in the way various energy consumers are treated in the internal market.

Article 15(3) of the ETD allows Member States to apply a level of taxation down to zero to energy products and electricity used in agricultural, horticultural or piscicultural works, and in forestry. This concerns not only the minimum levels of taxation for heating materials and electricity, but also the lower minimum tax levels for energy products used by these sectors as motor fuel (Article 8(2)). Article 15(3) is the only provision in the Directive that allows unconditional reductions/exemptions from energy taxes below the EU minima for business consumers[15]. Otherwise, tax relief below the minima can only be granted in exchange for alternative instruments ensuring the same outcome in terms of environmental protection and/or energy efficiency. This provision adds to the inconsistencies in the way different business sectors are treated, considering also that agriculture is largely left outside the EU ETS.

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[15] The only exceptions are commercial aviation and maritime transport; however, this is due to the specific international nature of the sectors concerned. Certain consequences of this specific treatment apply for inland waterways (also because of international inland waterways conventions) and railways, and include both maritime and inland fisheries. However, favourable treatment of fisheries is a consequence of the transport specific rules, including tax rules, for waterborne transport.

2.2.4. Lack of co-ordination between the ETD and the EU ETS Directive

2.2.4.1. Overlap between the ETD and the EU ETS Directive

The purpose of the EU ETS is to allow for cost-efficient reductions in greenhouse gases for a specific set of activities. On the other hand, energy taxes serve several functions, mainly to raise revenue and to incentivise clean an efficient energy use. The ETD sets a harmonised framework for these taxes to ensure the proper functioning of the internal market. However, to the extent that energy taxes also aim at incentivising CO2 reductions – either implicitly through their general effect on energy consumption or explicitly if switched already to a CO2 basis at national level – the two instruments overlap. In practice, the problem of overlap occurs because the ETD and the EU ETS Directive follows a different logic:

- The ETD applies when energy is used to produce heat or to move engines. On the basis of Article 2(4) of the ETD, other uses of energy and borderline cases are excluded from its scope, in some instances based on a description of the sector in question (e.g. metallurgical and mineralogical processes) or, in other cases, based on general criteria (e.g. electricity when it accounts for more than 50% of the cost of a product).

- The EU ETS Directive applies to greenhouse gas emissions from major energy and industrial installations. More in particular, it applies to emissions from activities listed on a sectoral basis in Annex 1 to the ETS Directive as well as to emissions from large combustion installations (large industrial combustion installations in non-listed sectors and combustion installations to produce heat for space heating purposes reaching a certain capacity threshold (rated thermal input exceeding 20MW[16])). Transport, agriculture and households are sectors with significant emission levels that in general are not within the scope of the EU ETS, but are, in principle, caught by the ETD[17].

The degree of this overlap is impossible to quantify in today's situation because it is not visible in the current tax system which part of the level imposed serves an implicit environmental purpose[18].

However, to the extent that it occurs, the overlap between both instruments leads to *cost-efficiency* losses by distorting the price signal of the EU ETS. Even though combined application of taxation and the EU ETS produces a strong incentive to reduce emissions in the areas where both instruments apply, these might not be where reducing emissions would be the cheapest. This undermines the very logic of the EU ETS and distorts its functioning.

Both a CO_2 tax and a tradable permit scheme are, in principle, cost-efficient instruments to address climate change. They both can correct a market failure by putting a price on CO_2 emissions and allowing the market to adjust.

Joint application of a CO_2 tax to operators within a tradable permit scheme with a fixed cap would not entail, however, any additional environmental benefit. If the CO_2 tax is applied uniformly across the trading scheme, it

16 Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community, OJ L 140, 5.6.2009, Annex 1.

17 Combustion installations in greenhouses and district heating are nevertheless included in the ETS, aviation will be included from 2012.

18 Unless Member States have introduced explicit environmental tax components on national level, cf. however chapter 3.3 for the limits of purely national approaches.

would merely reduce the price of CO_2 allowances and act as a price ceiling on carbon emissions with respect to the operators. The tax would have, however, no influence on the amount of emissions, as it is determined by the cap but would increase the administrative costs due to compliance costs for operators.

In the case of CO_2 taxes applied unilaterally within the trading scheme, the overall effect depends on whether the tax is low or high and whether the country is large enough to have influence on the allowance price. If the tax is low/ the country is small, it will have no impact on the allowance price. In such a case the marginal abatement costs increase for the operators of the country applying the tax, which will increase their abatement effort beyond the cost-efficient level. If the tax is high and/or the country is large, the CO_2 price will decrease. If the country is a net importer of allowances, it may benefit from the lower allowance price, while it would lose in the case it is a net exporter. In all cases the differential treatment of the participants in the emissions trading systems introduces a distortion of competition and would increase the overall costs of meeting the emission cap. The tax will lead to a redistribution of emission reductions[19], without however affecting the total emissions (because they are fixed for the entire trading system). In consequence, the same emission reductions will be achieved, but at higher overall costs.

Interaction between energy taxation and the EU ETS has been extensively discussed over the last couple of years and was, amongst other issues, considered in the report of the Economic Policy Committee[20]. On the basis of this report, the ECOFIN Council of 12 February 2008 emphasized *"the need for careful consideration of the interaction between different instruments to avoid reduced efficiency and excessive costs and to deliver a consistent price on greenhouse gases – both at national and European level"*.

2.2.4.2. Consequences of the overlap between the ETD and the EU ETS

Some operators are covered by both instruments

Many of the activities that are listed in Annex 1 to the ETS Directive coincide with uses that are excluded from the scope of the ETD. Nevertheless, the match between the scopes of the two instruments is not perfect and, by consequence, some operators are covered by both instruments. This is, on the one hand, because some of the sectors listed in Annex 1 to the ETS Directive are not or only partly excluded from the scope of the ETD. This notable concerns paper and pulp production and parts of the chemical industry. On the other hand, operators falling under the horizontal definition of large combustion installations in the ETS will typically come from sectors which are within the scope of the ETD (this covers usually less energy-intensive sectors; examples include mechanical engineering and production of consumer goods such as food or clothing).

Some operators are covered by none of the two instruments

This is notably the case for combustion installations from the sectors excluded from the scope of the ETD on the basis of Article 2(4) which, at the same time, fall outside of the EU ETS because their capacity is below the general threshold value for combustion installations. In addition, Member States may, for cost-efficiency reasons, exclude further installations just above the general threshold (but below a rated thermal input of 35 MW or annual emissions of 25.000 t CO2) according to Article 27 of the ETS Directive. Exclusion of installations below this higher threshold value is, however, subject to the application of *measures that will achieve an equivalent contribution to emission reductions*. A targeted tax related to CO_2 can

[19] Emission reductions will take place somewhere else than would be the case under the lowest marginal costs.

[20] Report prepared by the Economic Policy Committee on the efficiency of economic instruments in reaching energy and climate change targets, ECFIN/EPC(2007)REP/55386/final, 30/1/2008.

be considered as an alternative cost-efficient instrument to the ETS and thus in principle could apply to such installations (see also the impact assessment on the revision of the EU ETS Directive[21]). This approach is in line with the view that the Commission took from the start that taxation and emission rights should operate in a complementary fashion to achieve comprehensive coverage of CO2 emissions. It advocated the use of specialised instruments, with the emission permits scheme focusing on the biggest producers of greenhouse gas emissions and those gases that could be monitored with adequate technical precision, while energy taxes would be aimed more at smaller or mobile sources whose emissions were more difficult or expensive to monitor[22]. However, as stated above many of the installations concerned currently are out of the scope of the ETD.

In sum, the ETD in its current form does not appropriately take account of the EU ETS and potential interaction of the two instruments. On the one hand, it creates overlap in a number of areas which leads to a double burden on the operators involved and renders the EU ETS less efficient by distorting the price signal. On the other hand, it does not create an appropriate framework for Member States to use taxation as an equivalent instrument for reducing emissions from installations outside of the scope of the EU ETS.

3. OBJECTIVES OF THE ETD REVISION, EU RIGHT TO ACT AND ALTERNATIVES TO THE ETD REVISION

The objectives of the revision of the Energy Taxation Directive can be defined in a general and specific way. Alternatives to the ETD revision shall be seen in the light of these objectives.

3.1 General objectives of the revision

The main objective of the revision is to bring the Directive more closely into line with the EU's energy and climate change objectives as requested by the March 2008 European Council[23]. This means that the ETD revision shall provide an internal market framework for energy taxation that enables Member States to use energy taxation more effectively for environmental purposes and promotes energy saving. It should also allow for revenue generation in a way that does not distort competition between energy sources and energy consumers, improving as such the functioning of the internal market.

The ETD revision shall respect the principle of solidarity between EU Member States in the area of climate change and shall as well contribute to the overall objective of the "Growth and Jobs" strategy of the EU (the 2020 Strategy), including the Better Regulation aspect and the EU competitiveness agenda.

3.2 Specific objectives of the ETD revision

The objectives of the ETD revision can be further specified in the following way:

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21 SEC (2008)52 Accompanying document to the proposal Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system.

22 *Green Paper on greenhouse gas emission trading within the European Union* - COM(2000) 87, 8.3.2000.

23 European Council of 13-14 March 2008, Presidency conclusions (7652/08).

(1) **Ensure consistent treatment of energy sources in the ETD** in order to provide a real level playing field for different energy consumers. Distortions inherent in the present system because of widely differing minimum rates between competing products should be removed in order to improve the functioning of the internal market and provide a neutral tax structure.

(2) **Provide an adapted taxation framework for renewable energies**. The ETD should reflect the positive characteristics of renewable energies in the general structure of the tax system, rather than leave it to Member States to do so on a case-by-case basis as is currently the case under Art. 16 of the ETD. The new structure should in particular reflect the potential for greenhouse gas saving established in EU legislation[24] and that their energy content is generally lower that the conventional fuel they substitute.

(3) **Provide a framework for the use of CO2 taxation to complement the carbon price signal established by the ETS**. The new structure should provide a framework for Member States to apply CO2 taxation to all areas where the EU ETS does not apply including in particular areas currently excluded from the scope of the ETD. At the same time overlaps between both instruments should be avoided to ensure consistency and avoid losses in cost-efficiency.

3.3 EU right to act and limitation of purely national strategies

Under the existing ETD, nothing prevents Member States from increasing the rates of their energy taxes or from introducing CO2-related taxes. However, such national approaches result in unsatisfactory solutions (in terms of level of rates and coverage) and risk distorting the internal market (due to the non-harmonised structure of the tax):

(1) Energy taxation impacts on business costs and, hence, on the competitiveness of companies. Experience has shown that, for business use (or at least for the most energy-intensive uses), Member States fix their tax rates closer to the EU minima, in order to preserve the competitiveness of their companies vis-à-vis companies in other Member States. However, as explained in point 2.2.2, these minima do not properly take into account environmental and energy policy consideration and even promote the use of more polluting energy products. It is therefore crucial to revise the minima providing for a consistent treatment of different energy sources in order not to limit the level of ambition that Member States can pursue with taxes on energy, in particular for business use.

(2) CO2 taxes introduced in the framework of the existing ETD do not adequately address emissions in the non-ETS sector. As the ETD has a restricted scope, large part of energy use remains untouched by those CO2 taxes. For those energy uses covered by the ETD, the Commission State aid practice has shown that it is difficult to apply a CO2 tax only to non-ETS installations. Hence, providing a CO2 price signal for all areas not covered by the ETS and, in general, ensuring consistency with the EU ETS can only be achieved through a revision of the ETD.

(3) Member States could introduce a theoretical "CO2 tax" in different ways. For example, it can be levied on energy sources on the basis of directly-metered emissions

[24] See point 11 of Annex I to Commission Decision 2007/589/EC.

or on carbon "embedded" in the final goods[25]. Similarly, CO2 tax levied on energy can be charged at different stages of energy supply or demand and thus can potentially conflict with the end-use approach under the EU ETS. It is clear, however, that the lack of an EU-wide framework will lead to a proliferation of national solutions causing internal market distortions, additional burdens for businesses and even double taxation. Only a CO2 tax levied at the same point and with the same structure across different Member States can ensure full compatibility with the internal market and avoid the risk of double taxation.

In sum, the problems identified can only be remedied by means of a revision of the ETD. The ETD revision and its timing need to be seen in the broader context of the EU energy and climate change agenda. Member States are designing and putting in place their strategies to meet the 2013-2020 energy and climate change goals. The revised ETD would provide legal certainty to both Member States and stakeholders regarding the role of taxes in this context.

4. POLICY OPTIONS FOR THE REVISION OF THE ETD

The problems identified in Chapter 2.2 imply that the policy options should concentrate primarily on the structure of taxation. Consistent treatment of competing energy sources could be achieved by aligning their minimum rates on the basis of energy content. Alignment of minimum rates on the basis of the CO2 content would moreover reflect climate-change related externalities of the energy products in a systematic way. In order to achieve efficiency in the interaction between the ETD and the EU ETS the scope of CO2 related taxes should moreover be adapted to cover all energy uses not included in the ETS, whereas ETS participants should be excluded from this tax element. Based on these considerations, a number of policy options combining energy-content and CO2-based taxation in different forms and at different levels were identified and modelled for this Impact Assessment.

These policy options are evaluated against the criteria of internal market and fair competition, environmental effectiveness, budgetary impact and equity in Chapter 7.1 and, based on this evaluation, the most effective and efficient options are combined into a preferred policy set (Chapter 7.2).

4.1 Considerations on the levels of taxation for the policy options

4.1.1. Guidance concerning the level of CO_2 minima

In theory, an optimal tax would be set at the level of the total costs to society of the environmentally damaging behaviour it addresses. However, since the optimal value of a carbon tax is very difficult to determine in practice, this possibility has not been further explored here. Guidance for the level of CO2 taxation should rather be sought from the main policy instruments of the EU's climate change policy for 2020, the EU ETS and the effort-sharing decision.

The allowance price under the EU ETS

[25] Such an approach has notably been discussed in relation to goods imported from third countries, cf. e.g. SEC(2010) 650.

Roughly 50% of the EU's CO2 emissions are currently covered by the EU ETS. Although the real emission price is a market price which is fluctuating, the level of the CO2 tax could be aligned to the expected CO2 price for the end of the trading period 2013-2020 as modelled for the impact assessment accompanying the climate and energy package. This price had originally been estimated to be 30€/t CO2 (in 2005 prices) in the January 2008 Impact Assessment. It was, however, revised downwards in the 2010 update of this assessment to a price of 16.5 €/t CO2 in 2020(in 2008 prices))[26]. This lower price is mainly explained by the fact that the recent economic downturn has led to a lower baseline projection for CO2 emissions in the EU by 2020 meaning that less additional effort is needed to reach the emission reduction target.

Aligning the level of CO2 taxation for non-ETS sectors to the ETS allowance price would appear an obvious choice to the extent that the purpose of the tax is to ensure that all economic actors contribute to the effort needed to achieve the overall emission reduction target in an equitable way. In other words, this solution would be preferable from an internal market point of view in so far as it provides for a level playing field between installations inside and outside the EU ETS. In the heating sector for example, CHP and district heating are currently subject to the ETS carbon price, while small scale heating applications are not, so submitting them to a CO2 tax at the level of the ETS price would end current distortions between both competing options. Furthermore, from a macro-economic perspective applying the same CO2 price across the whole economy is the most cost-effective solution as it levels the incentive to reduce emissions in all sectors and thereby ensures that reductions are realised where abatement costs are lowest.

The national emission reduction targets laid down in the Effort sharing decision[27]

While being cost-effective, simply transferring the EU ETS price to the non-ETS sectors would, as mentioned above, disregard the specific construction of the EU energy and climate package. This package established separate emission reduction efforts for those sectors under the ETS and those outside taking into account the cost-effectiveness criterion. The target for the non-ETS sectors was then further subdivided into differentiated national targets in the effort-sharing decision. This differentiation took into account relative differences in GDP/capita across Member States in order to avoid a disproportionate impact on less affluent Member States. As a result certain Member States were even allowed to increase their non-ETS emissions in absolute terms until 2020.

As a consequence, the average price needed to achieve the non-ETS emission reduction targets was found to differ from the projected ETS price. While the 2008 impact assessment projected the non-ETS price to be 22€/t CO2 (in 2005 prices), the 2010 update which integrated the effects of the recent economic crisis revised this estimate downwards and came to the conclusion that a price of only 4-5€/t CO2 (in 2008 prices) would be needed in addition to the so-called "reference scenario"[28] to achieve the non-ETS targets. It could therefore be argued that choosing a CO2 tax level that is close to the estimated ETS price in 2020 would lead to an overshooting of national effort-sharing targets and therefore go beyond the level of

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26 SEC (2010) 650, p. 33.

27 Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (OJ L 140, 5.6.2009, p. 136).

28 This scenario includes the impact of already implemented policies and assumes achievement of the 20% renewables target by 2020 - SEC(2010) 650, p. 32.

ambition agreed in the energy and climate package. However, this is unlikely to be the case for the following reasons:

– The CO2 price of 4-5€ as indicated in the updated impact assessment quantifies the effort necessary on top of existing policies. However, the revised ETD would not introduce CO2 taxation as an additional instrument to what is already applied, but rather in the form of a restructuring of the current system of energy taxation. In practice, depending on their existing national rates Member States will in most cases have the choice whether they want to introduce CO2 taxation as part of a restructuring of national tax rates in force or whether they want to apply it on top of existing rates.

– The very low CO2 price quantifies the additional effort needed for achieving the effort-sharing target once the target to have a 20% share of renewable energies in final consumption is met. The setting of a carbon price in the non-ETS sectors at a relevant level could in itself deliver an important contribution to promoting a more extensive use of renewables in the transport and heating sectors.

– The low level of the CO2 price predicted necessary to achieve the non-ETS target is a function of the lower level of economic activity expected as a result of the recent downturn. However, in conditions such as at present economic forecasts can be considered particularly uncertain and a higher price level might be needed on top of the reference scenario if economic growth should pick up more quickly than currently modelled.

It is therefore clear that a carbon tax set at a level of 4-5€/t CO2 would come nowhere near incentivising the significant changes in the energy systems needed to remain on track for the EU's longer-term energy and climate strategy (in line with a 2 degree Celsius target). While the recent economic crisis might have made achievement of the short-term 2020 objectives somewhat easier, there risks to be an increasing gap between the trajectory needed to fulfil the 2020 objectives under the post-crisis conditions and the reduction effort that would be compatible with the objective to limit the temperature increase to 2°C in a 2050 perspective[29]. This risk would be aggravated if, in the absence of an effective price signal in the non-ETS sectors, Member States would lock into carbon-intensive technologies now because the 2020 targets in themselves require less of an effort given the lower level of economic activity. A clear carbon price signal would avoid such a lock-in.

Finally, it has to be recalled that the climate and energy package also included the perspective that the EU would increase its overall emission reduction target from 20% to 30% in case an international agreement was reached. The Commission has recently launched the debate on options to move beyond the 20% target[30]. While the outcome of this debate remains open, it can be stated at this point that a stronger price signal would obviously be needed for both the ETS and the non-ETS sectors in case such a decision was taken. In fact the corresponding CO2 price for such an increase in the target was estimated to be 30€/t CO2 in case of a single price for both the ETS and non-ETS sectors and in case access to international credits was allowed for half of the additional effort.

Table 2: Overview of estimated CO2 prices (in €2008/t CO2):

	20% target by 2020, 2008 impact assessment (with	20% target by 2020, 2010 impact assessment (with	30% target by 2030, 2010 impact assessment (with access to

[29] SEC(2010) 650, p. 40.
[30] COM(2010) 265.

	access to international credits)	access to international credits)	international credits, 25% to be achieved internally)
ETS price[31]	30	16	30
Non-ETS price	22	4-5	30

Even under the conditions of the effort sharing decision a CO2 price level that gradually becomes closer to the expected ETS price could be justified for reasons of cost-efficiency and for reasons of avoiding lock-in in low carbon technologies in the non-ETS sectors. For the purpose of this impact assessment, three different levels of CO2 price have therefore been chosen derived from the different projected carbon prices reported above, rounded to a multiple of ten (10, 20 and 30€/t).

4.1.2. Minima on the basis of energy content

The purpose of taxing according to the energy content is to ensure neutral taxation of competing energy sources, i.e. petrol, diesel, LPG, natural gas and biofuels in the transport area, and various heating materials among themselves. The advantage of such neutral taxation is that it promotes energy savings in the same way across all energy sources, allows generating revenue in a neutral way and, more importantly, does not distort the effects of carbon taxation or prices.

The absolute value of the minima per GJ of energy is derived from the existing minima based on volume or, in cases where a CO2 based component is introduced, from the residual part of the minima.

Specific case of transport fuels

Propellants are in most cases taxed at much higher levels than other energy consumption, with substantial differentiation between traditional fossil fuels (petrol and diesel) and alternative fuels in transport (LPG and natural gas[32]). Biofuels are taxed at the rate of the fuel they replace (ethanol at the rate of petrol, biodiesel at the rate of diesel, biogas at the rate of natural gas).

In 2007 the Commission already proposed an increase in the levels of taxation for petrol and diesel ("the commercial diesel proposal"[33]). This proposal aims at reducing competitive distortions between Member States by further approximating the minimum levels of taxation specifically on diesel. To ensure better tax neutrality on the fuel market, it proposes to align tax rates on a per volume basis which would leave the effective tax rate per energy contained still 12% lower for diesel than for petrol (Table 3 below shows the current rates and the rates proposed in the commercial diesel proposal). The minimum tax rate for both products would be increased to 380 €/1000l in 2014 in order to avoid a rapid erosion of the tax rate in real terms and to further reduce the distortions of competition. Furthermore, it can be assumed that the minima for motor fuels in the commercial diesel proposal are already high enough to reflect both the national realities in Member States and the costs of CO_2 (it was therefore assumed that they already contain an implicit CO_2 element). They have therefore been used as a basis in the policy options.

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31 Prices of the 2008 Impact Assessment are in € of 2005, while the 2010 Impact Assessment has 2008 prices.

32 Currently, LPG and natural gas are mostly of fossil origin

33 COM(2007) 52.

Table 3: Motor fuels

	Minima set in the ETD		ETD minima amended in accordance with the commercial diesel proposal	
	In current ETD units	**In €/GJ**	**In current ETD units**	**in €/GJ**
(1)	(2)	(3)	(4)	(5)
petrol	359 €/1000 litres	11.0	380 €/1000 litres	11.7
gas oil	330 €/1000 litres	8.9	380 €/1000 litres	10.3
kerosene	330 €/1000 litres	9.5	330 €/1000 litres	9.5
LPG	125 €/1000 kg	2.7	125 €/1000 kg	2.7
natural gas	2.6 €/GJ	2.6	2.6 €/GJ	2.6

Source: own calculation based on energy content factors set in Directive 2006/32/EC and emission factors set in Commission Decision 2007/589EC

4.1.3. Link between the minima and national tax rates

Member States are free to set their tax rates above the minima; each product is seen separately. The current system therefore cannot ensure that, when the minima are revised taking into account energy content and/or CO2 emission of energy sources, the relation between the minima of different energy sources would automatically be reflected at national level.

National tax rates for energy products used for heating and electricity are rather closer to the EU minima, which would thus seem to have a more direct effect on national rates. The situation is, however, different for the most commonly used motor fuels: petrol is usually taxed far above the EU minima, whereas the national taxes on diesel are much closer to the EU minimum tax levels.

In consequence, and particularly for motor fuels, a requirement to respect the relationship between the minima set in the ETD for different energy sources put to the same use might have to be introduced in order to ensure that the ETD revision achieves its objectives.

4.2. Main policy options

Based on the above ***four basic policy options 1 to 4*** have been identified, complemented by ***two additional transports specific options 5 and 6.*** This approach was required due to the use of different modelling tools. Economy-wide modeling tools, like the E3ME model used for the four basic policy options, operate with one aggregate transport fuel and thus cannot capture fuel shift between motor fuels. Another model was therefore used for options 5 and 6 (TREMOVE), in particular to model the shift between motor fuels as a consequence of changes in their minimum rates. The period covered by the analyses is 2013-2030.

To reflect some of the concerns expressed in the public consultation on the green paper (main purpose of ETD is revenue generation; avoid complication of the tax system), two options (1 and 2) were chosen that do not change the structure of taxation, but only revise the minima in a simple and coherent way to ensure a fair treatment of energy sources (respectively basing taxation on energy content and CO2 emissions only). Options 3 and 4 combine taxation based

on energy content and CO2 emissions. The policy options also allow testing the impacts of different values of the EU minima (both for energy content and for CO_2).

Baseline (business as usual)

The Baseline corresponds to the current situation in the Member States in its full effect in 2013. It means no intervention at EU level other than the issues already decided by the Council, including the gradual expiry of remaining transitional periods in the Directive (mainly gradual alignment to the minimum levels of taxation or introduction of taxation of certain energy products). The baseline does not address the problems described in Chapter 2.

Policy option 1 (revision of the minima on the basis of the energy content)

This policy option revises the EU minima according to the energy content. For **heating use**, it aligns them to the existing value for heating gas oil in GJ (0.56€/GJ, rounded up to 0.6 €/GJ – see Table 1, column (3)) as this product is heavily used for heating purposes and has traditionally been subject to excise duty in most of the Member States.[34] For **motor fuels** the minima used are those of the commercial diesel proposal (see Table 3, columns (4) and (5), showing the rates used in, respectively, current ETD units and €/GJ).

Policy option 2 (revision of the minima on the basis of CO_2 emissions)

This policy option expresses the minima for **heating fuels** in euro per tonne CO2 emissions, setting the rate at 20€/tCO2 (2013-2020 and at 30€/tCO2 as of 2021). As in option 1, the minima for **motor fuels** are aligned to the minima of the commercial diesel proposal. A policy option that would revise also the transport minima purely on CO_2 basis has not been considered, because it would mean unrealistically high CO_2 prices (see Table 1, column (4)).

Policy option 3 (revision of the structure of the Directive)

Recognising the fact that taxation of energy pursues different objectives (revenue raising and energy saving, on the one hand, and environmental objectives, on the other hand), this policy option introduces minimum rates based on two elements, energy content and CO2 emissions.

For **heating fuels**, the energy component is based on the lowest existing value in the current Directive (0.15 €/GJ for business use and 0.3 €/GJ for non business use)[35] and not on the value for gas oil as in option 1. The reason is that an additional CO2 tax element is applied here and using the value for gas oil as a reference would have resulted in very high total tax levels. The CO2 component expressed per tCO2 is set at the following levels:

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34 Taking the current rate applicable for natural gas (0.15 euro per GJ) under policy option 1 was not tested because it would have led to a lowering of minimum tax rates in force for gas oil and heavy fuel oil, which currently amount to 0.6 and 0.4 euro per GJ.

35 Taking the current rate of gas oil and aligning the energy part of the tax rates of all the energy products to it would lead to a significant increase in minimum rates if the CO2 part was added on top. The minimum rate for gas oil would increase from 21€/1000l today to 77€ instead of 60€ under policy option 3A; for natural gas the minimum rate would increase from 0,15€/GJ to 1,8€ instead of 1,3€ as under policy option 3A (all figures for business use)..

– Option 3A: 20€/tCO2 (2013-2020) and 30€/tCO2 (2021-2030), representing medium level of ambition in climate change policy. A higher level of CO2 tax was not modelled as this was considered to be unrealistic[36].

– Option 3B: 10€/tCO2 (2013-2019) and 20€/tCO2 (2020-2030), representing a lower level of ambition in climate change policy and assuming that the 9 Member States (BG, CZ, EE, HU, LV, LT, SK, RO, PL) with the high positive emission reduction targets will not introduce CO2 taxation before 2020.

As in option 1, the minima for **motor fuels** are aligned to the minima of the commercial diesel proposal.

Policy option 4 (additional uniform CO_2 tax)

This policy option is similar to option 3 but adds the CO2 component on top of the existing energy taxes for **heating fuels** as well as for **motor fuels**. This means that all Member States react to the new minima and introduce an additional CO2 tax in all non-ETS sectors, including in transport. This policy option was tested for a medium level of ambition in climate change policy similar to option 3A (22 €/tCO2 for the period 2013-2020 and 30€/tCO2 for the period 2021-2030).

Policy option 5 (restructuring of the EU minima for **motor fuels**)

This policy option incorporates a CO2 element in the rates proposed in the commercial diesel proposal and aligns the energy part of the tax on the same value per energy content, taking the proposed petrol rate (380 €/1000 l) as a reference. In order to limit the impact on diesel rates (that comes primarily from the energy content adjustment), a higher estimate for CO2 value was used (30€/tCO2).

Policy option 6 (restructuring of the EU minima for **motor fuels** and requiring that the relationships between minimum rates are mirrored at national level)

In addition to option 5, this option requires that the relationship between the petrol and diesel minima is mirrored in the rates set by Member States. For the purpose of this impact assessment, it is assumed that Member States would keep their petrol rate unchanged and, if required, increase their diesel tax rate to achieve equal treatment of petrol and diesel and, by extension, of other motor fuels.

Table 4 compares the current minimum rates and those set in the commercial diesel proposal with the minimum rates of taxation used for modelling options 1 to 6 in current ETD units:

[36] Taking a CO2 tax of 30€/t instead of 20€/t from 2013 on would result in both significantly higher minimum rates as well as higher national rates. As for gasoil the minimum would increase from 21€/1000l to 88€ instead of 60,4€ as under option 3A; for natural gas the minimum would increase from 0,15€/GJ to 1,9€ instead of 1,3€ as under option 3A. As for the impact on national rates, those Member States affected would have to increase national rates on gasoil by 45€/1000l on average instead of 28€ as under option 3A; for natural gas the Member States affected would have to increase national rates by 0.89 €/GJ instead of 0.43 €/GJ on average as under option 3A (all figures for business use).

Table 4: Minimum rates of taxation used for modelling options 1 to 6 (rates on 1/1/2013) in current ETD units

Energy product	Unit	Minima as set in the ETD	Commercial diesel proposal	Option						
				1	2	3A	3B	4	5	6
Motor fuel use										
Petrol	€/1000 l	359	380	380	380	380	380	380	380	380
gas oil	€/1000 l	330	380	380	380	380	380	380	438	438
Kerosene	€/1000 l	330	330	330	330	330	330	330	409	409
LPG	€/1000 kg	125	125	125	125	125	125	125	528	528
natural gas	€/GJ	2.6	2.6	2.6	2.6	2.6	2.6	2.6	na	na
Heating use (non-business use)										
gas oil	€/1000 l	21	21	22.2	54.9	66	38.6	60.3	na	na
heavy fuel oil€/1000 kg	€/1000 kg	15	15	24.0	61.8	73.8	42.9	68.0	na	na
kerosene	€/1000 l	0	0	20.9	50	59.0	34.7	55.0	na	na
LPG	€/1000 kg	0	0	27.6	58.0	71.2	42.5	63.8	na	na
natural gas	€/GJ	0.3	0.3	0.6	1.1	1.4	0.9	1.2	na	na
Coal	€/GJ	0.3	0.3	0.6	1.9	2.2	1.3	2.1	na	na
Electricity	€/MWh	1.0	1.0	2.16	0	1.0	1.0	0	na	na
Heating use (business use)										
gas oil	€/1000 l	21	21	22.2	54.9	60.4	33	60.3	na	na
heavy fuel oil	€/1000 kg	15	15	24	61.8	67.8	36.9	68.0	na	na
kerosene	€/1000 l	0	0	20.9	50	55.2	30.2	55.0	na	na
LPG	€/1000 kg	0	0	27.6	58	64.9	35.9	63.8	na	na
natural gas	€/GJ	0.15	0.15	0.6	1.1	1.3	0.7	1.2	na	na
Coal	€/GJ	0.15	0.15	0.6	1.9	2	1.1	2.1	na	na
Electricity	€/MWh	0.5	0.5	2.16	0	0.5	0.5	0	na	na

Source: Own calculations based on emission factors set in Commission Decision 2007/589/EC and energy content of the energy products set in Directive 2006/32/EC

4.3. Additional policy options

Chapter 6 analyses a number of specific aspects of the ETD review which are not included in the modelling of options 1 to 6 above:

– Remove the specific minima for heating gas oil that apply for BE, LU and DK (Article 9(2) of the ETD) described in point 2.2.3.

– Remove the possibility to fully exempt energy products used for agricultural, horticultural and piscicultural works, and in forestry (Article 15(3) of the ETD) described in point 2.2.3.

– Awarding special treatment to sectors deemed to be at risk of carbon leakage. In the course of the work on the impact assessment, it also resulted that the potential risk of carbon leakage needs to be addressed.

– Complete the list of energy products in the scope of the ETD with renewables not yet included (Article 2(1) of the ETD).

5. ANALYSIS OF IMPACTS OF THE POLICY OPTIONS

This chapter gives an overview of the various impacts of policy options 1 to 6 described in Section 4.2, comparing them to the baseline. Detailed modelling results including at country level are contained in Annex 4. In general, it needs to be pointed out that a more efficient tax structure in itself would provide better and more consistent price signals and would ensure more effective use of energy taxation both for environmental and fiscal purposes. This impact assessment shows that the costs of restructuring of the existing tax system now would be very low or even negative.

For the purpose of the modelling, the following key assumptions were made:

– The baseline represents the projection to the future of the current situation assuming no policy change occurs, meaning that national energy tax rates are equal or exceed the current EU minimum rates and are held at their actual levels in nominal terms in 2013 – 30 (except in the TREMOVE model used to model options 5 and 6, which takes into account the EU minimum rates in real terms – see also Annex 2, point 3). The baseline also assumes that the EU emissions trading scheme (EU ETS) is in place and covers the main ETS sectors.

– The EU minimum rates are set at the levels described in Table 4 for the various policy options and are assumed to be constant in real terms during the projected period. This implies that they are automatically adjusted for inflation. National energy tax rates are affected only when they need to match the new EU minima in all the policy options except 4 and 6, in which is assumed that all Member States increase their tax rates.

– In all the policy options it is assumed that the Member States would use additional revenue from energy taxation to reduce the employers' social security contributions.

– World energy prices are assumed to evolve in accordance with the first row of Table 1 in Annex 2, point 6.

– In the E3ME modelling, the baseline does not assume achievement of the objective of reaching the 20% share of renewables in final energy consumption.

Economic models used

Two sets of modelling were carried out for the purpose of the impact assessment:

– Options 1 to 4 were modelled by Cambridge Econometrics with the E3ME model. Transport specific modelling was done by the Aristotle University Thessaloniki using the TREMOVE model for options 5 and 6. These models, described in more detail in Annex 2, points 1 and 2, used the same baseline projections as the 2008 energy and climate change package.

– To evaluate the impact of the revision of the ETD in the light of the economic and financial crisis, as requested by the Commission at its orientation debate of 23 June 2010, the environmental and economic impact for the EU as a whole of the introduction of CO2 taxes in the Member States has been modelled using the QUESTIII model of DG ECFIN (see detailed description of the model in Annex 2, point 4). To integrate the impacts of the crisis, the same baseline projections as in the 2010 update of the energy and climate change package have been used. The model tested the introduction of CO2 taxes in the Member

States amounting to 20€ per tCO2 from 2013 until 2020 and 30€ per tCO2 2021 onwards. This option, which is similar to policy option 4, was modelled in three variants: assuming labour tax recycling, lump-sum tax recycling and fiscal consolidation (additional tax revenue is used to reduce public debt). It was assumed that CO2 taxes are applied in all Member States in all non-ETS sectors, that government consumption and investment are linked to nominal GDP and thus remain neutral in the scenarios and that there is no additional policy from outside the EU. Detailed results of this modelling are included in points 5.3 and 5.4.

In spite of the differences in the two sets of modelling, the results are within the same range and the conclusions that can be drawn from them – and that are reported in this chapter – are the same.

5.1. Impact on national rates and on energy prices

To correctly assess the impact of the increases in Member States' tax rates, one should take account not only of the rate increase in nominal terms but also of the relative importance of the various energy sources in the energy consumption and of the impact of the increase on energy prices. This can be illustrated by the following example: policy option 3A leads to an increase in the rate of gas oil in BE from 17.1 to 43.3€/1000 l or 253% (see Annex 5, Table 1). However, as the tax only amounts to 2.7% of the price, the tax increase would only lead to a price increase of 6.9% (see Annex 11, Table 1). Moreover, gas oil only represent 2.1% of the final energy consumption by industry in BE (see Annex 7), meaning that the impact for the industry would be limited. Hence, to allow for a correct assessment of the impact of rate increases, the following data have been compiled:

– Annex 5: impacts in absolute terms of policy options 1 to 4 on national rates for energy products used for heating and electricity (business use);

– Annex 6: impacts in absolute terms of policy options 1 to 4 on national rates for energy products used for heating and electricity (non business use);

– Annex 7: showing the relative share of energy sources in the total energy consumption of the industry and indicating for each energy source if the Member State concerned would have to increase its rate (for options 1 to 3). In option 4, all Member States would have to increase the rates on all products;

– Annex 8: showing the relative share of energy sources in the total energy consumption of households and services and indicating for each energy source if the Member State concerned would have to increase its rate;

– Annex 9: impacts in absolute terms of policy options 1 to 6 on national rates for energy products used as motor fuel;

– Annex 10: percentage share of different energy sources in the energy consumption of industrial sectors, households, services and agriculture in the Member States;

– Annex 11: impact of policy options 1 to 4 on the price of energy products used for heating and electricity (business use);

– Annex 12: impact of policy options 1 to 4 on the price of energy products used for heating and electricity (non business use).

A detailed assessment of the impact of the various policy options on rates and prices in general and at Member State level can be found in Annex 3. In general, the following conclusions can be drawn:

– Overall, the very divergent impacts on rates between products within Member States and for the same products between Member States that appear from Annexes 5, 6 and 9, highlight one of the key issues behind the ETD revision: the existing minima do not provide a coherent basis for taxation of energy on the internal market.

– For energy products used for heating purposes for business use, the most significant impacts on rates relate to natural gas (Annex 5, Table 5) and coal (Annex 5, Table 6), which also represent an important share of energy consumption in the industry (respectively 29.7% an 13% for the EU-27 – see Annex 7). This is due to their current relatively low level of taxation and, for coal, to the fact that coal has relatively higher CO2 emissions and is thus most affected in CO2 driven policy options. It should however be observed that these impacts are mitigated by the fact that large parts of business use fall under the EU ETS and, hence, would not be subject to CO2 taxation.

– For non business use of energy products, natural gas is also the product which is most affected. However, contrary to its business use, there are major differences in the share of natural gas used in total energy consumption in Member States (see Annex 8). In that context, it should be noted that it is the intention to keep the flexibility that Member States have today to allow for tax reductions or exemptions for energy products used by households for heating purposes.

– Electricity which accounts for almost 30% of energy consumption of the business sector and about 27% of household consumption is not subject to CO_2 taxation under the ETD and is therefore not affected in most scenarios.

– For motor fuels, the impacts are generally higher for diesel than for petrol (the impact of this is examined in more detail in Section 5.7 – Impact on energy mix).

– As regards energy prices, the main conclusion is that the impact of rate increases on energy prices is not substantial. Larger impacts only occur for those policy options that foresee more significant increases in the overall rates (in particular ***option 4***). The impacts are more homogeneous for business use, because energy prices tend to diverge less across Member States for business use. Given the existing discrepancies in their taxation treatment, one can observe that the impacts differ substantially between energy sources. All the options also drive the price of the ETS allowances (and thus of energy prices) downwards, mainly because of the reduction in energy demand as compared to the baseline resulting from the policy options (for more details, see Annex 3 point 2 and Annexes 11 and 12). A sensitivity analysis was carried out using the E3ME modelling to check the results should the baseline energy prices differ substantially (cf. Annex 3 point 4). The modelling showed that the main impact of higher oil prices would be to reduce the effectiveness of the minimum levels of taxation in reducing energy demand (partly because the higher oil prices would have already reduced energy demand) but that the direction of the changes and the ranking of the policy options remains the same.

5.2. Budgetary impacts

The budgetary impact would to a large degree depend on how Member States implement a new EU framework for energy taxation. Should all Member States for instance decide to implement it by means of an additional CO2 tax of 20€/t (an approach similar to option 4), additional revenue for the EU-27 can be estimated at around 40 billion Euro[37].

For the modelling of the options, it was assumed that any additional revenue is recycled back to the economy, meaning they are budgetary neutral. Additional revenue would come from higher minimum levels of taxation (options 1-3 and 5) and from additional taxation above the minima introduced by Member States (options 4 and 6). Adjustment in the scope of CO2 taxation (non-ETS sectors, with exclusion of ETS installations and inclusion of small installations from sectors that are currently out of the scope of the ETD) would also have an impact on revenue, in both directions.

Furthermore, several additional elements analysed in the impact assessment, but not reflected in the modelling results, could in reality reduce Member States' revenue. As regards the treatment of renewable energy sources and alternative fossil fuels for transport (cf. Chapter 5.8), the budgetary impact can be estimated in the following way:

– Assuming the 10% requirement of the market share of the products is respected, a possible full tax exemption for biofuels would result in budgetary loss amounting to 17.0 billion in 2020.[38]

– Possible full tax exemption for LPG would result in budgetary loss amounting to 3.7 billion in 2020.

– Eventual full tax exemption for CNG would result in budgetary loss amounting to 0.6 billion in 2020.

5.3. Environmental impact, impact on CO2 emissions

Taking into account that CO2 is the externality that Member States have started to address with taxes on energy and is the only externality that is directly related to the fuel, does not depend on the combustion technology and is truly of cross-border nature in all circumstances, impact on CO2 emissions is the main environmental variable looked at in this impact assessment. In spite of that, the options analysed in this impact assessment would lead to general environmental improvements, in particular when it comes to air pollution. That is particularly true for taxation of motor fuels (the Commission already pointed out at earlier occasions that fuel taxes also help to reduce non-greenhouse gas impacts of transport[39]) and also for the more favourable taxation of renewable energies where this impact assessment makes reference to the sustainability criteria as defined by Directive 2009/28/EC[40].

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37 Own calculation based on the total annual CO2 emissions of sectors not subject to the EU ETS (households and services; transport; agriculture; small installation not subject to the EU ETS).

38 The calculation is based on Primes projections for the quantity of biodiesel and bioethanol consumed in 2020.

39 See for example COM(2007) 52 and the accompanying impact assessment SEC(2007) 170.

40 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, p. 16).

When it comes to the size of the effect on CO2 emissions, it is important to note that with the exception of option 4, all other policy options consist in a restructuring of existing national rates and the changes in the tax system do therefore not necessarily apply on top of existing national rates.

Table 5 summarises the effect of options 1 to 4 on emissions. All policy options would reduce CO2 emissions under the E3ME modelling. The emission reductions range from below 1% to almost 2% of the economy-wide CO2 emissions in 2020 going up to almost 3.5% in 2030 (cf. Annex 4, point 2 for details). The highest impacts are achieved under option 4 that assumes that all Member States introduce an additional CO2 tax on top of their existing rates in all non-ETS sectors. The table also includes the variant of policy option 3B ($3B_n$) that took into account the rates in nominal terms, in order to isolate the effects of indexation of the minimum rates in the modelling. The results confirmed that without indexation excise duties loose their real value over time and their environmental effects become negligible (this equally applies to the macro-economic impacts described in section 5.4).

The QUEST III model predicts somewhat lower reductions of total GHG emissions in the EU27 of about 1.7% by 2020 and about 3% percent by 2030, both in case of lump-sum recycling and under labour tax recycling. The reductions are slightly lower under the assumption of fiscal consolidation (around 1.5% both for 2020 and 2030).

Table 5: % change in CO2 emissions of the policy options compared to the baseline

Option / **Model**		**1**	**2**	**3A**	**3B**	**$3B_n$**	**4**
E3ME (CO2 emissions)	**2020**	-0.22	-0.37	-0.42	-0.33	-0.28	-2.01
	2030	-0.54	-0.83	-0.87	-0.63	-0.22	-3.45
QUEST III (total GHG emissions)	**2020**	na	na	na	na	na	-1.7
	2030	na	na	na	na	na	-3

Source: E3ME

The impact on CO2 emissions of a revision of the ETD can thus be considerable and reach 2% of total EU emissions under option 4 or about 4% of emissions covered by taxation in 2020. Expressed as part of the GHG reduction effort needed outside the ETS this is more than one third (about 37%), if one takes into account the baseline emissions as corrected downwards recently[41]. In absolute numbers this corresponds to 92 million t CO2. Importantly, the modelling simulations showed that such emission reductions can be achieved either with very limited costs or even with small economic benefits.

5.4. Macroeconomic impacts

Impact on GDP and employment (E3ME modelling)

The impacts of the policy options on ***GDP*** are very small but positive (cf. Annex 4, Table 5). The impact on ***employment*** is positive in all options and in all Member States (cf. Annex 4, Table 8). The favourable economic impacts are the stronger, the higher the amount of

[41] Own calculations based on figures from Capros et al., Model-based analysis of the 2008 EU policy Package on Climate Change and Renewables, 2008 http://ec.europa.eu/environment/climat/pdf/climat_action/analysis.pdf

additional tax revenues. Hence, policy option 4 would have the most favourable economic impacts, as it introduces a CO2 tax on top of the existing national taxes. Even in this option the impact at the EU average level would be relatively small: in 2020 and 2030 respectively and compared with the baseline, employment would increase by 0.29% (about 700 000 jobs) and 0.39% (about 1 000 000 jobs) and GDP by 0.21% and 0.27%. The impacts of all other policy options would be considerably smaller than this.

This positive impact on GDP and employment is driven by the modelling assumption that additional revenue from energy taxation would be used to reduce the employers' social security contributions. Lower labour costs boost employment and decrease domestic price levels increasing private consumption. This assumption reflects the practices of many Member States which have carried out environmental tax reforms (cf. Annex 2, point 5) and is in line with the general orientation in the ETD itself (recital 11), which promotes the principle of tax neutrality as a means to modernise national tax systems in favour of both the environment and employment. To isolate the impact of revenue recycling, a variant of policy option 3B ($3B_{lsp}$) was modelled, which assumes that tax revenues are recycled through lump-sum transfers to households (equal amount of money given to each household). In this scenario the favourable impacts on GDP and employment do not materialize in the same way as in the other policy options.

Furthermore, given the long time frame of this impact assessment (until 2030), indexation was applied to the minimum rates in the modelling simulations in order to maintain their real value. To isolate the effects of indexation, a variant of policy option 3B ($3B_n$) was modelled in nominal terms. The results confirmed that without indexation excise duties loose their real value over time and their effects become negligible. It would therefore appear to be required to provide for indexation of the minimum rates in the ETD as well (Annex 14 describes how indexation of the minimum rates could be introduced in the ETD).

The following table summarises the impacts on GDP and employment of the various options modelled with E3ME:

Table 6: Effects on GDP and employment in the various policy options (EU 27)

		Option 1	Option 2	Option 3A	Option 3B	Option $3B_{lsp}$	Option $3B_n$	Option 4
GDP (% change)	**2020**	0.05	0.05	0.05	0.06	0.01	0.05	0.21
	2030	0.04	0.06	0.05	0.05	-0.02	0.03	0.27
Employment (% change)	**2020**	0.06	0.07	0.08	0.05	-0.01	0.05	0.29
	2030	0.09	0.12	0.12	0.09	-0.02	0.04	0.39

Impact of the economic and financial crisis (QUESTIII modelling)

The results obtained from the QUESTIII model run subsequently to assess the impact of the financial and economic crisis also show a positive impact on GDP and employment, albeit at a somewhat lower level than option 4, to which it compares (cf. detailed modelling results in Annex 13). This modelling also confirmed the relative merits of the different forms of revenue recycling, as illustrated in the table below:

Table 7: GDP and employment effects from carbon taxes (Percent deviations from baseline)

	Labour tax recycling		Lump-sum tax recycling		Fiscal consolidation	
	2020	**2030**	**2020**	**2030**	**2020**	**2030**
GDP	0.014	0.028	-0.082	-0.099	-0.085	-0.062
Employment	0.028	0.036	-0.122	-0.158	-0.087	-0.098

Overall, it can be concluded that the results of the modelling based on an adjusted baseline taking into account the values of the economic variables as impacted by the economic and financial crisis confirm the main macroeconomic trends that appeared from the modelling of the examined policy options. In other words, the economic and financial crisis does not undermine the rationale of a revision of the ETD.

The QUESTIII modelling also usefully shows how alternative ways of revenue recycling would influence the impacts. When revenue is recycled via lump-sum payments to households or is retained in the public budget to reduce public debt, the positive economic impacts would not materialise. However, the modelling showed that the impacts of fiscal consolidation via a carbon tax would be slightly better than effects of lump-sum tax recycling. Use of revenue is a matter for Member States to decide and will also depend on how Member States would implement any possible ETD revision, but this impact assessment can provide them with useful guidance.

These results also need to be seen in a broader context. Member States might need to raise taxes in order to carry out fiscal consolidation in any event[42]. Increasing labour taxes – as an alternative to fiscal consolidation via a carbon tax - would be more distortive, hindering job creation and economic activity even more[43]. In addition, the beneficial impact on the energy mix and the environment would not materialise and other measures (possibly costlier) would have to be taken to achieve the climate policy targets. So, the overall results would be worse compared to fiscal consolidation via a carbon tax that combines environmental benefits with certain short to medium term economic costs.

Impact on consumer disposable income at national level

Similarly to GDP, the related effects on ***consumer disposable income*** would be fairly small but positive. Revenue recycling makes the household real wages and real disposable income increase in all policy options provided that additional revenue is used to reduce labour costs (cf. Annex 4, Table 9).

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42 For more details see Monitoring tax revenues and tax reform in the EU Member States 2010, European Commission Taxation papers (working paper 24/2010).

43 Various studies have shown that taxes on income are usually associated with lower economic growth (and so lower steady-state GDP) and that property and consumption taxes (including environmentally related taxes) are the least detrimental to growth. See e.g.. Johannson, A., Heady, C., Brys, B. and L. Vartia (2008), Taxation and Economic Growth, *OECD* Economics Department Working Papers, 620, OECD publishing. Arnold, J. (2008), "Do Tax Structures Affect Aggregate Economic Growth?: Empirical Evidence from a Panel of OECD countries", OECD Economics Department Working Papers, No. 643, OECD Publishing. Myles, G. D. (2009), Economic Growth and the Role of Taxation – Aggregate Data, OECD Economics Department Working Papers, No. 714, OECD publishing.

At national level, all policy options except for the one with lump-sum recycling ($3B_{lsp}$) show a slight increase in the real consumer disposable income in almost all Member States. Policy option $3B_{lsp}$ shows a slight decrease in consumer disposable income for almost all Member States. Policy option 4 is the only one which increases significantly the consumer disposable income in a large number of Member States. For more details, see Annex 4, point 6.

5.5. Distributional impacts on households

This chapter examines how the households with different socio-economic characteristics are affected by the policy options.

Effects of the policy options on consumer prices for energy products

As indicated in Chapter 5.1, the impact on national tax rates and hence also consumer prices varies between different energy products and Member States. Considering only the non-business use, which is relevant from the point of view of the household sector, the most important change seems to concern natural gas, which is commonly used as a heating fuel in the EU: it represent on average 36.7% of final non-business energy consumption in the EU-27 (cf. Annex 8). Under option 3A and 3B, respectively 21 and 11 Member States would see their domestic price for natural gas increase as a result of the increase in EU minimum rates (cf. Annex 12). Gas oil is also frequently used as a heating fuel in many Member States, although its share of final energy consumption is smaller (16 % at the EU-27 level). Under option 3A, 10 Member States would experience some increase in domestic gas oil prices and under option 3B only 2 Member States. The importance of solid fuels (coal) for household heating is less important in the EU as a whole (2.3%), but has importance in a few Member States (BG, IE, PL). The impact of all policy options on the price of coal would be substantial due to its high CO2 content and the low levels of current national tax rates. However, it must be noted that under policy option 3B, 9 Member States (amongst which BU and PL) would have the possibility to apply a transitional period regarding the CO2 tax which will lower the impact on the tax increase for coal. The price of electricity would only be affected in option 1.

The national tax rates and prices of transport fuels would be affected by the commercial diesel proposal, which is included in policy options 1, 2, 3A, 3B and 4, and by policy options 5 and 6. The policy options 5 and 6 would increase the prices of gas oil (diesel) substantially in nearly all the Member States, while the other policy options (commercial diesel proposal) would affect diesel prices in 15 Member States, but to a lesser extent than policy option 6. The prices of petrol would not be affected. Only 3 Member States (BG, CY, RO) need to increase their current national rates to be in line with the EU minimum tax level as they have been granted transitional periods which will expire by 2013. (cf. annex 9).

Impact of price increases for households at different income levels

The distributional impact of policy options depends on the extent to which these price increases burden the households at different income levels differently. The impact of the price increases of domestic energy are usually considered regressive, since the households at the low end of the income scale spend a higher share of their income on energy than the households at the high-end of income scale. The low-income households thus bear a bigger burden of tax increases in relative terms than high-income households. This regressive effect can be seen from Tables 8 and 9, which describe how household real disposable income would be changed if electricity and gas prices would be increased by 10% (without taking into account any behavioural changes or compensatory measures). In Table 8 the impact is given

for five income quintiles (each representing 20% of incomes) and in Table 9 for different socio-economic groups:

Table 8: Changes in real household incomes (%) from the 10% increase in electricity and gas prices for five income quintiles, EU-27

All households	1st quintile	2nd quintile	3rd quintile	4the quintile	5the quintile
-0.54	-0.69	-0.65	-0.59	-0.53	-0.43

Source: Cambridge Econometrics (2008)

Table 9: Changes in real household incomes (%) from 10% increase in electricity and gas prices for socio-economic groups, EU-27

Manual workers	Non-manual workers	Self-employed	Unemployed	Retired	Inactive	Densely-populated area	Sparsely populated area
-0.53	-0.44	-0.51	-0.59	-0.67	-0.59	-0.51	-0.56

Source: Cambridge Econometrics (2008)

The tables indicate that low-income households would be more affected than high-income households and that pensioners, unemployed and inactive groups would be more affected than the active population. Households living in rural areas would have a slightly higher burden than households living in urban areas.

Assessment of the distributional impacts – EU 27

The assessment of distributional effects of energy tax policies needs to take into consideration also other factors than the price increases of domestic energy. Economic literature points out that the regressivity of energy tax increases could be moderated by a number of factors, including the use of tax revenues and the different incidence of transport fuel taxes compared with that of taxes on heating fuels and electricity[44], which are of particular relevance here and will be considered more in detail.

Table 10 shows the EU-27 weighted average change in household real disposable income (compared with the baseline) under policy options 1, 2, 3A, 3B and 4 for the same five income quintiles and socio-economic groups as used in Tables 8 and 9. As explained, these policy options include the "commercial diesel proposal" and thus the modelling results incorporate the effect of transport fuel taxation to the extent the national tax rates on transport fuels are affected by the options. However, an additional scenario (option 4bis in table 10 below) was run without transport fuel taxes and forms thus an interesting comparison with the otherwise similar option 4. As elsewhere in this impact assessment, it is assumed that the tax revenues are entirely used to reduce the employers' social security contributions except in scenario 3Blsp, where revenue is recycled through lump-sum transfers to households (each

[44] An overview of these factors can be found, for instance, in Speck (1999): Energy and carbon taxes and their distributional implications, Energy Policy 27 (1999) and in OECD (2006): The Political Economy of Environmentally Related Taxes.

household receives the same amount of money; the total amount of transfers being equal to additional tax revenues). Under all options, it is assumed that no exemptions apply to the household sector so that consumer prices fully reflect the increases of national tax rates. Distributional effects are here fully static, as modelling did not take into account any behavioural or feedback effects.

Table 10: Change in real household incomes (%) in 2030 in comparison with the baseline, EU-27 weighted averages

	Option 1	Option 2	Option 3A	Option 3B	Option 3Blsp	Option 4	Option 4bis
All households	0.08	0.11	0.11	0.09	-0.05	0.41	0.12
1st quintile	0.10	0.11	0.10	0.09	-0.01	0.39	-0.23
2nd quintile	0.09	0.11	0.10	0.09	-0.04	0.36	-0.16
3rd quintile	0.08	0.10	0.10	0.09	-0.05	0.36	-0.01
4th quintile	0.08	0.11	0.11	0.09	-0.05	0.39	0.18
5th quintile	0.08	0.12	0.13	0.09	-0.06	0.49	0.47
Manual workers	0.08	0.11	0.11	0.09	-0.06	0.39	0.21
Non-manual workers	0.08	0.12	0.13	0.09	-0.06	0.46	0.39
Self-employed	0.07	0.10	0.11	0.09	-0.06	0.42	0.22
Unemployment	0.09	0.10	0.10	0.09	0.03	0.40	-0.05
Retired	0.09	0.10	0.09	0.09	0.02	0.37	-0.24
Inactive	0.11	0.12	0.13	0.11	0.03	0.43	-0.07
Densely populated area	0.09	0.12	0.12	0.10	-0.05	0.47	0.21
Sparsely populated area	0.07	0.08	0.08	0.07	-0.05	0.31	0.02

Source: Cambridge Econometrics (2008)

The table indicates that household real income would increase at all income levels and socio-economic groups in comparison with the baseline in the policy options based on revenue recycling through the employers' social security contributions. Moreover, the economic benefit is in general fairly equally distributed between income and socio-economic groups under all policy options. However, it can be observed that the households living in urban areas would have somewhat higher benefits than the households living in rural areas indicating that the burden of higher energy costs is higher for the latter group.

The impact of revenue recycling on household revenues can be seen by comparing options 3B and 3Blsp. In the latter the economic benefits disappear, since lump-sum transfers do not stimulate the economy in the same way as the reduction of labour costs through social security contributions. However, lump-sum transfers benefit, in relative terms, low-income households more than high-income households, and thus this policy would be progressive as a whole. Socio-economic groups usually considered to be the most vulnerable ones (retired, unemployed and inactive) would be the highest beneficiaries of this policy.

Comparison of options 4 and 4bis reveals to what extent the absence of regressivity is caused by transport fuel taxes. Excluding transport fuel taxes from the scenarios make the distributional effect of energy taxation highly regressive, as can be seen from the column 4bis.

Low-income households would lose, even taking into account the beneficial effect of revenue recycling, while the households in higher income quintiles and socio-economic groups representing non-manual workers and self-employed would gain. The result implies that transport fuel taxation alone is highly progressive, i.e. the relative tax burden increases with the income level of the household, which is in accordance with the evidence found in other European studies[45]. It should be pointed out that the options 5 and 6, which are not included in this modelling exercise, would increase the diesel taxes more than the "commercial diesel proposal". As diesel cars tend to be bigger than petrol cars and likely to be used more by high-income groups, the impact of these options could be even more progressive than is shown in table 10.

Finally, the comparison of columns 3A and 3B reveals the effect of the transition periods accorded to 9 Member States. One can observe that transition periods do not play an important role from the distributional point of view at the EU-27 average level. Under the option 3B the economic benefits to the households are somewhat smaller because tax increases are lower and thus less revenue is recycled than under option 3A, but the impacts are very equally distributed across income brackets and socio-economic groups.

In conclusion, the regressive impact of taxing domestic fuels, which is shown in tables 8 and 9, disappears completely at the EU aggregate level when transport fuel taxes are included and the effects of revenue recycling are taken into account.

Assessment of the distributional impacts for individual Member States

For the individual Member States distributional effects are shown in Annex 18. One can observe that the change of household real income is generally lower in the old Member States compared with new Member States, where national tax rates are initially lower. In most cases the income change is equally distributed across income brackets in accordance with the results at the EU aggregate level.

However in IE and UK the impact of policy options 2, 3A and 3B is regressive in the sense that high-income groups gain more from tax policy than low-income groups. This corresponds to the evidence found in an earlier study which indicates that energy taxation as a whole is more strongly regressive in the UK and IE than in other Member States[46]. It should be noted that the tax exemptions on natural gas and electricity accorded to the household sector in these two countries are not taken into in account the scenarios displayed in Table 10, which could explain the regressivity of policy options even including transport fuels, which in other countries entirely remove this effect. However, it should also be observed that Member States

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45 Evidence from Denmark (Jacobsen- Pedersen –Wier (2001): Fordelningsvirkninger af energi- och miljöafgifter. Risö National Laboratory, Roskilde) and Finland (Tuuli (2009): Polttoaineverojen ja muiden ympäristöverojen tulonjakovaikutukset. VATT Muistio joulukuu 2009) indicates, for instance, that middle- and high-income households own more cars and spend a larger share of their income on transport fuels than low-income households, which makes transport fuel taxation highly progressive in these countries. Similar evidence was found also in another study covering 11 EU Memeber States (Barker – Köhler (1998): Equity and Ecotax Reform in the EU: achieving 10% reduction in CO2 emissions using excise duties, Environmental Fiscal Reform Working Paper no. 10, January 1998). Gasdoline taxes are, however, found to be regressive in the US (e.g. Poterba (1991): Is the gasoline tax regressive? NBER Working Paper 3578) and West- Williams, (2004): Estimates from a consumer demand system: Implications for the incidence of environmental taxes. Journal of Environmental Economics and Management 47).

46 Barker –Köhler (1998).

can mitigate the impact of energy taxation for households applying tax exemptions or reductions on the basis of Article 15(1)(h) of the ETD (see also Chapter 7.2 – preferred policy set).

Regarding new Member States, policy options 2, 3A and 4 are clearly regressive in HU, where low-income brackets would, in fact, experience some losses, while higher-income groups would gain. This regressive impact disappears, however, in policy option 3B, in which HU would benefit from a transition period. The results for LT and RO, in which the households would experience some income losses under all policy options, do not show any strong regressivity, as the losses are fairly equally distributed across income brackets (in RO the middle-income brackets would experience somewhat higher losses than low- or high-income brackets). These two countries would also be subject to a transition period under option 3B, in which these effects would be significantly reduced.

5.6. Sectoral impacts and competitiveness effects

The E3ME model was also used to analyse the impacts of the policy options on productive sectors. Productive sectors can face higher costs due to higher taxation in some cases and can benefit from lower labour costs due to revenue recycling. Lower labour costs may also boost employment and private consumption, which in turn will have a positive effect on the output levels.

A third important factor affecting the sectors is the change of the ETS allowance price. This price falls to the extent that energy taxation decreases energy demand and thus also the demand for allowances (cf. Annex 3, point 3).

As a whole, the sectoral impacts do not raise a concern for adverse competitiveness effects in any of the policy options, although effects are not equally distributed among productive sectors. Under the assumption of labour tax recycling, employment levels are higher or constant in all sectors and only very few sectors experience small output losses. Results per sector usually show the same tendency under all options with this recycling method, with option 4 triggering the strongest impacts because the amount of revenue to be distributed is highest here. On the other hand, revenue recycling by lump-sum payments leads to (albeit small) employment and output losses in a higher number of sectors. Details on the sectoral changes in employment and output by 2020 can respectively be found in Annex 4, Tables 7 and 10).

5.6.1. ETS sectors

The ETS sectors, as a whole, benefit from the tax policies implied by policy options through two channels: lower indirect labour costs and lower ETS allowance prices.

One sector for which a small decline in output level was modelled is the production of ***basic metals***. This is also the industrial sector in which the use of coal is most widespread, which is the energy product for which introduction of CO2 based taxation will lead to the strongest price increase. The competitiveness impact on this sector will, however, be limited for the very reason that it is covered by the ETS and all but the small installations falling below the threshold for ETS participation will therefore benefit from the automatic exemption from the CO2 tax element under all option, except option 1. This is in line with the modelling results showing fairly moderate output losses in 2020 (cf. Annex 4, Table 10).

The negative impact on output is slightly more marked in the case of fossil fuel based energy industries – ***fuel manufacturing and gas supply*** – which can be regarded as an inevitable consequence of the desired shift away from carbon-intensive energy sources. This result is confirmed by the results of the QUESTIII modelling which shows a shift in both value added and employment away from the fossil fuel based to the renewable energy sector[47].

Other ETS sectors (energy-intensive industries and electricity production) generally benefit from higher output levels, but the effects remain fairly small.

5.6.2. Sectors covered by energy taxation

The non–ETS manufacturing sectors face higher energy costs, but do not benefit from lower ETS allowance prices (unless they consume electricity). As energy costs make up only a small share of total costs in these sectors (typically accounting for around 1% of turnover), lower labour costs offset this impact in most cases. The situation is relatively less favourable for mechanical engineering, which does not profit from the shift in the tax burden under most options (and would actually experience a small fall in the output level in 2030). In contrast, the sectors producing consumer goods, such as textiles and clothing, food and drink and electronics, benefit from the boost of private consumption.

For the ***car manufacturing sector***, the argument has been put forward that the reduction in demand for diesel cars as a consequence of increased diesel taxation will lead to employment losses with EU producers which are currently specialised in diesel technology. However, even policy option 6 would only avoid further dieselisation, rather than reduce the diesel penetration rate already reached (cf. Chapter 5.7). This is because consumer interest in diesel cars does not exclusively depend on lower fuel taxation but is also driven by more efficient conversion technology of the engines presently available[48].

The restructuring of the petrol and diesel minima would mean a 1,3% decrease in the sale of new diesel cars by 2020 compared to the baseline[49].

Under option 6, providing for a mandatory alignment between national rates for motor fuels, and assuming that MS would keep their petrol rates unchanged and would only increase rates on diesel, sales of diesel cars would decrease by 11,74% by 2020 compared to the baseline. However, in total sales of diesel cars would still increase by 9% in 2020 and the projected increase in the sale of diesel cars would therefore only be slowed down.

The service sectors are the main beneficiaries of revenue recycling, as these sectors are labour-intensive and use relatively little energy. In particular, in hotels and catering and retailing, the increases of output levels are among the highest of all sectors. Insurances and computing services are also able to benefit relatively strongly from the tax shift in terms of output levels.

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47 Under both lump-sum as well as labour-tax recycling, cf. Annex 13 for details. For other than energy sectors, QUESTIII does not provide for sufficient disaggregation and therefore has not been taken into account for this sub-chapter.

48 As evidenced by the fact that the tendency towards dieselisation of the car fleet exists also in Member States with little or no tax advantage for diesel. The UK for example has a similar market share of diesel as Germany although it charges the same tax rate per litre for petrol and diesel whereas in Germany diesel enjoys a tax advantage of 18ct/l.

49 Tremove 2.52 modelling

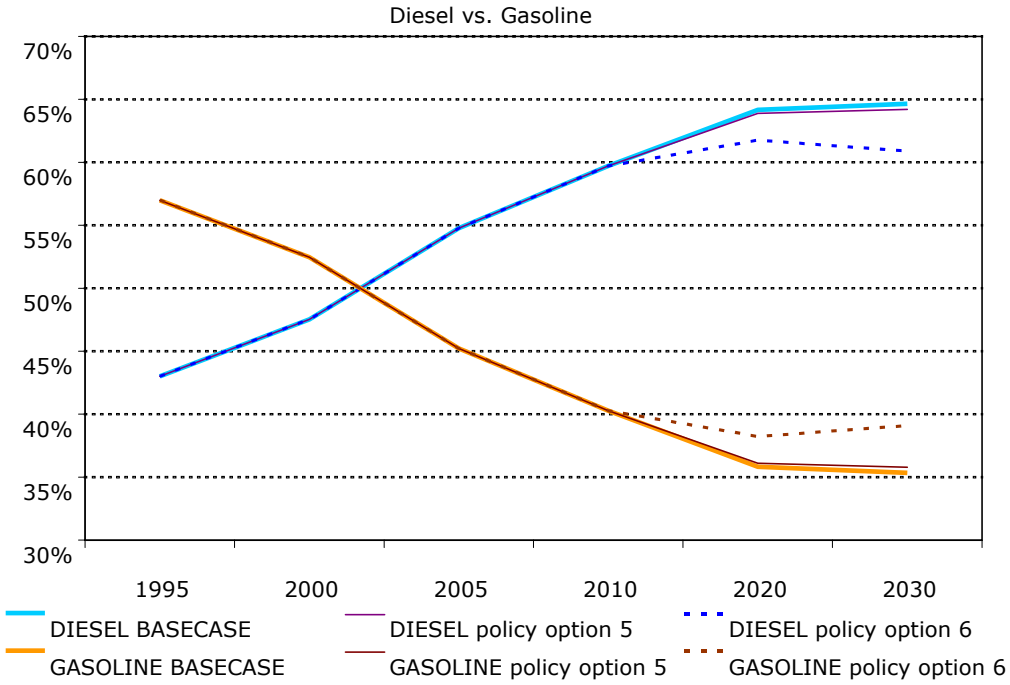
The ***haulage sector*** would also increase output as a result of the increase in demand for services according to the results obtained from E3ME. However, this model does not capture the impact of the cost increase resulting from higher taxation of diesel, which was modelled with TREMOVE. The impact on transport demand of the increase of the diesel minima to 412,2 EUR/1.000 l would be of -0,2% in 2020 compared to no policy change[50]. This is largely in line with the results of the impact assessment conducted for the Commission's earlier commercial diesel proposal, which predicted similar small losses in freight transport demand[51]. Only under option 6, transport demand would go down by 1,3% in 2020 compared to no policy change. It needs to be borne in mind that these figures do not take into account possible transitional periods.

The impact on agriculture is discussed more in detail in Chapter 6.2.

5.7. Impact on energy mix

As far as the motor fuel market is concerned, minimum tax rates on diesel are 24% lower today than on petrol (cf. Table 1, column (3)) when transferred to an energy content base. Detailed modelling confirmed that removing the price advantage for diesel both in the EU minima and in national rates would have a rebalancing effect on the supply and demand on the fuel market (option 6). On the contrary, alignment of the EU minima only (option 5) would have only minimal impacts on the market share of the two fuels (cf. Figure 1 below). The same effects would materialise at national level (cf. Annex 4, Table 4).

Figure 1: market share of diesel and petrol (gasoline) in Europe in business as usual case and under the two policy options



Source: TREMOVE

50 Tremove 2.52, Heavy Duty Vehicles >32 t

51 A decrease of 0.2%, albeit for a slightly more moderate increase in the minimum rate to 380€/1000l, cf. SEC(2007) 170, p. 26. This impact assessment also indicated small impacts on transport prices and a limited extent of modal shift, cf. ibd. pp. 23 and 30.

Impact of the change in market share between petrol and diesel on CO2 emissions

The overall effect of the shift from diesel to petrol on emissions is determined by two elements: the relative efficiency of the cars as indicated by the amount of CO2 emitted per 100 kilometres driven and the actual driving patterns for petrol and diesel cars, i.e. the total transport volume.

Vehicle efficiency is targeted by the existing *strategy to reduce carbon emission from cars.* Regulation 443/2009 sets the target of 130g CO2/km as a fleet average for manufacturers by the end of 2012 (with a transition period until 2015). Diesel cars have a limited advantage in terms of CO2 emissions per kilometre driven and it is therefore sometimes claimed that a relative shift from diesel to petrol would render achievement of the above target more difficult or costly. However, this needs to be put in perspective. First, the CO2 in cars target is to be met in principle in 2012, a timeframe in which the proposed ETD revision is unlikely to have any significant impact on the fuel mix even if one counts in psychological effects. Second, while the diesel version of a given car may have as much as 35% lower fuel use/km and almost 20% lower CO_2 emissions than the petrol version[52], diesel buyers have shifted to increasingly larger and more powerful cars more than in the petrol market, to the point where the average diesel car purchased in 2009 had a 20% higher engine power and 24% higher weight than the average petrol car[53].

As a result, new diesel cars bought in 2009 had only 1.6% lower emissions relative to petrol cars[54]. A shift in the ratio of petrol to diesel cars would therefore affect average emissions and, by consequence, costs of complying with the CO2 in cars target only marginally. Moreover, looking at emission reductions already achieved in the past, more than 95% of these can be attributed to efficiency improvements of new vehicles (both diesel and petrol) and only 5% arose directly because of the increased share of diesel in the fleet (based on Laspeyres decomposition[55]). Finally, in the longer term, energy efficiency improvements and cars driving on CO2-free fuels are the only way to achieve likely future targets consistent with the 2°C trajectory and economy wide 80-95% GHG emission reductions in the EU by 2050. Fair and neutral treatment of all transport fuels, rather than incentives for a further increase in the share of diesel, is therefore the right way forward as this would provide a technology neutral advantage to all CO2-free fuels and would also encourage energy efficiency.

As regards driving patterns, diesel passenger cars are shown to be driven for 50 – 100% longer distances than petrol passenger cars[56]. Thus total CO_2 emissions produced over the lifetime of diesel passenger cars will be much higher than for petrol passenger cars. While a

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52 Comparing vehicles with very similar characteristics in terms of vehicle segment, acceleration and comfort

53 Cf. Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee, Monitoring the CO2 emissions from new passenger cars in the EU: data for 2009 - COM(2010) 655, p. 5 and 6.

54 One has to be careful though when interpreting absolute numbers as the diesel fleet has a higher average engine capacity than the petrol cars. The medium term tendency for petrol cars to catch up in terms of efficiency nevertheless cannot be explained mainly by reference to car size as the difference in engine capacity between diesel and petrol cars in 2009 was roughly the same as in 2000, cf. ibd. , p. 3 and 6.

55 Lee Schipper, Emily Hedges, and Loic Mignon: The Impact of New Passenger Vehicle Changes and the Shift to Diesel on the European Union's New Automobile CO_2 Emissions Intensity

56 Cf. e.g. Final Report: European Database of Vehicle Stock for the Calculation and Forecast of Pollutant and Greenhouse Gases Emissions with TREMOVE and COPERT, p. 71 (http://www.e3mlab.ntua.gr/e3mlab/reports/Fleets_Final_Report.pdf).

part of the higher mileage of diesel cars might be because they are purchased by people who need to drive further, their lowering operating costs will also encourage users to make some journeys they would not otherwise have done. Increasing the level of diesel taxation is bound to reduce the travel margins (some trips with very low value added will be replaced by trips with lower transport costs or cancelled). This effect would be expected to contribute to a net reduction in transport GHG emissions with all other factors remaining constant.

5.8. Impact on renewable energy sources and alternative fossil fuels for transport

5.8.1. Renewable energy sources

Currently the taxation of renewables is based on volume at the rate of the fossil fuel they replace. This treatment applies for all biofuels in transport and liquid biomass in heating. Due to higher production costs of the product, such taxation acts as disincentive for deployment of renewables. In order to remedy those effects, Member States may, on the basis of Article 16 of the ETD, provide for tax exemptions/reductions not exceeding the difference in production costs between biofuels and fossil fuels (cf. list of state aid decisions concerning biofuel support measures in Annex 15). This can include an adjustment for the lower energy content. Member States have to monitor annually the production costs and regularly adjust the amount of the tax exemption.

Changing volume based taxation into energy content-based and/or CO2-based taxation would provide a natural advantage to renewable energy sources not requiring any state aid approval:

– It would remove the disincentive that volume based taxation creates for energy sources with lower energy content (in particular ethanol).

– It would create an additional incentive for deployment of renewables to the extent that they provide greenhouse gas savings at the end use. It will also encourage the penetration of more advanced biofuels that have higher greenhouse gas emissions savings.

Table 11 shows that under policy option 5, bioethanol and biodiesel would be taxed respectively about 46% and 25% less than petrol and diesel if their lower energy content is considered and if a zero CO2 tax is applied.

Table 11: Tax advantage for bioethanol and biodiesel under option 5

Product	Option 5 (euro/1000 l)	Net Calorific Value (GJ/1000 l) – see Annex III of Directive 2009/28/EC	CO2 tax corresponding to 30 euro per tCO2 (euro/1000 l)	Energy tax (euro/1000 l)	Total advantage for biofuels (euro/1000 l)
Petrol	380	32	67,6	312.4	
Bioethanol		21	0	205,0	175,0
Diesel	438	36	82,3	355.7	
Biodiesel		33	0	326.1	111,9

Although energy content-based and/or CO2-based taxation would improve the current tax treatment of biofuels, they might not be sufficient as incentive in the short term. Hence, allowing Member States to apply further reductions of the energy tax rate on the basis of Article 16 of the ETD during a transitional period might be appropriate. In line with EU

policy, only biofuels fulfilling the sustainability criteria laid down en EU legislation[57] should benefit from such lower energy tax rates.

5.8.2. Alternative fossil fuels for transport

As compared to renewables, the EU does not have a comparable policy to promote alternative fossil fuels in transport. The market for LPG and natural gas for transport purposes has been rather limited although individual Member States have seen significant penetration rates (e.g. LPG accounts for 15% of the passenger car fuel mix in Poland according to industry figures[58]). In 2009, 3.61% of all new passenger cars registered in the EU27 were with Petrol-LPG specification[59].

Alternative fossil fuels for transport have certain advantages from security of supply point of view in so far as they provide alternative energy sources in a market otherwise almost entirely dependent on petrol and diesel. The advantage is nevertheless limited given that today's supply comes from the same producers the EU depends on otherwise for its oil and gas deliveries. Also, most of the LPG production is directly dependent on the oil production or refining. Security of supply of natural gas can in certain areas of Europe is even worse than for crude oil. Concerning environmental benefits, existing CNG and LPG vehicles perform better in terms of air pollution than the existing vehicle fleet powered by gasoline and diesel engines. However, this advantage will become less significant with increasing market penetration of vehicles complying with the new Euro 5 and 6 standards[60]. As far as carbon intensity is concerned, LPG has a limited GHG benefit compared to petrol and diesel, in particular if well-to-tank emissions are taken into consideration. On the other hand, natural gas vehicles could play a significant part as a medium-term solution in a decarbonisation strategy for transport, in particular if gas of fossil origin is increasingly to be replaced by biogas for which the same infrastructure can be used.

Although the introduction of CO2-based taxation would provide a (limited) in-built advantage for alternative transport fuels, this seems not to be sufficient as incentive in the short term. Given the scarcity of alternatives to diesel and petrol cars on today's markets and the strong dependence of LPG and CNG on the current favourable tax treatment (cf. Annex 9, Tables 4 and 5, showing the difference between the current rates and the rates applicable to LPG and CNG under option 4 and 5), a lower energy tax rate could be justifiable, at least in the short term.

5.9. Internal market impacts

All policy options that have as starting point revision of the minima in a coherent way would remove the current differentiated treatment of fossil energy sources in the Energy Taxation Directive. The policy options would ensure that the minima are product neutral and/or reflect the differences in CO_2 emissions from combustion. The same would be achieved for renewable energy sources. As a consequence, the level playing field for energy consumers

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57 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

58 AEGPL, Autogas in Europe. The Sustainable Alternative, Brussels 2009, p. 25.

59 monitoring report of DG CLIMA, after ISC, adoption pending

60 European Environment Agency, TERM 2006: Indicators tracking transport and environment in the European Union (EEA report no 1/2007).

would be improved: the minima would be fair for any business operating on the internal market whether it consumes oil, natural gas, coal or biomass.

Impact on distortions on the internal market

As far as heating use is concerned, comparing the coefficient of variation of business heating rates for natural gas in the baseline and the tax rates analysed by the different policy options shows that all policy options substantially reduce the degree of variation on the internal market. This is shown in the following Table:

Table 12: coefficient of variation for natural gas (EU 27)

Baseline	Option 1	Option 2	Option 3a	Option 3b	Option 4
14.5	3.35	1.63	1.41	2.80	1.83

The same applies for motor fuels, to the extent that the policy options lead for one or the other fuel to an increase in the minima and thus to further approximation of the tax rates on the internal market. As the results for option 6 indicate, the condition to respect the relationship between rates also at national level might have one undesirable side effect, i.e. higher variations on the internal market. With respect to table 13 below, it needs to be noted, nevertheless, that the variations increase for diesel due to the fact that it is assumed that Member States would introduce the conditions by means of an increase in the diesel rate.

Table 13: coefficient of variation for diesel (EU 27)

	Baseline	Commercial Diesel	Option 4	Option 5	Option 6
Coefficient of variation petrol tax rates - EU 27)	0.50	0.43	0.44	0.43	0.50
Coefficient of variation diesel tax rates - EU 27)	0.26	0.15	0.22	0.08	0.72

Level playing field between the trading and non-trading sector

Different targets inevitably mean different costs to reach such a target and thus the mere existence of the trading and non-trading area might mean certain degree of differentiation. However, the ETD revision could create a balancing system.

(1) The EU minima for the CO2 component should get as close as possible to the EU ETS price and thus help to create an EU-wide CO2 price signal. As close as possible means that the underlying logic of having two separate targets for emission reductions for 2020 should not be undermined.

(2) Given the differentiated targets for Member States, at national level Member States will need different price signals to achieve them. This is respected under the ETD, because it operates with EU minima only. Some Member States might need higher CO_2 taxes to reach their national target than other Member States. In such case they might wish to approximate the price signal between small and big operators covered either by taxation or by ETS, in other words they might wish to set the tax rates for these operators close to the price of ETS allowances. Member States thus need to have

a possibility to reduce their rates down to the EU minima for all the businesses concerned.

(3) Finally, different costs of compliance for businesses under the ETS and those under taxation could also come from the fact that some of the allowances in the trading scheme will continue to be handed out for free after 2013. This could be considered particularly problematic in the case of those sectors considered to be under a serious risk of carbon leakage[61] as these will receive, 100% of the relevant benchmark for free until 2020. It is therefore considered necessary to address the question of specific treatment of sectors deemed to be exposed also under the ETD (cf. Chapter 6.3 below).

5.10. Impact on small and medium sized enterprises (SMEs)

By definition, the ETD does not distinguish between small and big energy consumers. All uses of energy that by their nature represent heating or motor fuel use are taxable under the ETD and all SMEs using energy as motor fuel or for heating purposes are covered by the ETD already now.

Taxes levied under the ETD are normally included in the price of energy products and thus being subject to them does not entail any administrative costs. That is the case now for those SMEs that are taxable under the ETD and it would be the case also in the future. Administrative procedures are also in place to ensure that certain uses of energy can be left outside the scope of the ETD and thus the same procedures can be used in order to ensure application of CO2 taxes to such business. For details see Chapter 5.11.

In order to measure the impact on the SMEs one should take into account not only the increase in the tax rate in nominal terms, but also the relative importance of the various energy products in the energy consumption (Annex 7) and the impact of the increase on energy prices (Annex 11). As no Eurostat data are available on the energy mix of SMEs, nor on the energy consumption per unit produced of SMEs as compared to other businesses, one can only look at the impact for businesses in general and assume the results also apply for SMEs.

Analysing the data presented in the two annexes, the major impact for businesses would come from the increase in the rates applicable to natural gas[62] accounting for 30% of the total energy consumption of the industry. Taking into account its energy content and CO2 emissions, natural gas is currently subject to lower levels of taxation (both in the ETD and in Member States) than other energy products. As a result 13 Member States would have to increase their tax rates in 2013, resulting in price increases of between 1% (SE) and 35.9% (LU). All 9 Member States that would be allowed to postpone the introduction of CO2 taxation until 2021 would at that time face price increases ranging from 10.4% (HU) to 87.5% (BG). It should be observed that, in both groups, some Member States are not or only marginally affected whilst others would have to make important tax increases. This shows that the levels proposed are 'sustainable' in many Member States already, also for SMEs, and that the proposal only redresses the situation by bringing the levels of taxation in MS closer to each other, reducing competitive distortions caused by largely diverging rates of taxation.

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[61] These sectors account for c. 77% of total industry emissions under the ETS, cf. IP/09/1338 of 18.9.2009.

[62] Other products (mainly gas oil (4.6%), heavy fuel oil (4.2%) and solid fuels (13.4%)) only account for a small part of energy consumption.

Regarding the possible competition with third countries, special provisions are foreseen to alleviate the burden on sectors considered to be under a risk of carbon leakage. Under the preferred option Member States would be obliged to provide a tax credit to companies, including SMEs, in these sectors (cf. chapter 6.3).

5.11. Administrative burden on businesses and tax administration

Excise duty is a simple tax to levy, collect and administer. The number of taxpayers is limited (fuel suppliers or big energy consumers) and thus the administration costs are practically negligible. Only energy suppliers or big energy consumers are tax payers or operators registered for excise purposes. They pay and collect the tax or manage their exemption.

Using the existing excise system for the purpose of CO2 taxation allows introducing a new element in energy taxation without any additional administrative costs and without any new administrative burden.

Consultation with Member States confirmed that should taxation change from volume based to energy content and/or CO2 based, two stages need to be differentiated:

– Design of the tax and calculation of the rate, which requires differentiation between the energy content based and CO2-based component of the tax.

– Chargeability of the tax: one joint rate can be applied and tax can be charged based on usual trade units (volume), reduced rates would be applied in the case of e.g. ETS companies exempt from the CO2 tax. No change compared to the current situation, neither for the business or the private consumer, nor for the tax administration. Existing procedures would continue to apply.

A detailed assessment of impacts is contained in the table below, differentiating 3 groups of stakeholders: the government, the tax payer or authorised operator (energy supplier, big energy consumer) – entity dealing with excise procedures, energy consumer (any other business, private consumer, or public entity) – entity not dealing with excise procedures.

Table 14: Overview of the administrative burden on business and tax administration

	Administrative burden for tax administration	Administrative burden for the tax payer	Administrative burden for the energy consumer
Setting the tax rates on the basis of the energy content	New requirements on the tax administration in the process of designing the taxation rates. No additional burden in the context of administration of the taxes (simplification rule Art. 12 ETD). EU-wide guidance concerning energy content of energy products and electricity exists in Directive 2006/32/EC and, for biofuels, in Annex III of Directive 2009/28/EC.	No additional burden on the trade (simplification rule Art. 12 ETD)	n.a.

Setting the tax rates on the basis of end-use CO_2 emissions	New requirements on the tax administration in the process of designing the taxation rates. No additional burden in the context of administration of the taxes (simplification rule Art. 12 ETD). EU-wide guidance on the reference CO_2 emission factors is contained in Commission Decision 2007/589/EC.	No additional burden on the trade (simplification rule Art. 12 ETD)	n.a.
Revision of the structure of the ETD: CO_2 component in energy taxes (options 3, 4, 5, and 6)	Managing more than one tax levied on the same energy source is not new to some tax administrations. Directive 2008/118/EC[63] provides for common rules governing the application of taxes on energy. These rules facilitate and simplify the administration of excise duties.	Directive 2008/118/EC provides that energy is taxed at the moment of release for final consumption. It is the refinery, coal supplier, etc. who is liable to pay the tax to the authorities at that moment. The supplier can apply one compound rate based on usual trade units (simplification rule Art. 12 ETD). Simplified rules apply for electricity and natural gas: the tax is charged on the invoice for the final consumer, in view of the particular distribution network.	
Special tax treatment of ETS installations	Minor increase in administrative burden (need to manage the system), but not beyond what is already the case when Member States provide for preferential tax treatment on an optional basis, e.g. for voluntary agreements (given the standardised EU ETS procedures, the burden might be even lower). The special tax treatment can be managed using existing techniques for providing specific tax treatment: tax exemption/reduction can either be provided directly (because the final consumer is a taxpayer) or by means of a full/partial refund on the tax included in the price of energy.	Usually not concerned, unless the burden of control is put on the fuel supplier, which would be rather uncommon, or except for cases when the taxpayer is at the same time beneficiary of the scheme (simplified procedure when a big energy consumer is at the same time a taxpayer).	Burden of proof on the beneficiary (current approach in the energy tax area when preferential tax treatment is granted).

[63] Council Directive 2008/118/EC of 16 December 2008 concerning the general arrangements for excise duty and repealing Directive 92/128/EEC (OJ L9, 14.1.2009, p. 12).

CO_2 taxation for small installations excluded from EU ETS	See row above. In some cases this would involve application of CO_2 taxation to uses that are not normally taxable. The technique would, however, be the same as in the case above (even if currently full exemption from energy taxes applies, this must be managed in one of the above mentioned ways: direct application because the consumer is entitled to receive energy without tax or application via refund).	See row above.	See row above. As far as uses outside the scope of the ETD are concerned, application of (only) CO_2 taxation would not create an additional burden as already now procedures must be in place to provide for the application of the existing exemption/reduced rate from national taxes.
Burden related to tax treatment of renewables	No basic difference as compared to the current practice under Article 16. Limiting a preferential tax treatment of biofuels included in fuel released for consumption to sustainable biofuels only requires the verification by the tax administration of the respect of the sustainability criterion. This verification can be done on the basis of the mass balance system that economic operators shall use in application of Article 18 of Directive 2009/28/EC to prove that biofuels respect the sustainability criteria laid down in Article 17 of that Directive. Hence, no new tax obligations and verification procedures have to be put in place.	No basic difference as compared to the current practice under Article 16. To benefit from a preferential tax treatment of sustainable biofuels included in fuel released for consumption requires proof from economic operators of the respect of the sustainability criterion. This proof can be given on the basis of the mass balance system that economic operators shall use in application of Article 18 of Directive 2009/28/EC to prove that biofuels respect the sustainability criteria laid down in Article 17 of that Directive. Hence, no new tax obligations have to be imposed upon economic operators.	n.a.

6. ASSESSMENT OF IMPACTS OF SPECIFIC POLICY OPTIONS

6.1. Country specific minima for heating gas oil

Unlike other country specific minimum levels of taxation, the lower minimum level that applies to BE, LU and DK for heating gas oil (see point 2.2.3) is not time-limited. This impact assessment examines the impact of the application of this lower minimum level of taxation in the light of possible trade distortions between Member States. In BE and LU, the bulk of the consumption of gas oil concerns private use, whereas in DK the consumption is rather balanced, with significantly higher then EU average share by the industry (as DK only applies a lower rate for business use).

The detailed assessment made in Annex 19 did not lead reveal any distortions in trade of gas oil between the Member States concerned and their neighbouring Member States. However, the share of gas oil in the overall consumption of energy products used for heating purposes in the industry (DK, LU) and in the service sector (BE) suggests that the existence of the lower minima for heating gas oil creates an advantage for business consumers in the three countries concerned. This risks generating distortions and undue advantages in the internal market because it offers a beneficial treatment to certain business consumers as compared to their competitors in other EU Member States. It should therefore be considered to remove Article 9(2) from the ETD. Overall, the modelling carried out with the E3ME model did not show any particular impacts on the countries concerned of removing this provision.

6.2. Possibility to apply full tax exemption to energy consumption in the primary sector

Article 8 of the ETD sets lower rates for certain industrial and commercial purposes, including agricultural, horticultural or piscicultural works and in forestry (Article 8(2)(a)). On that basis, Member States can apply lower levels of taxation to energy used in the primary sector including uses of motor fuels, which represent a major component in the energy related costs of agricultural businesses (on the average 75% of energy costs of a farm).

In addition, Article 15(3) of the ETD allows Member States to unconditionally apply exemptions or tax reductions to the energy used by the primary sector covering all taxable uses. A revision clause in the same Article obliges the Council to re-examine their tax treatment at a later stage, based on a Commission proposal. This impact assessment examines this issue in combination with Article 8(2)(a), which partially overlaps with Article 15(3).

Application of Article 15(3) and 8(2)(a) by the Member States

Annex 16 provides an overview of the application by Member States of Article 8(2)(a) and 15(3) of the ETD. It shows that Member States apply these provisions very differently. As regards Article 15(3), Member States either apply zero rates for all the energy products or apply it for one product only, for one of the primary sectors (e.g. only for agriculture or for horticulture) or for all of them. From the last column of the table, it can be deduced that 17 Member States apply Article 15(3) with rates below the general minima fixed in the ETD.

To assess the importance of the application of Article 15(3), only should also consider the importance of the energy product in the overall energy consumption of the primary sector. Annex 17 shows the percentage share of the energy sources mainly used in the primary sector

(gas oil, natural gas and electricity) in its total energy consumption in the Member States (heating and motor fuel uses). Other energy products (heavy fuel, kerosene, LPG and coal) are not included as their use in the agricultural sector is negligible (respectively 2.3%, 0.1%, 2.6% and 3.5% of the final energy consumption). It also shows which Member States would have to increase their rates in case Article 15(3) would be repealed.

Energy use and specificities of the primary sector

On average, the share of energy costs is high in the overall cost structure of agriculture. According to Eurostat[64], it represents about 7% of the value of the farming output and 12% of the input costs. A comparison with the indicator of energy intensity used in Article 17 of the ETD ("purchases of energy products and electricity amount to at least 3% of the production value") gives an idea of the relative importance of energy costs for the sector.

Because of the high share of energy costs, an increase in energy prices has an important impact on overall production costs and income in the primary sector. The sector is in general a "price taker", being characterised by a large number of single family businesses whose individual market shares are in general marginal. Nevertheless, important differences between sub-sectors and regions exist. Production systems, farm structures and management are highly differentiated across the EU and lead to large differences in the short term availability of more energy-efficient solutions and possibilities to respond to changes in energy prices. The high complexity and heterogeneity of the agricultural sector, which considerably varies the response of operators to higher energy costs and the actual net benefits achieved at local level, point to the need for more flexibility of Member States in agricultural energy taxation.

Assessment of the policy options

Three alternative solutions have been assessed against the objectives of the ETD revision and the likely consequences on the level of agricultural holdings, taking into account the specificities of the sector. The conclusions can be summarised as follows (for more details, see Annex 19, point 2):

Alternative I consists in maintaining Article 15(3). Such an unconditional exemption or tax reduction could be seen to be conflicting with the general objectives of the revision of the ETD to set minimum levels of taxation in order to pursue environmental benefits. Leaving the current situation unchanged would also fail to address distortions of competition in the internal market flowing from the divergent application of Article 15(3). On the other hand, agriculture is already subject to a number of environmental requirements and standards. Moreover, maintaining Article 15(3) would continue to allow Member States to reflect the specificities of their primary sector described above in their tax rates.

Alternative II consists in repealing Article 15(3). In that case, 12 Member States would have to raise tax levels for heating use and electricity and/or for motor fuel use (see Annex 17). The effects of repealing this provision could be mitigated by applying lower minimum levels of taxation on the basis of Article 8(2) of the ETD (as some Member States already do). Another alternative would be to apply the general provision for businesses of Article 17 of the ETD which requires beneficiaries of tax rates below the minima to provide counterparts which deliver equivalent effects to the tax. However, applying Article 17 to the primary sector

[64] 2008, Economic Account of Agriculture

would lead to practical difficulties and disproportionate administrative costs due to the high fragmentation and diversity of the sector.

Finally, Alternative III consists in repealing Article 15(3) but making it subject to the delivery of environmental counterparts in a simplified manner, reflecting the specificities of agriculture and other primary sectors. Such an approach would address the objectives of the ETD – reduce internal market distortions and provide incentives towards energy efficiency and emission reductions – whilst at the same time maintaining a certain margin of flexibility for Member States. This solution would maintain the possibility for Member States to adjust their level of taxation of energy on the basis of the specificities of their primary sector while ensuring an effective achievement of the ETD's objectives.

6.3. Awarding special treatment to sectors deemed to be under the risk of carbon leakage

Sectors within the scope of the EU ETS

To avoid delocalisation of carbon emissions out of the EU, the EU ETS envisages a 100% free allocation of emission rights during the period 2013-2020 to the sectors of industry deemed to be under the risk of carbon leakage (subject to benchmarks and potentially uniform cross-sectoral correction factor and linear reduction factor).. The risk of carbon leakage also applies to small installations[65] within these sectors that would have to pay CO2 taxation. It might therefore be considered necessary to devise special rules for those small installations to avoid carbon leakage following the application of CO2 taxation. As regards the identification of those ETS sectors which are considered as being under a risk of leakage, all industrial sectors[66] were analysed for the purpose of the EU ETS and a list of the sectors eligible for receiving 100% of the relevant benchmark for free was established[67]. This list is valid for five years and will be regularly updated by means of a Commission decision.

For sectors not deemed to be under the risk of carbon leakage, the EU ETS envisages and 80% free allocation of emission rights in 2013 to be reduced to 30% by 2020 (subject to the same conditions quoted above). As opposed to the leakage sectors, where free allocation is considered necessary from the point of view of principle (because increased costs cannot be passed on), the decreasing number of free allowances for the non-leakage sectors is very much a transitional rule. The purpose is to avoid an abrupt break from the current situation i.e. moving from almost full free allocations to full auctioning, which might cause hardships for some industrial sectors. The situation is different as regards taxation because carbon taxation will be introduced as part of the existing national system of excise duties and there is thus no need for such a transitional instrument at an EU level for small installations within these sectors but excluded from the scope of the ETS. Besides, by fixing only a minimum carbon price the revised ETD will offer Member States the flexibility to phase-in carbon taxation gradually by starting at the EU minimum and increasing the level step-wise.

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65 In this chapter the term "small installations" is used to denote those installations falling below the threshold for participation in the ETS as defined by Directive 2003/87/EC, as amended by Directive 2009/29/EC, Article 27 (1) and Annex I respectively.

66 NACE four digit codes covering sections B and C of NACE.

67 Commission Decision 2010/2/EU of 24 December 2009 determining, pursuant to Directive 2003/87/EC, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage, OJ L 1, 5.1.2010.

As for the number of installations potentially concerned, no exact figures are available, but it is estimated that a share of up to 14.5% of emissions from the energy and industrial sectors combined are presently not covered by the ETS and could therefore become subject to CO2 taxation[68].

Sectors outside the scope of ETS

The rules concerning carbon leakage only refer to installations under the ETS. However, installations not covered by the ETS, but subject to emission reductions or limitation obligations as a consequence of the Effort Sharing Decision may also be exposed to the risk of carbon leakage. In particular, the agricultural sector is mostly outside the ETS and therefore has not been assessed in terms of carbon leakage risk, but is subject to the ETD. As agriculture operates in an open global market, it could be exposed to such a risk. The Effort Sharing Decision foresees a specific assessment of the carbon leakage risk for agriculture in case of an international agreement. The Environmental Council has also called for a specific assessment of the carbon leakage risk for agriculture.[69]

How to take account of the risk of carbon leakage in the revision of the ETD

The detailed assessment in Annex 19, point 3 concludes that a reduction in the CO2 tax liability based on past energy consumption of an individual company multiplied by a fuel mix benchmark (tax credit) would best respect a number of key criteria. The link to benchmarking ensures that only the amount of tax is credited that would be due if the company had used a reference fuel, considered as a benchmark of CO2 efficiency.

The results of the existing and future analysis of carbon leakage should be taken into account by the ETD. However, given the possible changes of the scope of the list of ETS sectors deemed to be exposed and the fact that the risk of carbon leakage for the agricultural sector still has to be assessed, the ETD should simply refer to ETS and agricultural legislation in order to identify the sectors deemed to be at risk for the purposes of the ETD. The ETD can only set the rules on the application of the CO2 tax and exemption or compensation mechanisms for these sectors and, for the determination of these sectors, refer to assessments required by other legislation or, in case of none, require a specific assessment. The actual naming of the sectors concerned is outside the scope of EU taxation policy.

A further question is whether Member States shall be **obliged** to introduce these compensations **or** whether the EU shall leave this **optional** for Member States. An optional solution might be less advantageous from the internal market point of view and would require State Aid authorisation. It would, however, be in line with the overall flexibility left to Member States (only harmonisation of the tax structure and the definition of a minimum rate allowing Member States to freely set national tax rates above the minima according to their needs under the effort sharing decision[70]). It would also allow taking into account that some Member States already have CO2 taxes for which an obligatory tax reduction measure could have significant budgetary impacts and could call into question the environmental effects pursued by such national tax policy. Indeed, an obligatory solution would mean that

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68 This is the difference between EU-27 emissions of 2007 reported to UNFCCC and allowances handed in for the same year (industry calculation).

69 Conclusions of the Environmental Council meeting of 15 March 2010.

70 A number of Member States will even not have to apply such taxation at all in the period up to 2020 as they have no reduction target to fulfil under the effort sharing decision.

everybody gets the maximum according to the benchmark defined whereas an optional scheme allows for this maximum to be given but also allows giving less.

6.4. Inclusion of biofuels into the list of energy products in the ETD

This aspect of the ETD revision would have no impact on taxation of biofuels itself. The main impact would result from the balance between increase and decrease of administrative costs/burden for the tax administrations and for the trade on the one hand and more clarity and legal certainty and reduced economic risk for operators and tax administrations on the other.

In order to analyse these issues in detail and to develop a common approach between the Member States for applying the control and movement provisions of Directive 92/12/EEC (in the meantime replaced by Directive 2008/118/EC) to biofuels, a Fiscalis Project Group was created in 2007 to which 10 Member States and the Commission participated. Trade representatives were also consulted by the Group. The objective of the Group was to strike the right balance between, on the one hand, the need for a unified and standardised treatment of biofuels comparable to the treatment of any other energy product and, on the other hand, the need for a balanced and proportional administrative burden for economic operators and the tax administrations. The Group had 4 meetings in the course of 2007 and prepared a report containing a number of clear recommendations, which was presented to the Member States in the Excise Committee in 2008. Those recommendations that require a modification of the ETD are summarised in annex 19, point 4.

7. COMPARING THE POLICY OPTIONS

7.1. Comparison of the policy options against selected criteria

This chapter evaluates the policy options analysed in Chapter 5 and 6 against a set of four key criteria: internal market and fair competition, environmental effectiveness, budgetary impacts and equity. The first two of them are directly related to the objectives of the ETD revision described in Chapter 4, whereas the last two can rather be described as additional constraints.

- Internal market and fair competition. This looks at the ability of the various options to remove the following types of distortions in the internal market: distortions between energy users in different Member States due to differences in national tax rates; distortions between competitors using different energy products; and distortions between ETS and non-ETS participants. This criterion therefore reflects specific policy objectives (1) and (3).

- Environmental effectiveness. Under this title the impact of the policy options on the treatment of renewable energies is assessed (specific policy objective (2)). Furthermore, it is indirectly linked to objective (3) in the sense that here it is compared in how far the options contribute to a reduction in CO2 emissions outside the EU ETS which is the purpose of introducing a CO2 price signal complementary to the EU ETS.

- Budgetary impacts. This criterion had to be added because, while meeting the objectives of the ETD revision, some policy options might undermine the ability of Member States to use energy taxation for revenue raising purposes, which 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. In this sense, this chapter looks at the distribution of effects between richer and less well-off Member States – in this respect it mainly follows the solidarity approach reflected in the differentiated targets of the effort-sharing decision. Furthermore distributional effects between different income groups within the Member States are assessed.

As to the ***economic impacts*** of the policy options in terms of GDP and employment, as has been stated in Chapter 5 these are modest but positive in all policy options provided revenues are recycled via a reduction in labour costs. Since the tendency is the same under all options (only the size of the effects varies according to the amount of revenue disposable for recycling) further discussion of this aspect is not needed for the purposes of this chapter.

Internal market and fair competition

First, all policy options tested would improve the current situation in the sense that they would ensure a more consistent treatment of energy sources by aligning their tax treatment on an objective basis – either energy content or CO2 emissions or a combination of both. However, option 2 represents major shortcomings because it restricts the tax base for energy taxation and leaves important energy sources outside its scope (electricity, renewables). This could be considered undesirable from an internal market point of view because it would leave taxation of these two groups of energy products fully to national discretion and therefore

depart from the original objective of the ETD to create a comprehensive framework for taxation of all competing energy sources on the internal market.

As regards distortions of competition between Member States all options again show positive effects (cf. Table 12 concerning natural gas), although some differences can be observed. The derogation for introducing CO2 based taxation for nine Member States proposed under option 3B would make it score somewhat less favourably than option 3A to which it is otherwise quite similar. On the other hand, option 4 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. Removal of country specific minimum levels of taxation for heating gas oil (deletion of Article 9(2) of the ETD) would further enhance the scoring of each policy options from the internal market point of view.

As regards the transport fuel, option 5 would lead to a significantly lower level of divergence between Member States. Analysis of option 6 showed that the requirement to respect the relationship between products also at national level risks leading to more distortions between the Member States on the internal market. However, this is only true under the *assumption* that petrol taxes remain unchanged and diesel rates are reviewed upwards. In reality, most Member States are already taxing motor fuels at a level that would allow them to implement the alignment by a reduction of petrol rates.

As regards the distribution of burden between the ETS and non-ETS sectors, all options introducing a specific CO2 based tax element can be considered beneficial: options 2, 3A, 3B and 4 all introduce a CO2 tax element which would be complementary to the EU ETS and thereby remove current overlaps in accordance with the specific policy objective (3). On the level of a CO2 tax that would provide for equal treatment between the ETS and non-ETS sectors, as explained in point 4.1.1, it is impossible to give a definitive answer at this point. However, two observations can be made here. First, a system of taxation relying exclusively on CO2 based taxation (option 2) would erode the tax base to an extent that might force Member States to increase rates disproportionately on those still liable in order to safeguard revenues. Second, an indexation mechanism establishing a link between the ETS price and the level of CO2 taxation would help to avoid excessive distortions.

Option 1 meets the specific objective of tax neutrality between energy sources and, hence, improves 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. This policy option does however not address the question of overlap with the EU ETS, nor does it provide a consistent price signal for CO2 emissions in the non-trading area

Option 2 would meet the objective of introducing a CO2 price signal in non-trading areas, except transport and would ensure consistency with the EU ETS. The CO2 tax on heating fuels would not apply to EU ETS installations and to electricity and energy sources that are considered CO_2 free under the Kyoto emissions accounting (such as renewables). As far as heating fuels are concerned, this policy option would restrict the scope of the ETD to fossil energy sources.

This option might present certain shortcomings from the fiscal point of view as is may lead to a reduced tax base, especially as it is expected to lead to an increased share of renewables used for heating purposes (electricity as such and renewables would no longer be taxable).

Environmental effectiveness

The current unfavourable tax treatment of renewables would be partly removed by option 1 as the lower energy content of most biofuels would no more be penalised under the system proposed here. On the other hand, as opposed to the options introducing CO2 based taxation, option 1 would not reflect the natural advantage in terms of CO2 neutrality as recognised in EU legislation. Biofuels differ when it comes to the question which of the two effects is more important; 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 (see Table 11. Options 3A and 3B combining both elements are therefore best able to comprehensively reflect the advantages of renewables in the structure of the tax system.

The effect of the policy options on CO2 emissions depends on two things: impact on national rates and the set-up of the policy options. As for the former, all policy options would lead to lower CO2 emissions. The impacts are highest for option 4 where it is assumed that all Member States introduce an additional CO2 tax on top of their existing tax rates. Concerning impacts related to the set-up of the policy options, CO2 taxation reduces emissions more than energy-content based taxation. That makes option 1 less beneficial, because its impacts on CO2 emissions are less pronounced. Since only policy option 4 requires Member States to apply CO2 taxation on top of existing rates, it is not surprising that it has the biggest effect on CO2 emissions. Comparing policy options 3A and 3B, the former has a higher effect on CO2 emissions. The main reason for this will be the higher level of CO2 tax; given their relatively small share in overall emissions (13%), the exemption for the nine new Member States is relatively less important in this context.

As far as transport is concerned, both policy options 5 and 6 can contribute to the EU's efforts to reduce emissions from road transport. Although the average emissions per kilometre of a diesel car are still slightly below those of a petrol car, this Impact Assessment has shown that the relatively lower share of diesel cars that would materialise in particular under option 6 would not lead to an overall increase in emissions. This is because apart from the relative efficiency of the cars, the level of total emissions is also determined by transport volume which would be reduced under option 6.

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. However, the decision 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. Option 2 is clearly weakest from this point of view because it restricts the tax base exclusively to fossil fuels consumed in the non-ETS sector. All other options appropriately safeguard Member States ability to raise revenue with energy taxation. A stronger increase in revenues is observed under option 4, which introduces CO2 taxes on top of existing rates, and under transport option 6 under the assumption that the alignment in the rate of transport fuels is achieved through an increase in diesel rather than a reduction in petrol rates. However, as stated above, this cannot be taken for granted as most Member

States do have the option to implement the alignment at least partly via a reduction in petrol rates.

In reality, however, the budgetary impacts would very much depend on national budgetary choices and also on flexibility left to Member States in the Energy Taxation Directive. This impact assessment shows that there might be certain scope for flexibility when it comes to taxation of households.

Equity

Equity among Member States: The effort-sharing decision of the EU energy and climate package introduced a differentiation in national emission reduction targets taking into account differences in national GDP per capita levels. This approach, which was designed to avoid an excessive impact of the emission reduction effort on poorer Member States, should from an equity point of view also be reflected in the structure of the ETD. Otherwise the impacts of upward changes in the minimum tax levels would primarily occur in Member States with tax rates closest to the EU minima, which in many cases are again those with lower GDP per capita levels. Option 3B thus introduces transitional periods for the introduction of CO2 based taxation reflecting the solidarity approach of the energy and climate change package and would rank best from this point of view. Options 2, 3A and 4 on the other hand can be seen as in conflict with the solidarity approach of the energy and climate package as they impose the same minimum CO2 price signal also on those Member States which have been given a more lenient reduction target because they are less affluent.

Removal of country specific minimum levels of taxation for heating gas oil (deletion of Article 9(2) of the ETD) would further enhance the equity among Member States.

Equity among energy consumers: the modelling showed that equity among energy consumers can be significantly increased if both heating and motor fuel uses are covered by the ETD revision as taxes on transport fuels can balance any potential regressive impact of taxes on heating fuels. The two transport options 5 and 6 therefore do not raise any distributional concerns in themselves. As regards the general policy options, the analysis showed that there are no overall negative distributional impacts. There are, however, differences among Member States that might warrant some degree of flexibility in this area. In any event, as shown in this impact assessment, possible negative distributional impacts can be overcome by recycling revenues from energy taxation in the form of lump-sum payments to households to compensate. Ideally such payment should be targeted to low income households, also to allow combining this form of revenue recycling with reductions in labour costs (which, on the contrary, benefits the economy).

The following table summarises the assessment made above of the various policy options:

Table 15: Comparison of the policy options in terms of selected assessment criteria

Policy option	Internal market and fair competition	Environmental effectiveness	Budgetary impacts	Equity
Option 1	+	(+)	+	+
Option 2	-	+	-	-
Option 3A	++	+	+	-
Option 3B	+	**(+)**	**(+)**	++
Option 4	**(+)**	++	++	- -
Option 5	++	+	+	+

Option 6	**(-)**	++	++	+

Note: The brackets denote that only half a mark is given.

7.2. The preferred policy set

Based on the above comparison as well as on the analysis of the specific policy options described in Chapter 6, a preferred policy set can be identified that would be constituted by the following elements:

- Structure and general level of taxation for heating fuels as presented in policy option 3A (20€/tCO2 (2013-2020) and 30€/tCO2 (2021-2030), (0.15 €/GJ for business use and 0.3 €/GJ for non business use).
- Transitional period for nine Member States for heating fuels to introduce CO2 based taxation until 2020 as contained in policy option 3B.
- Alignment of taxation of transport fuels on the basis of energy and CO2 content on the basis of transport policy option 6.
- Repeal of country specific minima for heating gas oil in accordance with Article 9(2) of the ETD.
- Reduction in the CO2 tax liability for small installations from sectors deemed to be exposed to a risk of carbon leakage on the basis of a fuel benchmark.
- Make the application of tax reductions for the primary sector (Article 15(3) of the ETD), subject to the delivery of environmental counterparts in a simplified manner.
- Inclusion of biofuels into the list of energy products in the ETD.
- Indexation of the minimum rates based on energy content (Annex 14 explains how this could be done in practice). For the CO2 part of the tax, this should take the form of a periodic alignment of the minimum rate to the evolution of the market price in the EU of the emission allowances.

The summary impact of the combination of the above elements – with the exception of the last point which is considered purely technical - is analysed in the section below. In addition to the options described above, the preferred policy set also retains the possibility for Member States to exempt households from taxation in accordance with Article 15(1)(h) of the current ETD. As this is an existing element, a separate assessment under Chapter 5 was not considered necessary for the purposes of this IA.

Summary assessment of the preferred policy set

The overall macroeconomic impact of the preferred policy set is very small but positive under the conditions of labour tax recycling, in line with the results presented in the preceding sub-chapter. In fact, results for the options 3A and 3B are almost identical for GDP (+0.06% and +0.05% in 2020) and sufficiently close for job creation (195.000 and 133.000 in 2020, cf. Annex 4) so as to make separate modelling dispensable.

Internal market and fair competition

The preferred policy set fully achieves objective (1) of the ETD revision, i.e. a consistent treatment of energy sources which avoids distortions between users based on the different fuels they consume. This is achieved by the alignment of minimum rates for both transport and heating fuels on the basis of their energy and CO2 content, supplemented in the case of transport fuels by the obligation for Member States to mirror this alignment in their national taxation systems.

Furthermore, the preferred policy set also effectively addresses the objective to achieve a level playing field between installations inside and outside the ETS. This is on the one hand because the double structure of the minima as established under both variants of option 3 allows the use of CO2 taxes as a complement to the ETS; on the other hand the specific solution found for small installations in sectors deemed to be under a risk of carbon leakage mirrors well the treatment of installations from the same sectors under the ETS.

Compared to the present situation, the preferred policy set will also lead to an overall reduction in distortions of competition between Member States as regards heating fuels (compare Table 12). The derogation for nine Member States to introduce CO2 based taxation will, to the extent that it is used, increase divergences between national rates somewhat, although it can be argued that this only translates the prior policy choice entailed in the differentiated targets of the effort-sharing decision. It does not therefore create any new distortions in the internal market that have not been considered acceptable before. On the other hand, the level playing field on the internal market is also strengthened by two of the specific policy options retained – the repeal of country-specific minima for heating gas oil as well as the repeal of the possibility to exempt the primary sector from taxation without counterparts – which remove current incoherencies in the tax system.

Finally, as regards motor fuels it is true that the obligation for Member States to align the tax treatment of petrol and diesel in their national systems could, if achieved entirely by an increase in diesel rates, increase differences in tax rates between Member States. Although this consequence is not inevitable as most Member States have a level of taxation today that would allow complying with the new rules by a downward adjustment of petrol rates, this nevertheless constitutes a significant trade-off which might call for some flexibility and notably a step-wise approach.

Environmental effectiveness

Given that the preferred policy set combines the higher level of CO2 taxation of policy option 3A (20€/t) with the transitional period for nine Member States as originally envisaged in option 3B, the effect in terms of CO2 emission reductions will lie in between the values modelled for these two options, i.e. between 0.42 and 0.33% of total EU emissions (cf. Table 5). It is not surprising that these figures are quite moderate because the principle of both variants of option 3 is a restructuring of existing national rates rather than the introduction of CO2 taxation on top of existing rates and it is this restructuring in which the main value added of the envisaged revision lies. It is in fact highly likely that some Member States will go beyond the minimum requirements and introduce more ambitious levels of CO2 taxation based on this structure which would result in higher emission reductions.

Importantly, the options chosen to address the specific situations both in the primary sector and in sectors exposed to a risk of carbon leakage are designed so as not to diminish the environmental effectiveness of the revised structure. In the case of agriculture, this is because all tax reductions will have to be accompanied by an environmental counterpart; in the case of sectors exposed to carbon leakage this is because the tax credit leaves the marginal incentive to abate emissions intact.

Renewable energies, and in particular biofuels, will profit from the preferred policy set because the combination of energy content and CO2 based taxation reflects the advantages of the various types of biofuels in the most balanced way in the general structure of the tax system. Furthermore they are also expected to profit from the removal of the current tax

advantage for diesel fuel implied in policy option 6 in the sense that the misleading signal implied in today's system is removed that a switch to diesel is an alternative to a move to truly CO2 neutral fuel sources in transport.

Budgetary Impacts

The preferred policy set would safeguard Member States' ability to raise revenues with energy taxes satisfactorily without forcing them into massive tax increases. The additional annual tax revenue for the chosen combination of option 3A and 3B is estimated to be 13,3 billion €[71].

Equity

As regards distributional impacts between Member States, the derogation for nine Member States will guarantee that, in line with the orientations taken in the energy and climate package, disproportional impacts on the less affluent Member States are avoided. This is considered sufficiently important to justify the trade-off with the principle of equal treatment on the internal market.

Finally the preferred policy set avoids regressive distributional impacts between different income groups because it combines a medium level of ambition with regard to heating fuels (in particular when compared to option 4) with the more ambitious policy options regarding motor fuels. Overall this will lead to a balanced effect on the different income groups not the least because the relatively higher level of diesel taxation implied in policy option 6 will impact mostly on the richer segments of society.

8. MONITORING AND EVALUATION

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 Excise Committee. Moreover, twice yearly DG TAXUD together with the Member States update the information database on the applicable energy tax rates (Excise Duty Tables).

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

[71] Own calculation based on Cambridge Econometrics: 14.2 billion is the revenue modelled for option 3A, of which 7.1 billion are revenues due to CO_2 taxation. 13% of the latter figure has been subtracted to account for the derogation for the nine MS.

Annex 1: Revenue from energy taxation

	Revenue from taxes on energy as % of total tax revenues	Revenue from taxes on energy as % of GDP	Revenue from taxes on transport fuel as % of GDP
EU-27 (weighted average)	4,4%	1,7%	1,4%
BE	2,8%	1,2%	1,1%
BG	8,8%	3,1%	3,0%
CZ	6,4%	2,3%	2,1%
DK	4,4%	2,1%	1,0%
DE	4,7%	1,8%	1,4%
EE	5,8%	2,0%	1,7%
EL	3,6%	1,2%	1,1%
ES	3,9%	1,3%	1,1%
FR	3,3%	1,4%	1,2%
IE	4,3%	1,3%	1,2%
IT	4,4%	1,9%	1,5%
CY	4,4%	1,6%	1,3%
LV	6,0%	1,7%	1,6%
LT	5,2%	1,5%	1,5%
LU	6,4%	2,3%	2,3%
HU	4,9%	2,0%	1,9%
MT	5,0%	1,5%	1,4%
NL	4,9%	1,9%	1,2%
AT	3,8%	1,6%	1,3%
PL	6,6%	2,3%	1,9%
PT	5,2%	1,9%	1,8%
RO	5,1%	1,4%	1,1%
SI	6,5%	2,4%	2,2%
SK	6,3%	1,8%	1,7%
FI	4,1%	1,8%	1,3%
SE	4,7%	2,2%	1,3%
United Kingdom	4,8%	1,8%	1,7%

All data are for 2008
Source: Taxation Trends in the European Union, EC 2010

Annex 2: Quantitative modelling tools applied in the impact assessment, the role of revenue recycling and sensitivity analyses

For the purpose of this impacts assessment two modelling tools were used to quantify the economic, social and environmental impacts of the policy options 1 to 6. A further modelling tool was used to assess the potential impact of the economic and financial crisis.

1. ECONOMY-WIDE MODELLING (E3ME MODEL)

The E3ME model of Cambridge Econometrics is a dynamic macro-econometric model designed to deal with E3 interactions (economy- energy –environment). It is a European model treating each Member State separately and keeping the rest of the world exogenous. The model output includes changes (with respect to the baseline) in macroeconomic variables (GDP, employment, inflation, wages, private consumption), energy demand and CO_2 and other energy-related emissions. These results are obtained at the EU average level and separately for each Member State. As E3ME has a fairly detailed sectoral structure, the changes in output, exports volumes and prices at the sectoral level can be detected. The competitiveness effects of policy options are discussed in the light of these results. Finally, distributional impacts on households (differentiated by income level, occupation and place of residence) are also produced.

Although E3M3 is in many ways similar to the general equilibrium models ("CGE-models") dealing with E3 interaction, such as GEM-E3, it has also certain distinct features. E3ME is of "Neo-Keynesian" inspiration: it is demand-driven and allows disequilibrium in the markets (and thus involuntary unemployment), even in the long-run. Markets are characterized by different degrees of competition, and economies or diseconomies of scale may prevail in production and consumption. Behavioural equations and parameters are estimated using dynamic time-series econometrics (co-integration and error-correction), which allows dynamic convergence to a long-term outcome, while also providing short- and medium term impacts. As the model output partly reflects these short-term/dynamic effects, the impacts of policies tend to be smaller than in CGE-models.

It should be pointed out, however, that E3ME is a hybrid model in the sense that it relies partly on calibrated parameters. This applies, in particular, to the price-elasticities for aggregate energy demand, which are not estimated on historical data sets[72].

Baseline assumptions in the E3ME modelling

The E3ME baseline scenario, projected over the period 2013 – 2030, is calibrated to be consistent with the updated 2007 PRIMES baseline of DG TREN[73] and thus to be consistent with the baseline which was used for the purpose of the January 2008 climate change impact assessment. Future world energy prices are exogenous in the model and assumed to be the same as in the PRIMES. Since the oil prices are lower than current price levels and forecasts, a sensitivity analysis with higher oil prices was carried out (for levels see table D1).

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[72] According to E3ME modellers estimated price-elasticities tend to be biased downwards, since variation in energy prices are temporary and have a smaller impact than permanent tax changes.

[73] European Energy and Transport: Trends to 2030 – Update 2007 (DG TREN 2008).

The EU emissions trading scheme (EU ETS) is modelled endogenously in the baseline so that the allowance price is determined according to the demand for allowances and the number of allowance available (fixed in such a way the allowance price matches that of the PRIMES baseline. The allowance price in the baseline is 20€/tCO2 in 2010, 21.8€/tCO_2 in 2020 and 23.8€/tCO_2 in 2030). The ETS covers the following sectors: power generation, other energy transformation, iron and steel, non-metallic mineral products, paper and pulp and other industry[74]. Over the period 2013-2030 (which is period of coverage of the modelling) the ETS includes also aviation, non-ferrous metals and chemical plants[75].

Given that the modelling covered the period 2013 – 2030, the baseline tax rates were assumed to be the existing national tax rates on 1st January 2008 and, where applicable, upgraded to take into account expiry of transitional periods in the EU minima. All tax rates in the baseline were assumed to be constant in nominal terms (and not in real terms as in the PRIMES baseline), corresponding to the ETD and the current practice in most Member States. When it comes to sectoral tax rates, a number of simplifying assumptions were needed to adjust the variety of rates currently applied on different users and fuel types in the Member States to the fuel groups and users of the E3ME model. For road transport the weighted averages of tax rates for unleaded petrol and diesel, with weights based on current consumption shares in each Member State, were used.

2. TRANSPORT SPECIFIC MODELLING (TREMOVE)

Given that the economy-wide modelling tools are not able to capture detailed changes within the transport sector, more specific transport related modelling was carried out using the TREMOVE model.

TREMOVE is a transport and emissions simulation model designed to study the effects of different transport and environment policies on emissions of the transport sector. The model estimates transport demand, modal split, vehicle fleets, emissions of air pollutants and welfare levels under different policy scenarios. The model makes it possible to model modal shift, e.g. shift to different fuels or means of transport. TREMOVE covers the 1995-2030 period with yearly intervals, for both passenger and freight transport in the EU-27.

TREMOVE modelling carried out for the purpose of this impact assessment was based on an updated baseline of the TREMOVE model version 2.52 (this version has been used as one of the models for the purpose of the most recent modelling for example under the Greening of transport exercise). However, new fuel prices for the EU countries, as they are known in 2008 were incorporated in this case. Also fuel taxes were updated according to the situation on 1 January 2008. This mainly involved updating values for non Euro-zone countries as their exchange rate to Euro have changed and thus TREMOVE values which are in Euros of year 2000 had to be updated. Only motor fuel prices and taxes were updated, all other values were kept as in the previous versions of TREMOVE. As in the case of E3ME the modelling covered the period 2013 – 2030 and thus assumed that the 2013 baseline tax rates are either

[74] This includes the non-specified category in the IEA energy balances data which for some countries and fuels include large ETS installations that have not been allocated to other industrial categories.

[75] It is to be noted that although it is never possible to perfectly match ETS coverage in a sectoral model, the emissions in the E3ME model were checked against the 2005 verified figures and the margin of error was only 2.3%.

the existing rates or the existing rates upgraded upwards to take into account the expiry of the transitional periods and the new diesel minima foreseen in the ETD as of 1st January 2010.

In TREMOVE the price elasticities, substitution elasticities and possibly resulting rebound effects are a core part of the model. All the transport modes have been taken into account as well as the possibilities of shifts between them. Substitution elasticities are assumed to be equal for all countries and all years. Price elasticities are calculated within the model, from the substitution elasticities, the prices and the transport quantities. Price elasticities differ by country and year.[76]

3. IMPACTS COMING FROM INDEXATION OF RATES IN THE MODELLING

For the purpose of the modelling (both with E3ME model and with TREMOVE model) the assumption was made that the value of minima in the policy options would be kept constant in real terms. This means that the policy options were indexed to take into account inflation. Given the long period of the modelling exercise 2013-2030, such indexation was necessary to ensure that the real value of the policy options would be maintained over time.

When it comes to the tax rates in the baseline, the approach under the two modelling methods differed, with E3ME modelling the baseline tax rates in nominal terms (thus reflecting the existing reality in most Member States and in the ETD) whereas TREMOVE modelled them in real terms. Given that the E3ME model offers the possibility to keep tax rates in the baseline in real terms, this approach was preferred since baseline in nominal terms better reflect the existing reality and the objective of the exercise was to compare results to existing policy. However, inevitably, at a certain moment of time, the indexation influenced partially the results (price level increases just under 50% between 2013 and 2030 assuming 2-3% inflation for 17 years, in consequence the minima of 0.6€/GJ in 2013 become 0.9€/GJ in 2030. Likewise 0.3€/GJ in 2013 becomes 0.45€/GJ in 2030).

4. MODELLING TAKING INTO ACCOUNT THE POTENTIAL IMPACT OF THE ECONOMIC AND FINANCIAL CRISIS (QUESTIII)

The QUESTIII model is a dynamic stochastic general equilibrium (DSGE) model in which the behavioural equations are explicitly derived from inter-temporal optimisation of economic agents. The model represents two regions, the EU and the rest of the world. In each region, the model economy is populated by liquidity and non-liquidity constrained households, monopolistically competitive firms in five sectors, a monetary authority and a fiscal authority. Labour supply is endogenous and households offer high-skilled, medium-skilled and low-skilled labour services, where high-skilled employees are either employed in the R&D activities or traditional production activities. The monetary authority follows a standard Taylor-rule in each region and interest rates are endogenously determined. We distinguish two non-energy sectors, an energy-intensive and a non-energy intensive sector. The energy sector is composed of three subsectors: fossil-fuel based (dirty), green and nuclear energy sectors. The energy-intensive and the “dirty” energy sector are subject to an emission-cap scheme.

[76] More detailed description of TREMOVE model can be found on the following link: http://www.tremove.org/documentation/Final_Report_TREMOVE_9July2007c.pdf

It is important to note that the model is less detailed compared to traditional CGE models: i.e. it cannot distinguish between different types of fossil fuels, e.g. oil or coal or different use of fuels, e.g. residential heating or transportation. Furthermore, the model can only estimate the impact of policy options for the EU27 as a whole and not for individual Member States.

5. REVENUE RECYCLING AND NATIONAL TAXATION POLICIES

This impact assessment indicates that the revenue recycling through the reduction of labour costs can bring forth significant economic advantages, which counteract the negative impact of higher energy costs on the economic activity. Environmental tax reforms, which aim to shift the tax burden away from labour towards environmentally harmful goods and activities, are the examples of such revenue recycling.

There is enough evidence to confirm that:

- In practice Member States are likely to recycle eventual additional revenue from energy taxation via reducing labour costs thus in line with the assumptions used in the modelling.

- In practice, by doing so (raising energy taxes and reducing labour costs), it is possible to achieve positive results broadly in line with the results of the economy-wide modelling carried out for the purpose of this impact assessment.

Several EU Member States have carried out tax reforms, which imply such a shift of tax burden, during the last few decades[77] and, more recently, some new Member States are implementing, or planning to implement such reforms[78].

The experience from the Nordic countries shows, that such reforms have a potential to lead to significant overall improvements in energy efficiency and emission reduction, whilst the effect on employment and GDP is neutral or slightly positive. All the Nordic countries carried out important environmental tax reforms in the 1990s with focus on energy and transport tax base. According to studies, energy-related taxes are estimated to have reduced total industrial CO_2 emissions by 9-11 percent between 1992 and 2000 in Denmark. In Sweden it is estimated that 60% of emission reductions between 1987 and 1994 are attributable to the energy tax system. Likewise, in Finland energy taxes are estimated to have decreased CO_2 emissions by 7%, by 1998, compared with a business as usual scenario. In Norway, the contribution of energy taxes to the reduction in CO_2 emissions is estimated to be only 2.3%[79].

The ex-post evidence on the six EU Member States having carried out environmental tax reforms is also obtained from the COMETR project[80]. The results of the project indicate that the ETR had a positive impact on economic activity in all the six countries, measured by the change in GDP. At the same time fuel demand and GHG emissions decreased, albeit at a modest speed and only up to 2003 in three of the countries. International competitiveness of these countries was not adversely affected, as gross output of energy-intensive industrial

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77 The countries include Denmark, Germany, the Netherlands, Finland, Sweden and the United Kingdom.

78 E.g. Estonia, the Czech Republic and Slovenia.

79 See, Nordic Council of Ministers, *The Use of Economic Instruments in Nordic and Baltic Environmental Policy 2001-2005, TemaNord 2006:525.*

80 Competitiveness Effects of Environmental Tax Reforms (COMETR). The final report is available on the following web-site: http://www2.dmu.dk/cometr

sectors slightly increased, except in few cases. The positive impact on economic activity was, according to the study, largely the outcome of the positive revenue recycling effect.

Annex 3: Overview of impacts on national tax rates and on energy prices

1. IMPACT ON NATIONAL TAX RATES

1.1. Business use (heating materials and electricity)

Detailed results about impacts on national tax rates for business use[81] are reported in Annexes 5 (heating use and electricity) and 7.

To sum up, the impacts differ product per product, thus highlighting one of the key issues behind the ETD revision: the existing minima do not provide a coherent basis for taxation of energy on the internal market because their level differs product per product.

Policy option 4 has in all circumstances effects in all Member States, because this policy option foresees introduction of an additional CO_2 tax on top of all existing taxes. The only exception is taxation of electricity, since such CO_2 tax would not apply to electricity as such.

At EU level, the most important industrial energy sources is electricity (almost 30% of industrial energy consumption), followed closely by natural gas (29.7%).

Only policy options 1 and 3A show an impact on taxation of ***electricity***. This is due to the alignment (of part) of the EU minima to the current value for heating gas oil. In terms of MWh, the revised minima would increase from the existing 0.5€/MWh to 2.16€/MWh. In consequence the tax rates in 17 Member States would have to increase. Other policy options are driven by CO_2 aspects and thus do not impact on taxation of electricity.

Given the rather low EU minima for ***natural gas***, this energy source is significantly affected by the policy options. Except for policy option 3B the number of Member States concerned is always around 20. There are no major differences in impact depending on whether the policy option is driven by CO_2 aspects or by energy aspects. EU Member States can be divided into three groups on the basis of national importance of natural gas in the industrial energy mix: share around average and above (17 Member States), share around 20% and below (5 Member States). The remaining 5 countries have very low share (Cyprus, Malta, Sweden, Finland), maximum of 10 % (Greece).

The last energy source of major importance for the industry is ***solid fuels*** (on average 13% of final energy consumption by the industry), which is most affected by the policy options. However, there are major regional differences in the consumption of solid fuels. Energy consumption well above the EU average is registered in Slovakia, Czech Republic and Poland (around 30%). Above 15% are then Bulgaria, Germany, Austria and Romania, closely followed by Belgium and France. In a reasonably significant number of countries the consumption share of solid fuels reaches around 10% (Hungary, Estonia, Greece, Italy, Cyprus, Lithuania, Netherlands, Sweden and the UK). The policy options have effect in practically all Member States and this impact is more pronounced with the CO_2 driven policy options. So, the reason for the impact is not only the fact that currently the minimum levels of taxation for coal are very low, buy also the fact that coal has very high CO_2 emissions and

[81] It is to be noted that not all Member States distinguish between business and non-business rates, however, given that the minima are set separately, the impacts on national rates have also been analysed separately for business and non-business use.

thus it is the energy source which is, logically, most effected by the CO_2 driven policy options (2, 3A and 3B).

As far as mineral oils are concerned, starting from the most important of them - ***heating gas oil*** – the impact of the policy options is rather limited. Basically only those Member States that benefit from the individual lower minimum levels of taxation in Article 9(2) would be affected in case of policy option 1, 3A (in additional two Member States are affected due to rounding) and 3B. Policy options 2, 3A and affect more Member States. Business use also involves uses of gas oil in industrial stationary applications (Art. 8(2) with specific minima). In this case, the impact of the policy options is rather limited (policy options 1 and 3a affect 3 Member States, policy option 2 affect 4 Member States, policy options 3B and affect 5 MS, policy option 3B affects 2 Member States). The impacts also have to be seen in relative terms: on the average only up to 5% of industrial energy consumption comes from heating gas oil. Major importance is registered only in the following countries (9-15% of industrial energy consumption): Cyprus, Denmark, Austria, Greece and the UK).

The number of countries affected by the policy options is larger for ***heavy fuel oil***, although the percentage increase is not very significant. It is to be pointed out that heavy fuel oil is an energy source almost exclusively consumed by the industry (80% of heavy fuel oil is industrial energy consumption), but at EU level it represents only 4% of industrial energy consumption; with three substantial differences: Cyprus, Ireland and Greece (15-20% of industrial energy consumption).

Finally, as far as the remaining mineral oils ***LPG*** and ***kerosene*** are concerned, it is to be stressed that their importance in the industrial energy mix is negligible. No data is available for kerosene (probably reported under figures for heating gas oil), LPG represents 1.5% of industrial energy consumption, with the sole difference of Greece (above 6%) and with France, Ireland, Portugal, Sweden and the UK above 2%. Kerosene represents on the average 1% of the industrial energy consumption, with higher share in the UK and in Ireland (5%). The specificity of these two energy products is that the existing minima are set at zero, thus leading to major differences in national taxation policies. A couple of Member States would be affected by the policy options for heating kerosene (including UK and Ireland), a major number of Member States would be affected for LPG. These two products are also typically consumed in industrial stationary installations. In this case, however, the Directive already sets positive minimum rates and thus the impact of the policy options is rather limited (with policy options policy options 2, 3B having the main impacts).

1.2. Non-business use (heating materials and electricity)

Detailed results about impacts on national tax rates for non-business use are reported in Annexes 6 and 8.

To sum up, the impacts differ product per product and follow the same patterns as for business use. Policy option 4 has in all circumstances effects in all Member States, because this policy option foresees introduction of an additional CO_2 tax on top of all existing taxes. The only exception is taxation of electricity, where this policy option has no impact (since such CO_2 tax would not apply to it).

Starting from the most important energy source – ***natural gas*** (which represents on average 36% of energy consumption by the residential and tertiary sectors) – the impacts are similar to those for business use. However, as compared to industrial consumption where gas share is

much more balanced, in this case there are major country by country differences in gas consumption. 50-60% of energy consumption of the households and tertiary sector comes from natural gas in the UK, Netherlands, Hungary, Italy and Slovakia. Natural gas makes up over 30% of the relevant energy consumption in Germany, Czech Republic, Belgium, Luxembourg, France, and almost 30% in Romania. Very low consumption share of 10% and below concerns other 10 countries.

The second major energy source of the households/service sector is ***electricity*** (with 27% share in their energy consumption). The impact on electricity tax rates is, however, again limited to policy options 1 and 3a.

The third most important energy source of this consumption category is ***heating gas oil*** (16%). It is worth noting that households and services represent a far bigger proportion of the entire EU energy consumption (41%) then industry (28%). Again, in the case of policy options 1 and 3A the impacts are very limited and basically concern only those Member States that benefit from the individual lower minimum levels of taxation in Article 9(2). Policy options 2 and 3A affect more Member States.

As far as ***solid fuels*** are concerned (2.3% of energy consumption), the policy options would again be of significant impact in most Member States. However, with the important exception of Poland (23% of consumption share) and maybe Ireland (11%), Bulgaria (8%) and the Czech Republic (5%), households' coal consumption is rather low or even insignificant (although these relatively small figures always refer to consumption of the major energy consuming sector).

Lastly, concerning other mineral oils which are of minor importance at EU level, it is worth mentioning ***LPG*** that represents roughly the same energy consumption share as solid fuels (2.4%), the impact of the policy options would again be more significant, given the currently existing zero minima. ***Kerosene*** which is of use for households heating in few Member States only, there is a rather high share in Ireland (27%), Malta (17%) and in the UK (6%). All policy options would impact on the tax rates in the UK and Ireland because these countries currently apply zero rates. None of the policy options would affect Malta in terms of tax levels.

1.3. Motor fuels for transport

The impact on national tax rates for motor fuels is reported in Annex 9 to the impact assessment report. The number of Member States affected varies product per product and is higher for diesel then for petrol. Under policy option 5 there would be 21 Member States affected for ***diesel*** (the same number as is the case under the existing commercial diesel proposal; the magnitude of the impacts is, however, slightly larger). Similarly, as in the case of the commercial diesel proposal, 8 Member States would be affected, under policy option 5, for ***petrol***.

For ***diesel***, policy options 4 and 6 affect all Member States. For ***petrol***, although all Member States are affected under policy option 4, it is only 8 Member States that are affected under policy option 6.

Other motor fuels are concerned by the policy options to the extent that these policy options change their rates (for example the commercial diesel proposal addresses only petrol and diesel, similarly policy option 6 does not affect the national rates of products other then petrol

and diesel). As far as kerosene is concerned, the impact must be seen in relative terms of its (minor) taxable use. Finally, concerning LPG and natural gas, all Member States would be affected both under policy option 4 and 5 (there is no impact under policy option 6 because this option is relevant only for petrol and diesel).

2. IMPACT ON ENERGY PRICES

Direct impacts of the policy options on energy prices have been analysed looking at the percentage increase in the energy price which the policy options generate via their impact on the national tax rates. This assessment puts the impact on national tax rates in a more relative context. The results are reported in Annexes 11 and 12 to this impact assessment report for the main energy sources (gas oil, heavy fuel oil, natural gas, coal and electricity). The impacts have been calculated using energy prices per 1 GJ and converting all the policy options on the same basis. The energy prices refer to 2006 (latest available IEA prices). Higher energy prices would drive the impacts downwards (see also the sensitivity analysis in Annex D of this report).

The main conclusion from the analysis is that the impact on energy prices is not substantial, larger impacts only occur for those policy options that foresee more significant increase in the overall rates (in particular ***option 4***) and rather limited under the remaining options. The impacts are more homogeneous for business use, because energy prices tend to diverge less across Member States for business use. Finally, given the existing discrepancies in their taxation treatment, one can observe that the impacts differ substantially between energy sources.

2.1. Business use (heating materials and electricity)

As far as ***heating gas oil*** is concerned, the impact of all the policy options on its price is negligible and that is also true for Belgium and Luxembourg that are the only countries affected under all policy options. Impacts are larger and more variable for ***heavy fuel oil***. There are few countries that remain affected also under the least ambitious policy options (in terms of tax levels), but the price increase is normally limited to 10%, with the exception of Cyprus (where HFO represents 20% of industrial energy consumption with main application on the mineralogical industry which falls outside the scope of the ETD). The other two Member States with similar price increase - Malta and Luxembourg - do not register any use of this product.

The impacts on the price of ***natural gas*** follow similar patterns as for heavy fuel oil. There is rather limited number of Member States that register an increase in the price (around 10%) even under the less ambitious policy options. These are Belgium, Greece, Italy, Luxembourg (where the price increase reaches almost 20% under policy option 3D). Few other Member States register impacts around 5%. Several new Member States register larger price impacts under policy options 1 and 3A (Bulgaria, Romania, Estonia, Latvia and Lithuania). The only energy product where price is more substantially affected (in all cases at least two digits increase) is ***coal*** and that happens under all policy options. The impact is largest in the Netherlands, however, this is due to very low industrial pre-tax price. This only shows that the policy options would primarily impact where CO_2 emissions are the largest, which is the case of coal. ***Electricity*** prices are affected only by policy options 1 and 3A. The price increase is, however, negligible in all Member States.

2.2. Non-business use (heating materials and electricity)

As far as non-business use of the main energy products is concerned (leaving aside heavy fuel oil which is not used by households), the patterns are very similar to those for business use. However, due to higher pre-tax prices of gas, coal and electricity the price impacts are lower, in spite of the slightly higher non-business use minima.

For ***heating gas oil*** the impacts are exactly the same as for business use. Prices of ***natural gas*** grow less than in the case of business use. With few exceptions (Bulgaria, Romania, Estonia, Latvia, Lithuania, Hungary and Luxembourg), the price increase even under the most ambitious policy options remains commonly around 10%. As far as ***coal*** is concerned, the price impacts are again larger, however, significantly lower than was the case under business use. The relative importance of these impacts diminishes also when the consumption shares are taken into account.

3. INDIRECT IMPACT ON ENERGY PRICES

The E3ME modelling provided indications about broader impacts of the policy options on energy prices, taking into account all other interactions in the economy. This can be seen via the impact on the price of ETS allowances (cf. Table 1 below). In the longer-term the direction of the impact equals under all policy option: driving the price of ETS allowances (and thus energy prices) downwards.

Table 1: EU ETS allowance prices, €/tCO2

	2020	2030
Baseline	21.8	23.8
Option 1	20.5	21.7
Option 2	21.8	22.8
Option 3A	21.9	22.8
Option 3B	21.6	22.7
Option 4	20.9	20.8

Source: E3ME

This impact comes primarily from changes in energy demand and thus from the impact on the energy sector. The fall in the allowance price is the highest under policy option 4 which introduces a uniform CO_2 tax across sectors and Member States and causes the largest drop in energy demand and in demand for fossil energy sources. The main driver of the impacts on allowance prices are, therefore, refineries and this impact comes from changes in demand for energy products. The electricity sector is also affected, but there might be movements in both ways: under policy options 1 and 3A demand for electricity falls because taxes on electricity can be affected by the increase in the minima for electricity. On the contrary, under the CO_2-based policy options demand for electricity can grow due to shift away from CO_2 emitting fuels thus limiting the fall in the allowance price or even driving the allowance price upwards. Under policy option 4 the drop in energy demand is big enough to outweigh the increase in demand for electricity and thus allowance price falls.

One could also conclude that taxing the ETS sectors (as is the case under policy option 1) can also (to a minor degree) contribute to the reduction of the allowance price. This explains why there is such a large price decrease under policy option 1 in spite of the rather limited overall results.

When policy options 2 and 3A were remodelled fully exempting ETS installations as well as electricity under option 2, the allowance price, on the contrary, went up to 24.3 €/tCO2 in 2020 under option 2 and to 22.4 €/tCO2 in 2020 under option 3A. In spite of the high increase of the allowance price under option 2, the effect of the tax exemption would prevail at EU level and in several Member States boosting electricity consumption.

4. SENSITIVITY ANALYSIS HIGH ENERGY PRICES

A sensitivity analysis was carried out using the E3ME modelling to check the results should the baseline energy prices differ substantially. The sensitivity analysis assumed the nominal oil price to achieve $100 barrel in 2010 (details about the energy prices used in the modelling are shown in Table 2 below).

Table 2: Oil price: sensitivity analyses, $/boe

	2010	2020	2030
E3ME modelling	54.5	61.1	62.8
Sensitivity analyses	84.2	94.4	97.0

Source: PRIMES (DG TREN (2008)), Cambridge Econometrics[82]

The modelling showed that the main impact of higher oil prices would be to reduce the effectiveness of the minimum levels of taxation in reducing energy demand (partly because the higher oil prices would have already reduced energy demand). It resulted from modelling that a 50% increase in the oil price would reduce the effectiveness of the taxes by around 20%. So, for example, a tax of 10€/GJ will have double the impact if pre-tax energy prices are 10€/GJ than if they are 20€/GJ because total prices increase by 100% rather than 50%. This is also the case when the taxes are based on carbon content rather than energy content; in the example above a tax of 20€/tCO_2 would also have double the impact if baseline pre-tax energy prices are 10€/GJ.

The summary of the results from the sensitivity analysis is reported in Table 3 below. The results demonstrate that although the magnitude of the changes may depend on the energy price assumptions, the direction of the changes remains the same and the ranking of the policy options remains the same.

Table 3: Summary of results from sensitivity analysis, EU-27 (2030), % difference from baseline (main modelling: "Main.", sensitivity analysis: "Sens.")

Policy option	Energy demand		CO2		GDP		Employment	
	Main.	Sens.	Main.	Sens.	Main.	Sens.	Main.	Sens.
Option 1	-0.50	-0.39	-0.54	-0.40	0.04	0.02	0.09	0.08
Option 2	-0.68	-0.54	-0.83	-0.69	0.06	0.06	0.12	0.11
Option 3A	-0.72	-0.58	-0.87	-0.73	0.06	0.06	0.12	0.11
Option 3B	-0.54	-0.41	-0.63	-0.49	0.05	0.05	0.09	0.08
Option 4	-2.45	-2.01	-3.45	-2.92	0.27	0.16	0.38	0.34

Source: E3ME

[82] All prices are in 2005 constant base.

It has to be pointed out that at an aggregate level, higher global energy prices do fulfil part of the role of energy taxation, i.e. they increase fuel costs and reduce overall fuel demand. However, at a more detailed level there are several considerations to be taken into account, meaning that higher global energy prices cannot be seen as a substitute for the analysed policy options:

- The first of these is the impacts on sectors (not just ETD sectors are affected by higher oil prices) and, more importantly from the point of view of the energy mix as it would change the relative prices between the various fuels. Since most of the policy options are CO_2 driven, they would impact on the energy mix in a different manner than a mere energy price increase (not discouraging the most carbon-intensive fuels the most).

- The second major difference is in economic impacts: domestic taxation generates the revenues that may be recycled through Europe's labour markets, driving positive changes in employment and economic activity. In contrast higher oil prices would normally be expected to reduce GDP in the EU. Although with high energy prices, the impacts of the policy options are slightly smaller than in the main modelling, the policy options with revenue recycling would still increases employment and GDP in Europe.

Annex 4: Detailed results of the modelling simulations with the E3ME model

1. IMPACT ON ENERGY DEMAND

Table 1 contains impacts on energy demand, both at EU and national level.

Table 1: Change in energy demand at Member States level (2020), as % difference from the baseline

MS	Option 1	Option 2	Option 3A	Option 3B	Option 4
EU-27	-0.29	-0.37	-0.41	-0.33	-1.56
BE	-0.54	-0.60	-0.64	-0.86	-0.88
DK	0.01	-0.12	-0.13	-0.06	-1.16
DE	-0.06	-0.19	-0.24	-0.10	-1.71
EL	-0.18	-0.30	-0.33	-0.24	-3.20
ES	-1.29	-1.31	-1.37	-1.30	-2.44
FR	-0.29	-0.38	-0.46	-0.80	-2.83
IE	-0.15	-0.79	-0.94	-0.47	-2.19
IT	0.04	-0.08	-0.10	0.03	-0.68
LU	-1.23	-1.43	-1.48	-1.37	-2.16
NL	-0.54	-0.80	-0.84	-0.63	-1.33
AT	-0.66	-0.45	-0.51	-0.36	-1.24
PT	-0.06	-0.14	-0.17	-0.18	-1.04
FI	-0.22	-0.14	-0.15	-0.13	-0.81
SE	-0.37	-0.03	-0.04	-0.08	-1.47
UK	-0.11	-0.12	-0.15	-0.10	-1.36
CZ	-0.19	-0.32	-0.38	-0.09	-1.11
EE	0.04	-0.19	-0.22	-0.04	-0.87
CY	-0.25	-0.25	-0.25	-0.22	-1.08
LV	-0.42	-0.55	-0.61	-0.28	-1.51
LT	-0.41	-0.54	-0.6	-0.24	-1.62
HU	-0.50	-0.89	-1.04	-0.21	-3.02
MT	-0.13	-0.29	-0.32	-0.13	-0.43
PL	0.04	-0.23	-0.26	-0.16	-0.32
SI	-0.41	-0.36	-0.37	-0.42	-2.03
SK	-0.19	-0.33	-0.40	0.01	-1.48
BG	-0.57	-0.74	-0.76	-0.62	-1.27
RO	-1.31	-0.66	-0.75	-0.22	-2.51

Source: E3ME

All policy options have more pronounced impacts as compared to the results at EU level for the following countries: RO, BG, HU, LV, AT, the NL, LU, IE, ES. Some countries register more significant impacts only after 2030: SI, EL. On the contrary, very minor impacts were registered in some of the high taxing countries. The rest of the EU, including new Member States such as CZ, EE, SK or CY is also close or below the EU average in terms of impacts. Some results are prevalently transport driven, even in 2020 (such as in the case of LU, ES or BG).

At country level, one can also observe some differences in the effectiveness of the different policy options as they appeared at EU level. Policy option 4 achieves the most important demand reductions in most of the cases (although there are significant differences between Member States). The differences between countries come primarily from differences in pre-existing tax rates and pre-tax energy prices, but also quite importantly from the differences in

the size of the ETS sector. The other element that drives the country specific results is national energy mix.

2. IMPACT ON CO_2 EMISSIONS

Table 2 contains impacts on CO2 emissions, both at EU and national level.

Table 2: Change in CO_2 emissions at Member States level (2020), as % difference from the baseline

MS	Option 1	Option 2	Option 3A	Option 3B	Option 3Bn	Option 3B lps	Option 4	Option 4 **2030**
EU-27	-0.22	-0.37	-0.42	-0.33	-0.28	-0.34	-2.01	-3.45
BE	-0.39	-0.60	-0.68	-0.77	-0.68	-0.83	-1.24	-2.11
DK	-0.01	-0.13	-0.14	-0.11	-0.09	-0.11	-1.36	-2.18
DE	0.02	-0.08	-0.14	-0.10	-0.06	-0.10	-2.26	-3.85
EL	-0.18	-0.34	-0.36	-0.29	-0.04	-0.29	-3.54	-5.00
ES	-1.45	-1.73	-1.80	-1.67	-1.50	-1.67	-3.23	-5.25
FR	-0.14	-0.28	-0.32	-0.70	-0.52	-0.71	-3.71	-6.73
IE	-0.13	-0.81	-0.98	-0.44	-0.33	-0.51	-2.38	-3.78
IT	0.02	-0.08	-0.10	0.01	0.00	0.03	-1.01	-1.23
LU	-1.20	-1.70	-1.80	-1.54	-1.50	-1.49	-2.59	-4.95
NL	-0.47	-0.78	-0.82	-0.63	-0.61	-0.69	-1.79	-2.60
AT	-0.37	-0.33	-0.37	-0.29	-0.25	-0.29	-1.40	-1.80
PT	0.01	0.12	0.14	0.06	0.07	0.03	-1.41	-2.56
FI	-0.27	-0.21	-0.22	-0.19	-0.17	-0.22	-1.42	-2.29
SE	-0.06	-0.01	-0.02	-0.01	0.00	-0.01	-2.08	-5.91
UK	-0.10	-0.11	-0.14	-0.09	-0.07	-0.08	-1.62	-3.15
CZ	-0.24	-0.60	-0.70	-0.11	-0.10	-0.12	-1.47	-1.99
EE	-0.18	-0.29	-0.33	-0.12	-0.10	-0.12	-1.15	-1.76
CY	-0.22	-0.26	-0.26	-0.24	-0.21	-0.24	-1.14	-2.24
LV	-0.52	-0.76	-0.83	-0.40	-0.37	-0.42	-2.57	-4.37
LT	-0.54	-0.99	-1.12	-0.31	-0.27	-0.3	-3.23	-2.62
HU	-0.54	-0.89	-1.01	-0.25	-0.24	-0.24	-3.40	-5.10
MT	-0.15	-0.31	-0.33	-0.16	-0.16	-0.19	-0.60	0.05
PL	0.07	-0.26	-0.29	-0.12	-0.11	-0.12	-0.34	-2.05
SI	-0.53	-0.45	-0.44	-0.56	-0.44	-0.56	-2.71	-6.57
SK	-0.18	-0.87	-1.05	0.00	0.02	0.00	-2.79	-4.08
BG	-0.44	-0.71	-0.72	-0.53	-0.52	-0.51	-1.59	-3.46
RO	-0.74	-0.77	-0.86	-0.36	-0.32	-0.38	-3.33	-4.73

Source: E3ME

When transport is left aside, the country level results change slightly. They are reported in Table 3 below. In line with the transitional periods granted under policy option 3B, the emission reductions are close to zero for the 9 new Member States with rather generous emission reduction targets for 2020. The emission reductions registered would be in this particular case caused by the indexation of the energy based part of the minima (the impact that would come from indexation can be seen when the results of policy option 3B are compared with its variant in nominal terms, labelled "$3B_n$").

Table 3: Change in non-transport CO_2 emissions, MS with transitional periods in option 3B (2020) - % difference from the baseline

	Option 3A	Option 3B	Option $3B_n$	Option 4
CZ	-0.82	-0.01	0	-1.06
EE	-1.69	-0.12	-0.08	-3.35
LV	-0.81	-0.11	-0.1	-1.27
LT	-1.13	-0.08	-0.05	-2.66
HU	-1.23	-0.02	-0.01	-2.55
PL	-0.71	0	0.02	-0.83
SK	-1.8	-0.02	0.02	-3.32
BG	-0.75	-0.1	-0.07	0.21
RO	-1.4	-0.01	0.04	-3.31

3. IMPACT ON FUEL MIX WITHIN TRANSPORT (OPTION 6)

Option 6 that achieves more significant effects both at EU and at national level, in all 27 Member States. The country by country results are reported in Table 4 below.

Table 4: Policy option 6: % share of gasoline in the total gasoline and petrol motor fuel consumption

	Evolution of the baseline					Policy option 6	
MS	1995	2000	2010	2020	2030	2020	2030
EU-27	57%	53%	41%	36%	36%	39%	40%
BE	37%	30%	18%	14%	14%	18%	21%
DK	72%	72%	66%	61%	62%	64%	66%
DE	63%	60%	47%	44%	45%	49%	52%
EL	64%	68%	69%	68%	66%	69%	66%
ES	41%	35%	24%	20%	19%	21%	22%
FR	49%	39%	22%	19%	19%	23%	25%
IE	65%	65%	61%	61%	60%	62%	62%
IT	60%	57%	42%	32%	29%	34%	33%
LU	57%	43%	19%	17%	17%	20%	20%
NL	66%	63%	57%	57%	58%	63%	67%
AT	59%	49%	31%	29%	30%	31%	34%
PT	73%	71%	54%	37%	36%	40%	42%
FI	55%	53%	52%	54%	55%	57%	61%
SE	73%	71%	68%	64%	64%	66%	67%
UK	67%	63%	51%	48%	49%	50%	51%
CZ	42%	43%	36%	32%	31%	33%	32%
EE	66%	55%	55%	49%	46%	49%	46%
CY	23%	26%	32%	34%	37%	35%	38%
LV	66%	59%	47%	43%	43%	46%	47%
LT	59%	61%	53%	46%	43%	47%	44%
HU	57%	52%	51%	48%	46%	49%	48%
MT	41%	42%	44%	45%	46%	51%	53%
PL	51%	50%	45%	44%	45%	46%	48%
SI	69%	56%	52%	51%	53%	52%	54%
SK	73%	71%	68%	64%	64%	66%	67%
BG	19%	36%	25%	23%	22%	25%	24%
RO	35%	50%	27%	25%	23%	25%	23%

Source: TREMOVE

4. MACROECONOMIC IMPACTS AT NATIONAL LEVEL

GDP is positively affected by policy options in all the Member States and follows the general patterns visible form the Chart below, with the exception of EL, LT, HU, RO and MT (in 2020 and 2030).

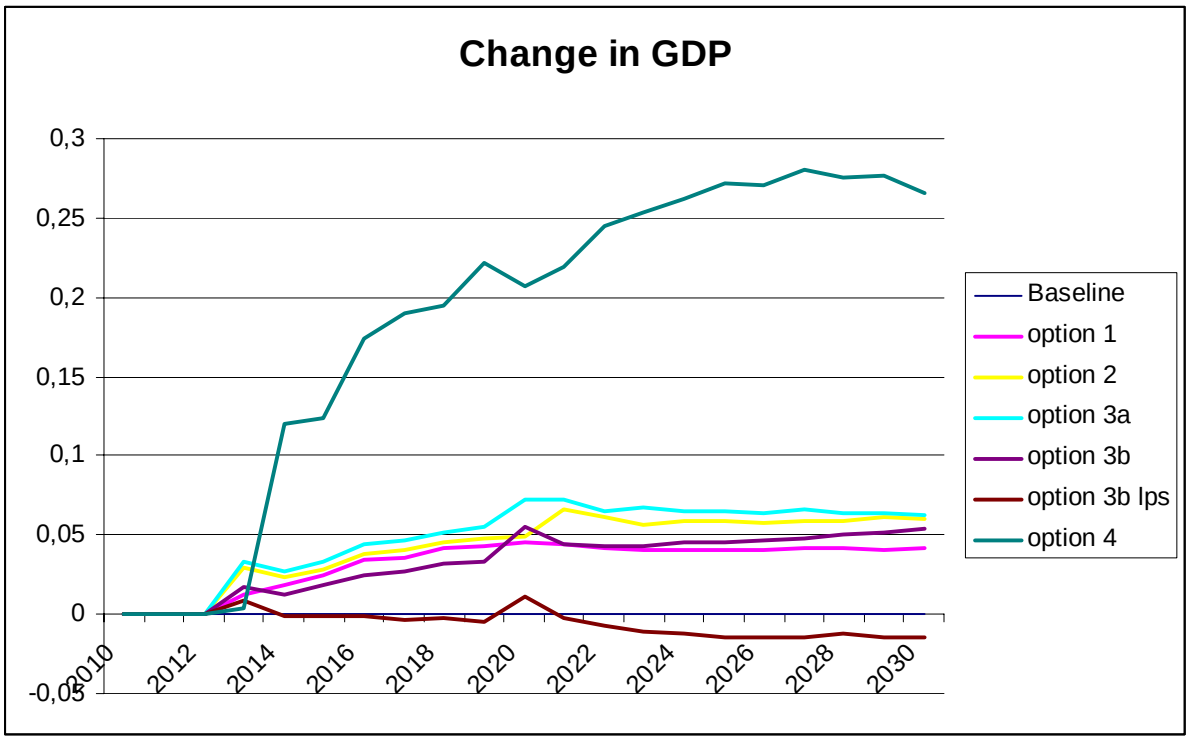
Table 5: Change in GDP at Member States level (2020 and 2030), as % difference from the baseline

	2020							2030						
MS	Option 1	Option 2	Option 3A	Option 3B	Option 3B n	Option 3Blps	Option 4	Option 1	Option 2	Option 3A	Option 3B	Option 3B n	Option 3Blps	Option 4
EU-27	0.05	0.05	0.05	0.06	0.05	0.01	0.21	0.04	0.06	0.05	0.05	0.03	-0.02	0.27
BE	0.16	0.17	0.18	0.17	0.16	-0.05	0.35	0.08	0.11	0.11	0.11	0.05	-0.07	0.31
DK	0.06	0.06	0.06	0.07	0.06	0.03	0.31	0.05	0.07	0.07	0.07	0.03	0.02	0.43
DE	0.02	0.02	0.03	0.04	0.04	0.03	0.10	0.02	0.04	0.05	0.04	0.03	-0.01	0.26
EL	-0.01	-0.03	-0.04	0.02	0.03	0.01	-0.14	-0.03	-0.03	-0.03	-0.05	0.04	-0.13	0.31
ES	0.02	0.01	0.01	0.02	0.02	-0.05	0.09	0.04	0.04	0.04	0.03	0.02	-0.10	0.23
FR	0.03	0.03	0.04	0.06	0.05	0.04	0.21	0.03	0.05	0.05	0.05	0.02	0.02	0.33
IE	0.09	0.10	0.11	0.08	0.08	0.03	0.50	0.09	0.16	0.16	0.15	0.07	0.05	0.76
IT	0.03	0.04	0.04	0.06	0.05	0.02	0.11	0.06	0.07	0.07	0.06	0.03	-0.03	0.20
LU	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.04	0.02	0.02	0.03	-0.01	-0.01	0.03
NL	0.16	0.17	0.18	0.16	0.15	0.00	0.36	0.20	0.21	0.22	0.19	0.16	-0.02	0.57
AT	0.04	0.05	0.05	0.05	0.05	0.03	0.12	0.08	0.11	0.12	0.08	0.03	0.01	0.38
PT	0.06	0.07	0.07	0.05	0.05	0.01	0.27	0.09	0.09	0.10	0.08	0.04	-0.01	0.43
FI	0.03	0.02	0.02	0.03	0.02	0.01	0.15	0.04	0.04	0.04	0.04	0.03	0.00	0.30
SE	0.03	0.02	0.02	0.02	0.02	0.00	-0.12	0.06	0.04	0.05	0.04	0.03	0.00	0.01
UK	0.06	0.06	0.07	0.05	0.05	0.01	0.42	0.01	0.05	0.04	0.06	0.01	0.02	0.18
CZ	0.05	0.08	0.09	0.02	0.02	-0.01	0.27	0.06	0.10	0.14	0.01	0.03	-0.05	0.57
EE	0.02	0.01	0.01	0.03	0.02	0.02	0.13	0.01	0.01	0.01	0.03	0.01	-0.01	0.13
CY	0.02	0.02	0.02	0.02	0.02	0.00	0.13	0.07	0.04	0.05	0.04	0.01	-0.03	0.26
LV	0.07	0.07	0.08	0.07	0.06	0.01	0.25	0.09	0.10	0.10	0.08	0.01	-0.03	0.32
LT	-0.03	-0.06	-0.07	-0.02	-0.01	-0.04	-0.08	-0.04	-0.09	-0.10	-0.02	-0.01	-0.05	-0.13
HU	-0.04	-0.10	-0.12	-0.03	-0.02	-0.04	-0.31	-0.11	-0.15	-0.16	-0.12	0.00	-0.14	-0.19
MT	-0.01	-0.01	-0.01	-0.03	-0.03	-0.05	-0.01	0.02	0.01	0.01	0.01	0.02	-0.05	0.18
PL	0.13	0.19	0.21	0.10	0.10	0.01	0.46	0.09	0.16	0.16	0.09	0.03	-0.03	0.29
SI	0.04	0.03	0.03	0.03	0.03	0.02	0.19	0.04	0.04	0.04	0.04	0.00	0.00	0.16
SK	0.04	0.06	0.07	0.01	0.01	0.01	0.20	0.04	0.08	0.09	0.01	0.01	0.01	0.35
BG	0.13	0.11	0.13	0.07	0.06	-0.04	0.37	0.09	0.13	0.13	0.05	0.02	-0.10	0.35
RO	0.04	-0.03	-0.04	-0.01	0.00	-0.04	0.01	-0.06	-0.10	-0.11	-0.07	-0.01	-0.11	-0.16

Source:E3ME

Over longer period, in 2030, the slightly negative impacts on GDP disappear for MT, but remain for the other countries. Option 4 affects, however, positively the GDP of EL, but not that of the three other countries. The very small reduction of GDP in these countries results from the fall of real private consumption, which is due to the relatively higher increase of consumer prices, leading to the fall of real incomes. In the case of HU, the positive employment effect caused by revenue recycling also remains rather small. In the remaining countries the change of private consumption is positive under all policy options, the positive impact being the strongest in the option 4. It should be noted, that the exemption of the nine new Member States from carbon taxes in the option 3B does not remove the (small) negative impact on the GDP of the above mentioned three Member States.

Figure 1



The impacts on the ***consumer price index*** vary between countries somewhat more than other economic impacts (see Table 6). In some countries the change of the consumer price index is in fact negative, i.e. consumer prices fall slightly from the baseline level. This is the case, for instance, when a policy option makes the ETS allowance price fall. Lower allowance prices affect, in particular, electricity prices, to the extent they are passed on to consumer prices, which seems to be the case here. The other factor, which counteracts the impact of higher energy costs on consumer prices, is the reduction of labour costs through revenue recycling, as indicated above.

Table 6: Change in consumer price index (2020), as % difference from the baseline

MS		Option 1	Option 2	Option 3A	Option 3B	Option 4
EU-27	EU-27	0.04	0.07	0.09	0.04	0.47
BE	Belgium	0.10	0.22	0.26	0.25	0.45
DK	Denmark	0.00	0.01	0.01	-0.01	0.15
DE	Germany	0.01	0.04	0.07	0.04	0.43
EL	Greece	0.06	0.08	0.09	0.05	0.54
ES	Spain	0.15	0.17	0.18	0.16	0.41
FR	France	0.07	0.15	0.18	0.06	0.51
IE	Ireland	-0.02	0.01	0.02	0.02	0.14
IT	Italy	-0.01	0.01	0.01	-0.02	0.63
LU	Luxembourg	0.33	0.42	0.44	0.46	0.48
NL	Netherlands	0.00	0.02	0.02	0.00	0.15
AT	Austria	-0.03	-0.01	-0.01	-0.01	0.14
PT	Portugal	0.01	0.04	0.05	0.03	0.15
FI	Finland	0.03	0.05	0.05	0.03	0.36
SE	Sweden	-0.02	-0.01	-0.01	-0.01	0.88
UK	UK	0.00	0.02	0.02	0.00	0.49
CZ	Czech Rep.	0.09	0.05	0.08	0.06	0.43
EE	Estonia	0.11	0.16	0.17	0.11	0.55
CY	Cyprus	0.07	0.07	0.08	0.06	0.23

LV	Latvia	0.16	0.19	0.21	0.13	0.61
LT	Lithuania	0.11	0.16	0.18	0.08	0.43
HU	Hungary	0.14	0.27	0.33	0.06	0.88
MT	Malta	0.01	0.07	0.08	0.05	0.19
PL	Poland	0.13	0.28	0.31	0.11	0.47
SI	Slovenia	0.24	0.25	0.27	0.27	1.03
SK	Slovakia	0.06	0.12	0.16	0.02	0.56
BG	Bulgaria	0.15	0.13	0.13	0.15	0.36
RO	Romania	0.30	0.42	0.47	0.23	1.14

Source: E3ME

The highest price increases take place in the countries, in which the increase of EU minima induces the highest increases of national tax rates. As indicated above, the main driver of these changes are taxes on transport fuels. Romania experiences the highest increase of CPI in all policy options (+ 1.14% in the option 4. The other countries, in which the increase of CPI exceeds the EU average (+0.04% in option 1) by a wide margin include BE, EL, ES, LU, CZ, EE, LV, HU, PL, BG, RO. These increases remain, however, clearly below 1% except in option 4 for two countries (RO, SI).

5. EMPLOYMENT EFFECTS AT NATIONAL AND SECTORAL LEVEL

The impact on employment is positive in all policy options due to the revenue recycling effect in the EU, as a whole, and in all the particular Member States. The impact is the highest in option 4, in which the number of employed would increase by more than 700 000 in 2020 in the EU. The second highest increase is in the options 2 and 3A in which respectively 176 000 and 159 000 new jobs would be created compared with the baseline (see Table 7). By 2030, theseis figures would increase to nearly 1 000 000 under option 4 and around 350 000 under options 2 and 3A.

Employment is improved, in all the countries, except in option $3B_{lsp}$, in which the tax revenues are recycled through lump-sum transfers to households (see Table 8). The positive impact is the highest in the countries, in which the tax increases implied by the policy options are the most important. The highest employment effects are found in BG, LT, RO, CZ and PL (in the range of 0.52% - 0.95% in option 4). In the option 1, 2 and 3A the impacts are about one third of those of the option 4 (in the range of 0.11% - 0.32% for the above mentioned countries) and in the option 3B around one fourth of those of the option 4 (in the range of 0.16 – 0.08%). Employment increases also for the nine countries with transitional periods under option 3B which is, in the first place, due to the revenues coming from motor fuels under the commercial diesel proposal.

The largest increases are experienced in some of the new Member States (CZ, PL, LT, BU, RO), where additional tax revenues make up the largest share of GDP, and where the average wages are relatively low and thus the reduction of labour costs has a proportionately larger impact.

The favourable impacts are, however, entirely related to the recycling of tax revenues in the form of reduction in the employers' social security contributions. If the revenues are recycled in the form of lump-sum transfers to households, the employment effect at the EU average level is slightly negative in 2030 (-0.02% compared with the baseline). At the level of individual countries the biggest negative impact would be experiences in SI (-0.26%) in the case of recycling revenues through lump-sum transfers.

Table 7: Change in employment from the baseline (2020), thousands, EU-27

	Option 1	Option 2	Option 3A	Option 3B	Option $3B_{lsp}$	Option 4
Agriculture	16	15	17	13	-1	60
Coal	0	0	0	0	0	0
Oil & Gas	0	0	0	0	0	0
Other Mining	1	1	1	1	0	1
Food, Drink & Tob.	5	6	7	3	0	21
Text., Cloth. & Leath	2	3	3	1	0	13
Wood & Paper	5	4	4	3	1	7
Printing & Publishing	2	2	2	2	0	5
Manuf. Fuels	0	0	0	0	0	0
Pharmaceuticals	0	0	0	0	0	1
Chemicals nes	1	1	1	1	0	3
Rubber & Plastics	2	2	2	1	0	8
Non-Met. Min. Prods.	2	3	3	2	0	10
Basic Metals	1	2	2	1	0	5
Metal Goods	2	2	3	1	-1	18
Mech. Engineering	2	4	5	4	0	20
Electronics	0	0	0	0	0	3
Elec. Eng. & Instrum.	1	2	2	1	0	7
Motor Vehicles	1	1	1	1	0	5
Oth. Transp. Equip.	0	1	1	0	0	2
Manuf. nes	2	2	2	2	-1	3
Electricity	0	0	0	0	0	0
Gas Supply	0	0	0	0	0	0
Water Supply	0	0	0	0	0	0
Construction	12	14	16	11	-4	55
Distribution	4	3	3	2	-6	16
Retailing	10	12	14	8	-2	56
Hotels & Catering	12	14	15	12	1	49
Land Transport etc	5	5	5	4	-1	22
Water Transport	1	1	1	1	0	1
Air Transport	0	0	0	0	0	1
Communications	1	1	1	1	0	6
Banking & Finance	4	4	5	4	1	25
Insurance	1	1	1	1	0	4
Computing Services	5	7	8	5	2	38
Prof. Services	22	27	30	17	-5	107
Other Bus. Services	17	18	21	13	-3	87
Public Admin. & Def.	0	0	0	0	0	0
Education	0	0	0	0	0	0
Health & Social Work	0	0	0	0	0	0
Misc. Services	18	18	19	17	2	57
Total	**157**	**176**	**195**	**133**	**-17**	**716**

Source: E3ME

Table 8 Change in employment % change from the baseline (2020 and 2030)

	2020							2030						
MS	Option 1	Option 2	Option 3A	Option 3B	Option 3B n	Option 3Blps	Option 4	Option 1	Option 2	Option 3A	Option 3B	Option 3B n	Option 3Blps	Option 4
EU-27	0.06	0.07	0.08	0.05	0.05	-0.01	0.29	0.09	0.12	0.12	0.09	0.04	-0.02	0.39
BE	0.16	0.16	0.19	0.16	0.15	-0.12	0.26	0.11	0.13	0.13	0.13	0.04	-0.08	0.22
DK	0.06	0.06	0.08	0.04	0.03	-0.01	0.33	0.06	0.09	0.10	0.08	0.03	0.00	0.35
DE	0.04	0.05	0.10	0.06	0.05	0.00	0.33	0.04	0.08	0.09	0.06	0.05	-0.02	0.41
EL	0.02	0.01	0.01	0.01	0.01	-0.01	0.11	0.07	0.07	0.07	0.07	0.01	-0.01	0.30
ES	0.10	0.09	0.11	0.09	0.08	-0.01	0.25	0.14	0.15	0.15	0.14	0.05	-0.04	0.27
FR	0.02	0.03	0.04	0.02	0.02	0.00	0.24	0.02	0.04	0.04	0.03	0.01	-0.01	0.25
IE	0.05	0.06	0.07	0.05	0.04	-0.01	0.26	0.10	0.12	0.13	0.10	0.05	0.00	0.46
IT	0.04	0.06	0.09	0.06	0.05	0.00	0.29	0.08	0.12	0.13	0.10	0.05	-0.02	0.43
LU	0.06	0.04	0.05	0.06	0.06	-0.06	0.04	0.09	0.06	0.06	0.06	0.00	-0.15	0.14
NL	0.11	0.11	0.14	0.11	0.10	-0.02	0.24	0.13	0.16	0.17	0.14	0.12	0.00	0.39
AT	0.06	0.05	0.07	0.05	0.05	0.01	0.19	0.11	0.13	0.14	0.11	0.03	-0.01	0.29
PT	0.06	0.05	0.07	0.04	0.04	-0.01	0.29	0.10	0.10	0.10	0.08	0.03	-0.02	0.44
FI	0.05	0.03	0.04	0.03	0.03	-0.01	0.25	0.05	0.04	0.05	0.04	0.03	-0.01	0.31
SE	0.04	0.02	0.03	0.02	0.02	0.00	-0.04	0.05	0.04	0.05	0.04	0.02	-0.01	0.12
UK	0.03	0.03	0.03	0.02	0.02	0.00	0.22	0.03	0.05	0.05	0.05	0.03	0.01	0.32
CZ	0.06	0.12	0.14	0.01	0.01	-0.03	0.34	0.15	0.20	0.22	0.08	0.02	-0.09	0.52
EE	0.03	0.04	0.05	0.02	0.02	-0.01	0.19	0.08	0.10	0.10	0.07	0.02	-0.03	0.38
CY	0.04	0.03	0.04	0.03	0.02	-0.01	0.19	0.04	0.03	0.02	0.04	0.00	-0.04	0.07
LV	0.09	0.09	0.10	0.06	0.06	-0.01	0.35	0.11	0.13	0.13	0.10	0.02	-0.04	0.38
LT	0.22	0.20	0.22	0.16	0.15	-0.01	0.71	0.37	0.38	0.37	0.34	0.11	-0.03	0.72
HU	0.03	0.03	0.02	0.01	0.01	-0.02	0.15	0.05	0.07	0.07	0.03	0.01	-0.09	0.28
MT	0.05	0.02	0.02	0.01	0.01	-0.05	0.12	0.12	0.08	0.08	0.07	0.03	-0.10	0.27
PL	0.13	0.19	0.22	0.08	0.07	-0.01	0.46	0.19	0.31	0.33	0.15	0.07	-0.03	0.64
SI	0.06	0.05	0.08	0.04	0.01	-0.06	0.24	0.03	0.05	0.06	0.05	0.02	-0.26	0.40
SK	0.06	0.05	0.07	0.01	0.01	0.01	0.26	0.10	0.10	0.11	0.06	0.01	-0.01	0.40
BG	0.31	0.29	0.32	0.21	0.20	-0.01	0.83	0.40	0.43	0.45	0.32	0.12	-0.03	0.95
RO	0.22	0.18	0.20	0.08	0.07	-0.03	0.67	0.29	0.27	0.28	0.16	0.04	-0.06	0.88

6. IMPACT ON PRICES AND ON CONSUMER DISPOSABLE INCOME AT NATIONAL LEVEL

Similar trends as at EU level can be observed at country level. In particular, all policy options except option $3B_{lsp}$ show a slight increase in the real consumer disposable income in almost all Member States, with, however, some countries experiencing a more positive change then others. Higher relative increase in real disposable income is due to a more significant domestic price decrease and higher wage increase and is noticed for BE, NL, LV, PL and BG. The only countries experiencing a decrease in consumer disposable income in all policy options are LT and RO. The increase in employment in LT, which is mostly noticed in the sectors with low wage rates, will not be able to compensate for the consumer price index increase while in RO it is the increase in gas price and a high share of gas spending that pushes up the consumer price index.

Policy option $3B_{lsp}$ shows a decrease in consumer disposable income for all Member States, except IT and AT where there is a small increase of 0.01% in 2020 as compared to the baseline scenario. Also, FI, SE, the UK and SK will not see any increase in consumer real disposable income, mainly due to relatively unaffected domestic prices.

Policy option 4 is the only one which increases significantly the consumer disposable income in a large number of Member States. SE is besides LT and RO the only country with a minor

negative change (-0.03) in real consumer disposable income, which is due to relatively high increase in consumer price index and no significant employment growth.

Table 9: Change in real consumer disposable income at Member States level (2020), as % difference from the baseline

MS		Option 1	Option 2	Option 3A	Option 3B	Option $3B_{lsp}$	Option 4
EU-27	EU-27	0.07	0.08	0.08	0.06	-0.02	0.29
BE	Belgium	0.24	0.23	0.24	0.16	-0.23	0.41
DK	Denmark	0.07	0.07	0.07	0.06	-0.01	0.39
DE	Germany	0.03	0.04	0.03	0.04	-0.04	0.12
EL	Greece	0.00	-0.01	-0.01	0.00	-0.02	0.08
ES	Spain	0.11	0.09	0.10	0.09	-0.05	0.23
FR	France	0.03	0.03	0.03	0.03	0.00	0.22
IE	Ireland	0.12	0.13	0.14	0.08	-0.04	0.53
IT	Italy	0.04	0.07	0.08	0.08	0.01	0.26
LU	Luxembourg	0.06	0.04	0.04	0.01	-0.22	0.11
NL	Netherlands	0.23	0.27	0.29	0.28	-0.02	0.47
AT	Austria	0.06	0.06	0.07	0.07	0.01	0.11
PT	Portugal	0.08	0.07	0.07	0.05	-0.04	0.47
FI	Finland	0.06	0.04	0.04	0.04	0.00	0.25
SE	Sweden	0.07	0.03	0.04	0.03	0.00	-0.03
UK	UK	0.07	0.07	0.08	0.06	0.00	0.51
CZ	Czech Rep.	0.13	0.23	0.26	0.02	-0.04	0.69
EE	Estonia	0.11	0.14	0.15	0.09	-0.05	0.54
CY	Cyprus	0.05	0.04	0.04	0.04	-0.01	0.24
LV	Latvia	0.18	0.19	0.21	0.13	-0.03	0.68
LT	Lithuania	-0.03	-0.07	-0.09	-0.01	-0.07	-0.16
HU	Hungary	0.04	0.05	0.05	0.01	-0.03	0.21
MT	Malta	0.07	0.02	0.02	0.02	-0.07	0.15
PL	Poland	0.22	0.36	0.39	0.13	-0.07	0.82
SI	Slovenia	0.06	0.04	0.05	0.02	-0.14	0.28
SK	Slovakia	0.13	0.11	0.13	0.02	0.00	0.61
BG	Bulgaria	0.20	0.20	0.21	0.11	-0.11	0.53
RO	Romania	-0.05	-0.17	-0.19	-0.12	-0.19	-0.23

Source: E3ME

7. IMPACT ON SECTORAL OUTPUT

Table 10 contains impacts of the policy options on the output of different sectors, for the EU-27.

Table 10 Change in sectoral output compared to the baseline (2020), EU-27

Sectors	Option 1	Option 2	Option 3a	Option 3b	Option 3b lps	Option 4
Agriculture	0.02	0.02	0.03	0.02	-0.01	0.22
Coal	0.00	0.00	0.00	0.00	0.00	0.00
Oil & Gas	0.00	0.00	0.00	0.00	0.00	0.00
Other Mining	0.01	0.00	0.00	0.00	0.00	0.01
Food, Drink & Tob.	0.05	0.06	0.06	0.05	0.00	0.31
Text., Cloth. & Leath	0.05	0.06	0.06	0.07	0.03	0.19
Wood & Paper	-0.01	-0.01	-0.01	0.01	0.00	0.04
Printing & Publishing	0.07	0.08	0.08	0.06	0.01	0.33
Manuf. Fuels	-0.03	-0.02	-0.03	-0.38	-0.38	-0.22
Pharmaceuticals	0.08	0.07	0.08	0.04	0.00	0.29
Chemicals nes	0.06	0.06	0.07	0.02	0.00	0.21
Rubber & Plastics	0.09	0.09	0.10	0.06	0.01	0.37
Non-Met. Min. Prods.	0.02	0.02	0.02	0.01	0.00	0.10
Basic Metals	0.00	-0.03	-0.04	0.01	0.02	-0.06
Metal Goods	0.03	0.03	0.03	0.02	0.01	0.17
Mech. Engineering	0.00	0.01	0.01	0.00	0.01	0.06
Electronics	0.16	0.17	0.21	0.14	0.04	1.16
Elec. Eng. & Instrum.	0.03	0.03	0.03	0.03	0.01	0.15
Motor Vehicles	0.02	0.02	0.03	0.01	-0.02	0.10
Oth. Transp. Equip.	0.02	0.00	0.00	0.01	-0.01	0.16
Manuf. nes	0.03	0.03	0.03	0.02	0.02	0.09
Electricity	0.06	0.05	0.07	0.03	0.00	0.45
Gas Supply	0.00	-0.07	-0.12	-0.33	-0.38	-0.77
Water Supply	0.07	0.09	0.10	0.07	0.01	0.42
Construction	0.03	0.03	0.04	0.03	0.00	0.18
Distribution	0.03	0.03	0.04	0.02	-0.02	0.06
Retailing	0.10	0.11	0.13	0.09	0.00	0.61
Hotels & Catering	0.08	0.07	0.07	0.09	-0.01	0.25
Land Transport etc	0.04	0.04	0.05	0.04	0.01	0.27
Water Transport	0.01	-0.01	0.00	0.00	0.00	0.18
Air Transport	0.09	0.04	0.05	0.05	0.00	0.44
Communications	0.08	0.09	0.10	0.07	0.01	0.49
Banking & Finance	0.07	0.09	0.09	0.06	0.00	0.21
Insurance	0.12	0.14	0.16	0.12	0.03	0.72
Computing Services	0.09	0.11	0.12	0.08	0.01	0.65
Prof. Services	0.05	0.06	0.07	0.04	-0.02	0.36
Other Bus. Services	0.05	0.06	0.06	0.05	0.00	0.35
Public Admin. & Def.	0.01	0.01	0.01	0.00	0.00	0.03
Education	0.01	0.01	0.01	0.01	0.00	0.06
Health & Social Work	0.03	0.03	0.03	0.03	0.01	0.12
Misc. Services	0.09	0.11	0.12	0.07	0.01	0.49
NES: Not Elsewhere Specified Source: E3ME						