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Closing the loopholes

Assessment of the potential impact of tax measures
on energy savings claimed under Article 7 of the EED

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Executive Summary

It is a worrying trend: energy demand in the EU has been growing over the last years, after a decade of falling energy use driven mainly by energy efficiency improvements. This trend risks undermining the EU's efforts to cut greenhouse gas emissions, tackle air quality and improve energy security. And it raises burning questions:

What is the state of play of the implementation of the 2012 Energy Efficiency Directive, which has put in place binding energy savings requirements for all Member States?

What will be the impact of the 2018 revisions of the Directive, which increased ambition levels and extended the energy savings obligation - Article 7 of the Directive - until 2030 and beyond, change?

Several studies have shown that energy and carbon taxes play an important role in many Member States for meeting their energy savings obligation in the 2014-2020 period. Often, those taxes were introduced decades ago and have not been updated since. Nevertheless, their impacts are claimed to be significant. But is this accurate?

The present study conducted by the Regulatory Assistance Project and Stefan Scheuer Consulting assesses the situation in all 28 Member States: How did the use of taxation evolve during the four first years of the energy savings obligation period (2014-2017)? And what would happen if all countries freely credited all energy taxes as energy savings, regardless their real impact?

The study concludes that this would render the Article 7 energy savings obligation meaningless. On paper it could wipe out the need for any new energy efficiency policy. But on the ground, energy use would continue to increase.

However, the revised Directive contains important safeguards set out in this study. Legislators have added new requirements to ensure that tax measures are indeed delivering new and additional energy savings. Applied correctly, this will reinforce the real contribution of the Directive to meet the EU's 2020 and 2030 energy savings targets - and make it possible to deliver the more ambitious greenhouse gas goals pledged by the Commission President-elect, Ursula von der Leyen.

These requirements are explained in a similar way by the European Commission in their Recommendations to Members States on the implementation of the revised Energy Efficiency Directive published end of September 2019.

1. Introduction

In 2012 the EU put in place the Energy Efficiency Directive (EED) which establishes the EU's 2020 headline target of 20% energy efficiency. The EED includes an obligation for Member States to undertake national energy efficiency measures in addition to the EU requirements and to deliver new energy savings each year (the Article 7 obligation). This obligation has been extended with the 2018 revision of the EED and is one of the EU's main legal instruments to support the achievement of its new energy efficiency headline target of at least 32.5% in 2030. Implementation of the Article 7 obligation will have a major impact on whether the 2020 and 2030 targets will be achieved or overachieved.

The latest 2018 energy estimates by DG Energy show that the EU faces a significant 2020 target gap. The decomposition analysis by the EU-financed Odyssee-Mure project¹ suggests that the pace of actual energy savings from energy efficiency improvements has been declining since 2010, and is now well below the levels one would expect to be delivered from the Article 7 obligation. Furthermore, the draft national energy and climate plans (NECPs) presented by governments following the Energy Union Governance Regulation fall far short by around 6% of securing the EU's 2030 headline target.

These are clear signals that energy efficiency policies are not delivering or are not expected to deliver. The implementation of the EED's Article 7 therefore requires urgent attention in view of reaching the EU's climate and energy targets.

Our report focusses on a specific category of national measures which are used by governments to meet the Article 7 obligation, energy and CO₂ taxes.

- Chapter 2 explains how energy and CO₂ taxes influence energy consumption and how this effect is measured.
- Chapter 3 describes the legal requirements setting the eligibility and accounting rules of taxation measures for the purpose of Article 7.
- Chapter 4 shows the reported use of taxation by Member States to realise their obligation over the current Article 7 period.
- Chapter 5 assesses the threat stemming from an overestimation of the effect of taxation measures.

2. Energy and CO₂ taxes

Energy taxes in the policy mix

In general, energy and CO₂ taxes are compatible with other energy efficiency policy instruments as they increase the incentives for people and organisations to reduce their energy consumption and carbon emissions, and to adopt more efficient technologies. In theory, the main effect of taxes on other policy instruments is that they reduce the need for financial incentives to achieve a certain level of savings as the energy cost-saving benefits are higher than were there no energy taxes. It is also likely that people and businesses will be more responsive to regulation requiring the adoption of energy saving equipment as it is more economic to do so if taxes on energy are higher.

However, a number of market barriers to cost-effective efficiency investments remain even when energy prices rise, such as the landlord-tenant problem, high implicit consumer discount rates, status quo bias, and information barriers. Thus, unless the tax is very high, it is unlikely

¹ <https://www.indicators.odyssee-mure.eu/decomposition.html>

to stimulate significant efficiency investments on its own.² Thus relying exclusively on taxation measures is not an approach that is likely to deliver significant energy savings.

Elasticities

Price elasticities of demand are empirical estimates of the responsiveness of demand to changes in price. Normal goods, such as energy, have negative elasticities, i.e. an increase in price leads to a decrease in demand. Inelastic goods have elasticities lower than -1 and most estimates of the elasticity of demand for energy are significantly lower than -1. For example, an elasticity of -0.15 means that a 1% increase in price would be expected to lead to a 0.15% decrease in energy consumption.

In the short-run, consumers have relatively few options in response to an increase in energy prices; they can, for example reduce energy waste through behavioural energy efficiency measures (e.g. filling up the kettle less) or simply reduce their energy service consumption (e.g. through under-heating their homes). In the long-run, consumers may undertake energy efficiency investments (e.g. buying a more efficient refrigerator or boiler, or renovating their homes). As a result, short-run elasticities are lower than long-run elasticities. If a price increase is perceived to be long-lived, long-run elasticities are likely to be higher, as consumers can make energy efficiency investments with more confidence that higher prices will persist.

Differentiating the behavioural impacts of taxation measures from other energy efficiency policies requires significant analytical effort. Higher energy prices make it more likely that consumers will take up subsidies for energy efficiency investments, while energy efficiency subsidies make it more likely that consumers will respond to higher prices. In such cases, attribution of the energy saving impacts between the tax and other policy measures must be carefully considered, and double counting of any demonstrated impact must be avoided. Given the high degree of overlap between taxation and other policy measures, the use of one of the following approaches to determine the impacts of taxation on consumption is appropriate:

- (i) Estimate the impact of the tax using only short-run elasticities and estimate the impacts of other policies separately;
- (ii) Estimate the impact of the tax using short-run elasticities in the first year of operation, graduating towards long-run elasticities over the years in which the tax is in place, not counting the impacts of overlapping policies.

While the use of elasticities does not tell us anything about the energy efficiency actions that result from the imposition of a tax, the underpinning requirement of Article 7 of the EED must be applied to the analysis of tax measures, i.e. that only the impacts of energy efficiency actions *in the obligation period* should generate eligible savings. For tax measures in place prior to the obligation period, and for which approach (ii) (above) is used, short-run elasticities should still be used at the beginning of the period to ensure that the impacts of earlier energy efficiency investments are not taken into account.

Tax revenue

Not only do energy tax measures produce a price signal for energy savings and a more conducive cost-benefit calculation for investment decisions, they also create tax revenues.

For a tax measure to be optimally efficient in energy savings terms the revenues created by the tax should be invested in policy and programmatic measures that reduce the behavioural, structural and market barriers to energy saving, thereby enabling consumers to act on the

² Sorrell et al., 2003

price signal. In many instances revenues are earmarked or redirected to the provision of other fiscal measures like subsidies for more energy efficient measures and technologies³ but could equally be directed to overcome other barriers of information or agency, through the financing of enabling programmes, expert support, and advice.

If invested into effective energy efficiency programmes the revenues from an energy pricing measure have been shown to produce seven to nine times more carbon savings than the impact of the price rise alone.⁴ Where energy taxes are reinvested in well-designed efficiency programs, the savings impact of the tax itself may be rather modest, with much larger savings resulting from the directed efficiency program that the tax has funded.⁵

Revenues resulting from energy and carbon taxes are also frequently used to offset the negative distributional impacts of the tax. When studied in isolation, a tax on consumption is more regressive than taxing income, as low-income households spend a greater proportion of their income on consumption than do higher-income consumers. The primary measure used to mitigate this regressive impact is to return tax revenues to consumers through social security or cashback. To maintain the mitigation of the distributional impacts, this measure needs to be sustained for as long as the energy tax is in place. In addition, the use of the revenues does nothing to reduce energy demand. For those Member States operating revenue redistribution measures, the impacts of redistribution on energy consumption need to be taken into account in their calculations of energy savings from taxation measures.

Alternatively, if energy tax revenues are invested into energy efficiency programmes that prioritise low-income and vulnerable households, the revenues from an energy tax will produce greater energy poverty alleviation impact through significantly lower bills, improved levels of energy services, and insulation of vulnerable consumers against future energy price increases. This approach is in line with Article 7.(11) of the EED which requires that, "in designing policy measures to fulfil their obligations to achieve energy savings, Member States shall take into account the need to alleviate energy poverty in accordance with criteria established by them."

3. Eligibility of tax measures and accounting rules

Article 7 of the Energy Efficiency Directive (EED)⁶ requires Member States to put in place policy measures to realise a minimum amount of energy savings (the Article 7 obligation) over the periods 2014 to 2020 and 2021-2030, which is equivalent to 0.7%⁷ and 0.8% new and additional savings per year, accumulating across multi-year compliance periods. Only energy efficiency actions *in the obligation period* can generate eligible savings.

The savings that can be claimed towards the Article 7 obligation have to be the result of a policy measure that is "*formally established and implemented in a Member State to create a supportive framework, requirement or incentive for market actors to provide and purchase*

³ Europe Economics, 2016, Evaluation of Fiscal Measures in the National Policies and Methodologies to Implement Article 7 of the Energy Efficiency Directive. https://ec.europa.eu/energy/sites/ener/files/documents/final_report_on_fiscal_measures_used_under_article_7_ed_0.pdf

⁴ Study based on the UK demand reduction resulting from a one-off 3% electricity price rise, compared with the reduction in demand resulting from the investment of the revenues from the price rise when invested in programmatic energy efficiency. RAP, 2015, Carbon caps and efficiency resources: launching a 'virtuous circle' for Europe. <https://www.raponline.org/wp-content/uploads/2016/05/rap-carboncapsefficiencylaunchingvirtuouscircle-2015-jan.pdf>

⁵ The same effect can be seen where an energy efficiency obligation on energy suppliers is funded via an increase in delivered energy costs; most of the savings result from the efficiency programs not from the rate or price increase that funds the programs.

⁶ Directive 2012/27 amended by Directive 2018/2002

⁷ Average number for the EU. Each country sets the number based on minimum 1.5% savings each year minus a range of exemptions and derogations.

energy services and to undertake other energy efficiency improvement measures” (Article 2.(18)).

Many governmental revenue instruments do not satisfy this requirement. Most broad-based taxes are created for general revenue purposes, not for the purpose of improving energy efficiency. Even some energy taxes often fall into this category, for example, where an energy sale or a value added tax is introduced in order to provide general governmental revenues. Impacts on consumption might occur but is not the intention, considering that a drop in consumption would reduce revenues. The measure would not fit with the criteria outlined in the definition above. On the other hand, an energy or CO₂ tax which is “formally established and implemented” with the objective to reduce energy demand could well be considered as a policy measure eligible for meeting the Article 7 obligation.⁸

In determining the energy savings from policy measures for meeting the Article 7 obligation the savings have to be additional - thus would have not occurred in any event (Annex V.2.(a)), and be material to the activity of the public authority (Annex V.3.(h)).⁹

=> Only if the tax is formally established and implemented in order to increase energy efficiency and the resulting savings are additional to what would have happened anyway and material to the activities of the implementing public authority can savings be considered for meeting the Article 7 obligation.

Energy or CO₂ taxes are a particular group of policy measures that have to respect the following principles in determining the amount of savings claimed:

- Credit shall be given only to energy savings from taxation measures exceeding the EU’s minimum levels of taxation (Annex V.4.(a)), which is very low for electricity and gas (€0.001 to €0.0005/kWh), somewhat higher for transport fuels (between €0.33 and €0.359/litre) and at 15% for VAT.
- Price elasticities shall represent the responsiveness of demand and shall be estimated on the basis of recent and representative official data sources (Annex V.4.(b))¹⁰.
- Energy savings from accompanying policy instruments, including fiscal incentives or payment to a fund, shall be accounted separately (Annex V.4.(c)).

4. Reported savings from energy taxes under Article 7

This section describes how Member States have used taxation measures as policies to realise their obligation over the current Article 7 period (2014 to 2020). It is based on a review of Member States’ notification and progress reports. It shows that while Member States have planned to use taxation, it is unclear whether all legal conditions are met. It also shows a discrepancy between plans and progress reports, both in terms of measures and impact.

In 2013 Member States (MSs) had to notify to the Commission their Article 7 obligations 2014-2020, planned measures and expected savings to demonstrate how they will deliver the target. Nine MSs¹¹ notified the use of energy tax measures though with limited information

⁸ However, care must be taken to distinguish the fuel-switching impacts of carbon taxes (e.g., simply moving consumption from coal to gas, or gas to renewables) from the possible efficiency gains from the carbon tax (reducing total energy demand). It would not be consistent with the energy-savings focus of Article 7 to treat fuel-switching as though it were the same thing as improved energy efficiency. The Clean Energy package requires progress to be made in the efficient use of energy as well as in reducing emissions and in increasing the use of renewable energy.

⁹ In the EED from 2012 the additionality and materiality condition were not specifically applicable to energy taxes, but added only with the revision from 2018.

¹⁰ See Chapter 2 for more information

¹¹ AT, EE, FI, DE, EL, NL, ES, SE and UK

on whether all Article 7 conditions are met¹². In most cases MSs do not set out whether the tax measure is formally established and implemented to improve energy efficiency and thus eligible. Only five MSs¹³ provided energy saving estimates. AT only provided lower and upper estimates. EL provided a savings estimate but it is unclear whether it is a cumulative or annual number. NL assessed the impacts of energy taxes as part of broader sectoral policy packages. ES did not provide any numbers.

=> The total of all Article 7 obligations amounts to 230,775 ktoe for the period 2014-2020. For most countries it is unclear whether all Article 7 conditions, in particular the definition of policy measures, are met.

=> The total savings impact of tax measures notified by the seven MSs¹⁴ lies between 32,067 to 41,764 ktoe, thus 14% to 18% of the total of the Article 7 obligations.

Each year MSs have to report the savings achieved under the Article 7 obligation. The latest available reports are from April 2019¹⁵. From the nine MSs which notified tax measures in 2013, eight MSs report savings from energy taxes. NL did not report savings from tax measures, explaining that the energy tax impacts are taken into account in the assessment of the impact of sectoral policy packages. Three additional countries, CZ, LV and LT reported energy savings from energy taxes without having notified those measures in 2013. For LV and LT it is unclear if EED Article 7 conditions are met (in particular whether the definition of "policy measure" set out in Article 2.(18) is respected). The CZ report is only available in Czech and could not be verified.

=> Eleven MSs¹⁶ reported savings from energy taxes amounting to a total of 14,758 ktoe during 2014-2017, which represents around 18% of the average savings for the period required to meet the Article 7 obligation. Extrapolating those savings impacts for the remaining period (using own or MSs available calculations) would result in 30,483 ktoe savings during 2014-2020, 13% of the Article 7 targets.

=> In most cases the reported savings and expectations until 2020 stay well below the initial notifications, notably in AT, SE and UK.

¹² AT, EE, FI, EL and SE did not provide sufficient information in particular to show for all tax measures notified that those are indeed policy measures in the meaning of EED Article 2.(18).

¹³ EE, FI, DE, SE and UK

¹⁴ AT, EE, FI, DE, EL, SE and UK

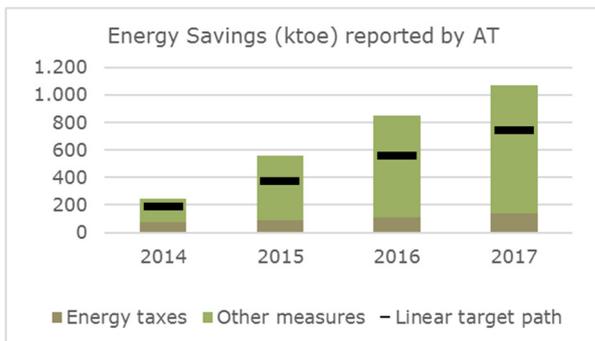
¹⁵ Reports from BG, HR, CY and EE are missing and the Romanian report is incomprehensible and does not follow the agreed reporting standard

¹⁶ AT, CZ, EE, FI, DE, EL, LV, LT, ES, SE and UK

Table 1: Overview of EED Article 7 notification and progress reports of MSs that use tax measures

| | ARTICLE 7 NOTIFICATION | | | | | FINDINGS FROM ANNUAL PROGRESS REPORTS | | | | | | | | |
|-----------------|-------------------------|-----------------------|--|-----------------------------|-------------------|--|-------------------------------|--------------|--------------|--------------|--------------------------|---------------------------------|-----------------------------------|---------------------------|
| | Target 2014-2020 (ktoe) | Energy taxes notified | What | 2014-2020 savings (ktoe) | % of obligation | What | Total savings per year (ktoe) | | | | Savings 2014-2017 (ktoe) | % of obligation until 2014-2017 | Expected savings 2014-2020 (ktoe) | % of obligation 2014-2020 |
| | | | | | | | 2014 | 2015 | 2016 | 2017 | | | | |
| Austria | 5.200 | Yes | electricity, gas and oil | 1,824 to 10,171 | 35% to 196% | | 78 | 91 | 108 | 136 | 937 | 50% | 1.479 | 28% |
| Czech Republic | 4.882 | No | "no tax beyond EU level is foreseen" | | | Environmental tax on fuels | 32 | 37 | 42 | 39 | 150 | 9% | 268 | 5% |
| Estonia | 610 | yes | VAT on fuels | 409 | 67% | | 40 | 55 | 178 | | | | 533 | 87% |
| Finland | 4.213 | Yes | Transport fuel taxation / road traffic | 1.979 | 47% | | 229 | 258 | 281 | 233 | 1.001 | 67% | 1.690 | 40% |
| Germany | 41.989 | Yes | Ökosteuern | 12.205 | 29% | | 1.767 | 1.767 | 1.744 | 1.744 | 7.022 | 47% | 12.205 | 29% |
| Greece | 3.333 | Yes | Increasing excise duty on heating oil consumption | 225 ktoe, but unclear value | | | | | | 122 | 122 | 10% | 490 | 15% |
| Latvia | 851 | No | "no plans to use tax measures as an alternative measure" | | | tax on diesel, petrol, gas, wood and electr. | 35 | 34 | 40 | 44 | 153 | 50% | 284 | 33% |
| Lithuania | 1.004 | No | | | | VAT on fuels | 32 | 46 | 47 | 52 | 177 | 49% | 334 | 33% |
| Spain | 15.979 | Yes | Law 15/2012: Energy tax reform with the aim of internalising the environmental costs and, thus, serving as a stimulus to | | | | 276 | 324 | 372 | 420 | 1.117 | 20% | 2.658 | 17% |
| Sweden | 9.114 | Yes | carbon taxes; impacts from other policies is subsumed estimated impact from the taxes | 11.513 | 126% | | 252 | 1.264 | 0 | 1.702 | 3.243 | 100% | 9.080 | 100% |
| UK | 27.859 | YES | Climate change levy | 3.912 | 14% | | 209 | 209 | 209 | 209 | 835 | 8% | 1.462 | 5% |
| EU Total | 230.775 | | | 32,067 to 41,764 | 14% to 18% | | 2.951 | 4.086 | 3.020 | 4.702 | 14.758 | 18% | 30.483 | 13% |

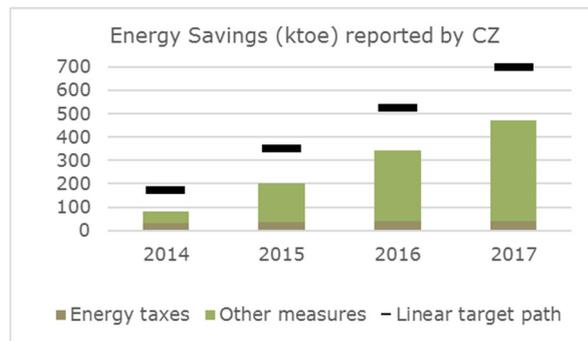
Figure 1: Eleven Member States reported savings from energy taxes



Following energy-related taxes are notified: Tax on electricity; Tax on natural gas; Mineral Oil Tax Act; Green Electricity Act; Federal Road Toll Act.

Unclear whether Article 7 conditions, in particular the definition of policy measure, are met. Short and long-run elasticities were applied for the initial estimate. The savings reported are at the lower end of the notified savings.

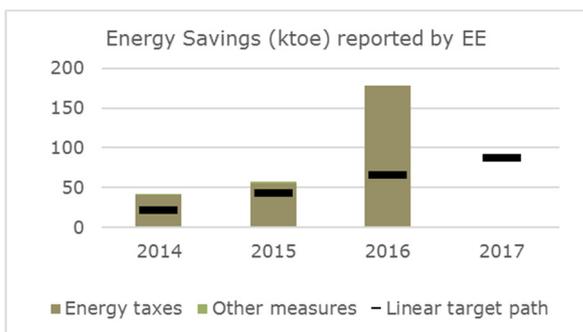
AT is the only country which reports tax measures together with complementary measures to deliver long-term savings, which appears to be a reporting error and has been corrected for our work here.



CZ mentioned in its notification that no tax measures are planned.

In 2019 CZ reported savings from an environmental tax on fuels for the first time and retroactively starting 2014.

Unclear whether Article 7 conditions are met - report is not available in English.

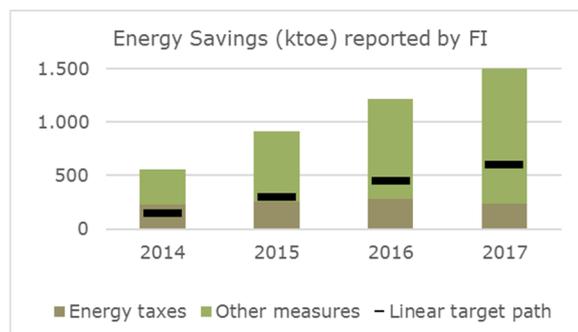


EE notified its excise duty and VAT on fuels and electricity.

Unclear whether Article 7 conditions, in particular the definition of policy measure, are met.

The reported annual and total savings are not fully comprehensible.

The expected savings by 2020 are 30% above the initial notification.

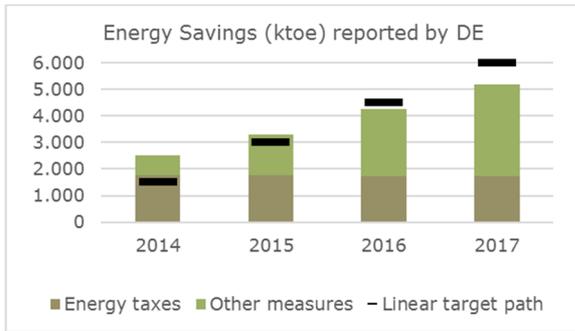


FI notified transport fuel taxes.

Unclear whether Article 7 conditions, in particular the definition of policy measure, are met.

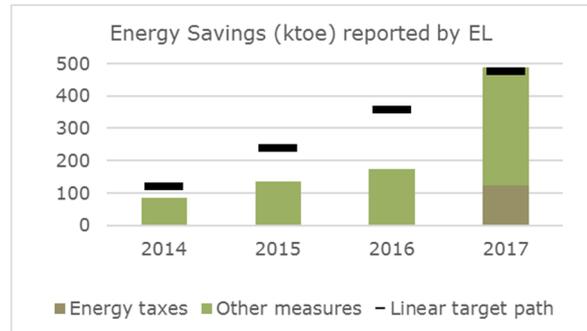
The tax share in reaching the Article 7 target is declining over time.

The expected savings by 2020 are 15% below the initial notification.



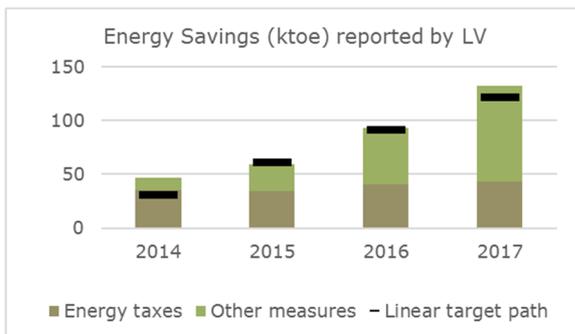
DE notified its energy tax from 1999 (and last updated in 2003) which aims at reducing resource use and employment costs, covering all fuels and electricity.

Unclear whether all Article 7 conditions are met.



Greece notified its VAT on heating oil as a savings measure in 2013 but only in 2019 it reported savings for the first time and only for 2017, not for the preceding years.

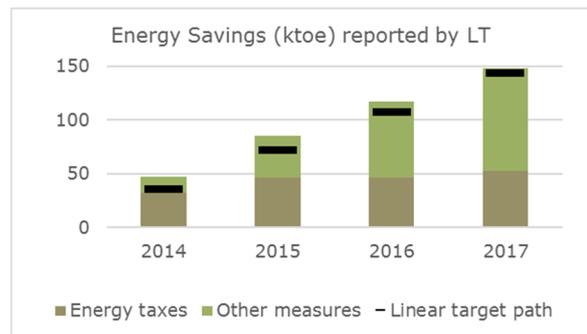
Unclear whether Article 7 conditions, in particular the definition of policy measure, are met.



LV did not notify tax measures and said it has "no plans to use tax measures as an alternative measure".

2018 progress report mentioned tax increase, 2019 report provides numbers also for previous years for excise tax, VAT, tax on fuels and electrical energy.

Unclear whether Article 7 conditions, in particular the definition of policy measure, are met.

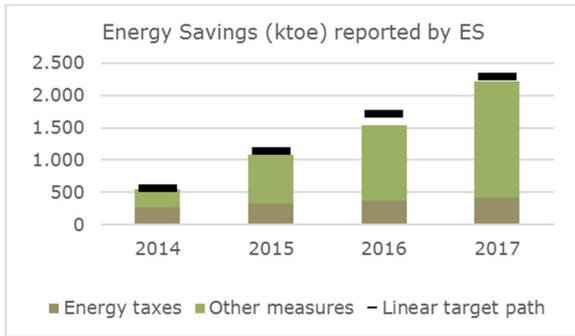


LT did not notify tax measures.

First time tax related savings (excise tax and VAT on fuels) were reported was in 2017 progress report.

Unclear whether Article 7 conditions, in particular the definition of policy measure, are met.

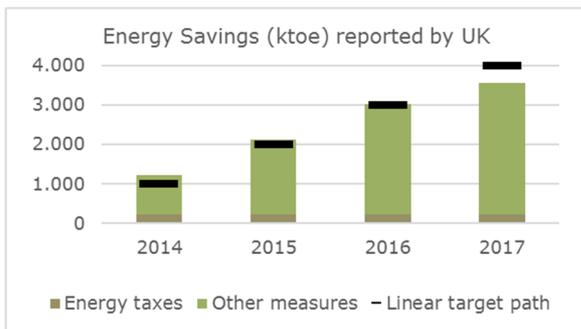
In calculating savings reference is made to the "experience of other countries (Sweden, Spain, and Germany)"



ES notified a whole suite of fiscal measures but without an expected savings number. *“Law 15/2012 of 27 December on fiscal measures for energy sustainability permanently established tax-related mechanisms aimed at sending final consumers of energy an appropriate price signal, in order to encourage the rational and efficient use.”*

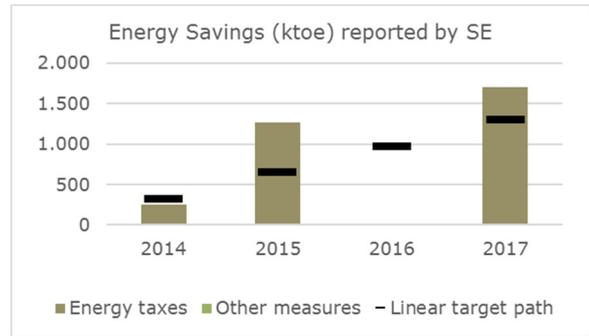
Unclear whether Article 7 conditions, in particular accounting rules are met.

Tax related savings are growing over time, which suggest increasing tax rates.



The UK notified the Climate Change Levy as energy tax measure.

The expected savings by 2020 are 63% below the initial notification. The explanation provided is that the economic model has been updated and in addition tax rates have changed (electricity decreased and gas increased).



SE integrates impacts from all energy efficiency policies and measures under the impacts of a suite of energy and carbon taxes.

Unclear whether Article 7 conditions, in particular the definition of policy measure, are met by all taxes (i.e. the non-carbon related taxes).

The savings by 2020 are 21% below the initial notification, according to own estimates based on the reported numbers.

5. Potential threat to the integrity of Article 7 from taxation measures¹⁷

In order to estimate the maximum amount of savings that could potentially be claimed, five parameters for the analysis are required:

- energy consumption of the main energy carriers
- existing tax rates for each of the main energy carriers
- minimum tax rates in the EU
- energy prices
- short and long run elasticities for each of the main energy carriers

This report assesses the savings that could potentially be claimed from taxation for the most important energy carriers including electricity, gas, petrol, diesel, and heating oil in households, services, industry, and transport. Together, those energy carriers contribute 73% to final energy use in the EU-28. Adding further energy carriers such as district heat would require significant research efforts. Given the large share of final energy use covered this was deemed unnecessary.

Article 7 determines that policies need to have the primary purpose of improving energy efficiency and delivering end-use savings.¹⁸ This means that VAT and levies used to fund renewable energy programmes for example are not eligible for use under Article 7. "Environmental taxes and excise tax only" is the most appropriate category in the context of Article 7. However, some Member States have recently proposed the use of higher than average VAT rates for the purpose of delivering savings. This report therefore provides data for all three categories in order to estimate the magnitude of savings that could be claimed if VAT and levies were allowed. Thus, potential energy savings have been calculated for three cases:

- 1) All taxes and levies above the minimum levels
- 2) VAT and other recoverable taxes excluded
- 3) Environmental taxes and excise tax only¹⁹

The formula used to calculate the annual savings for each category is:

annual energy savings =

(energy consumption) x (tax rate – minimum tax rate) x (elasticity) x (-1)

The elasticities used in the calculation for each energy carrier are shown in Table 2 below.²⁰

¹⁷ The analysis in this section considers the energy consumption impacts that result from the tax alone, not those that result from the reinvestment of the revenues or any other policy.

¹⁸ see Article 7 guidance note section C1: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013SC0451&from=EN>

¹⁹ Environmental taxes and excise duties data from Ecofys (2016): Prices and costs of EU energy. Online: https://ec.europa.eu/energy/sites/ener/files/documents/report_ecofys2016.pdf. This category of taxes was chosen as most appropriate for the purposes of this study although it is noted that not all environmental taxes and excise tax are introduced for the purpose of reducing consumption.

²⁰ Labandeira, X. et al. (2017) Meta-analysis of the price elasticity of energy demand. In Energy Policy 102 (2017) 549-568. Labandeira et al. (2017) derive these elasticities from a review of the empirical evidence and a meta-analysis to identify and allow for the main factors for each energy carrier (eg energy product, consumer, country as well as factors related to the data reviewed). The data on elasticities from this study is used for our calculation purposes but a large number of studies on elasticities are available and in using these figures we are not suggesting that these are the most relevant or accurate for all uses. The elasticities determined for use in each context must be appropriate to each situation.

Table 2: Elasticities

| Elasticity | short-run | long-run |
|----------------------------|------------------|-----------------|
| Energy carrier | | |
| electricity households | -0.126 | -0.365 |
| gas households | -0.18 | -0.684 |
| electricity non-households | -0.126 | -0.365 |
| gas non-households | -0.18 | -0.684 |
| petrol | -0.293 | -0.773 |
| diesel | -0.153 | -0.443 |
| heating oil ²¹ | -0.017 | -0.185 |

The table below presents the annual savings in ktoe for each of the different energy carriers and tax regimes analysed.

Table 3: Annual savings in ktoe

| Elasticity | All taxes excluding minimum VAT rate²² | | VAT fully excluded | | Only environmental taxes and excise duties | |
|----------------------------|--|-----------------|---------------------------|-----------------|---|-----------------|
| | short-run | long-run | short-run | long-run | short-run | long-run |
| Energy carrier | | | | | | |
| electricity households | 4,136 | 11,981 | 1,930 | 5,590 | 891 | 2,582 |
| gas households | 1,903 | 7,233 | 1,246 | 4,734 | 2,645 | 10,050 |
| electricity non-households | 12,840 | 37,194 | 4,439 | 12,859 | 753 | 2,180 |
| gas non-households | 3,064 | 11,645 | 1,302 | 4,948 | 2,009 | 7,633 |
| petrol | 16,236 | 42,833 | 9,531 | 25,144 | 9,531 | 25,144 |
| diesel | 15,332 | 44,393 | 7,467 | 21,619 | 7,467 | 21,619 |
| heating oil | 3,655 | 13,889 | 2,846 | 10,816 | 2,846 | 10,816 |
| SUM | 57,551 | 170,234 | 28,760 | 85,710 | 26,141 | 80,024 |

²¹ The meta-analysis performed in Labandeira et al. (2017) has produced elasticities for heating oil that are significantly lower than the average from the literature for that energy carrier. This is explained as resulting from the practical difficulties and costs of substituting heating systems which mean that consumers have a limited capacity to react to price increases unless they give up comfort. Electricity and natural gas have many uses (heating, cooking, etc.), which increases the capacity of reaction by consumers with respect to heating oil. However, most gas use is for space heating and elasticities should be close to other heating fuels. Given the slightly anomalous nature of the heating oil elasticities produced, the elasticities used here are for gas, as a comparable carrier which has been found by other studies to have similar elasticities.

²² A minimum VAT rate of 15% has been excluded from the calculation in accordance with European VAT legislation.

What does this mean in the context of Article 7? The following two figures compare the potential savings from taxation measures during the period 2014-2020 and 2021-2030 with the targets notified by Member States to the European Commission for 2014-2020 and the targets expected for 2021-2030.

If short-run elasticities are applied and only environmental and energy taxes are used the EU-28 would be able to meet 69% of the sum of its Article 7 targets for 2014-2020. Seven Member States (Cyprus, Greece, Italy, Malta, Netherlands, Portugal, United Kingdom) could meet their full target using existing environmental and energy taxes. If long-run elasticities are applied seventeen Member States would achieve their targets and overall the EU would meet 91% of the sum of its Article 7 targets.

Figure 2: Share of Article 7 targets 2014-2020 that could be delivered by using environmental and energy taxes only

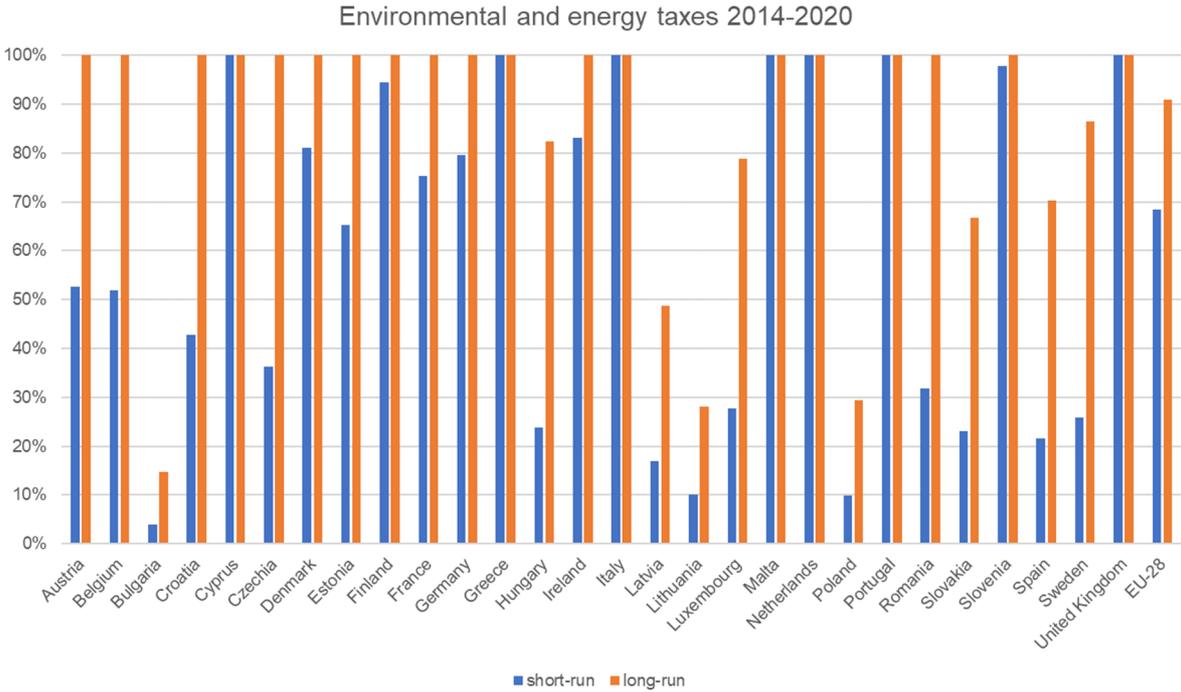
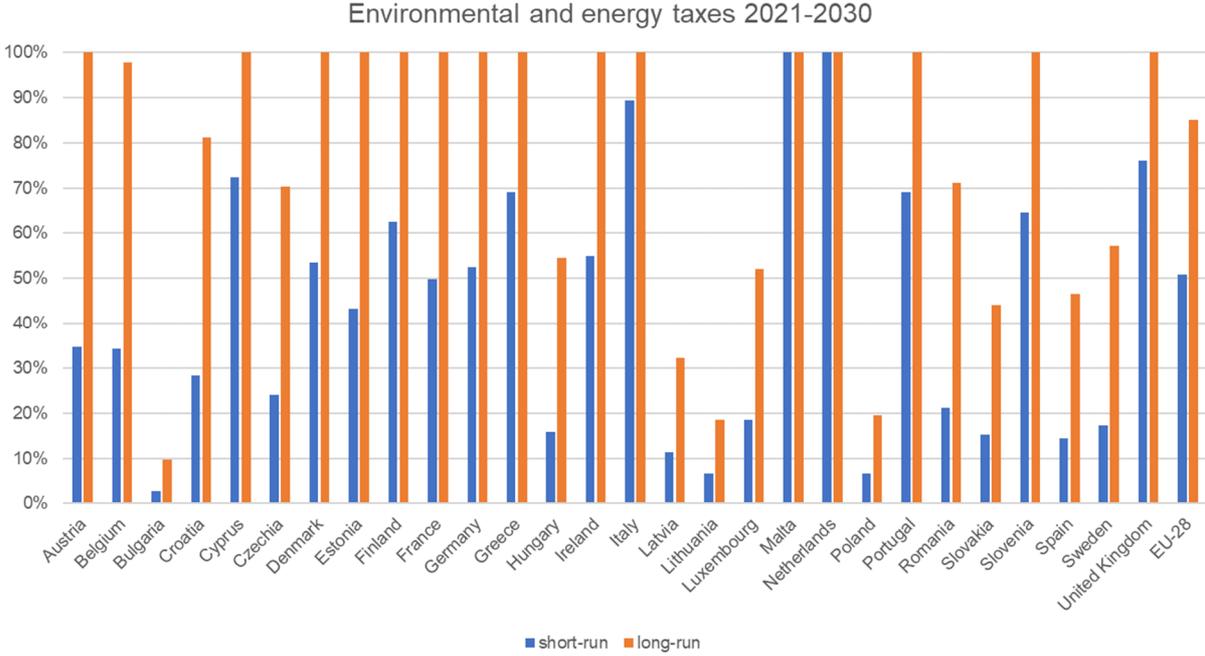


Figure 3: Share of Article 7 targets 2021-2030 that could be delivered by using environmental and energy taxes only



In the period 2021-2030 up to 51% of the target could be achieved if short-run elasticities are used and 85% if long-run elasticities are applied. The figures are lower than in 2021-2030 because of the longer period and the higher Article 7 target.

It is important to recognise that those figures are based on only 73% of energy consumption, being covered by the analysis and the total savings that could be claimed is most likely higher than indicated here.

This analysis shows that there is a significant risk that Member States could potentially claim the majority of required savings from existing tax measures both in the current and next period. This is not what the intention of the Energy Efficiency Directive was, and it could compromise the ability of the EU-28 to meet its 2020 and 2030 Article 3 targets.

6. Conclusions

National energy and carbon taxes play an increasing role for the implementation of the EED's energy savings obligation 2014-2020. In many cases general energy taxes introduced decades ago or not updated over the last years are used to claim substantial amounts of new and additional energy savings, by simply applying the counterfactual: *how much more energy would people consume if we would drop the tax.*

Our study does not assess whether Member States are meeting the legal requirements, but it is against common sense to argue that 'not-dropping' an energy tax is a 'measure' serving the EED purpose: increase energy efficiency and further reduce energy consumption. Governments have not made an effort to demonstrate that the tax in question is an eligible measure, which is put in place to deliver energy savings, and whether the calculation method is robust enough to avoid the overestimation of impacts. In several cases reported savings stay below initial estimates.

The 2018 revision of the EED strengthened the case against broad-brush savings claims from tax measures by requiring that the resulting savings from energy and carbon taxes be additional to what would have happened anyway and material to the activities of the implementing public authority. The quality and strictness of implementation and enforcement of these legal provisions will have a major impact of the future of the Article 7 energy savings obligation. If no condition were to be applied, Member States could overachieve their obligations without having to continue existing energy efficiency measures or put in place new ones - the existing taxes would be enough. Even if only existing 'green' energy taxes are considered would this mean no further action (or even less) for most countries if standard price elasticities are applied.

Practical and legal guidance on how to apply the conditions of eligibility, additional, and materiality is urgently required. This has to be put in perspective with the European Commission obligation under the Governance Regulation to ensure that the EU's 2030 energy efficiency target is met and to propose additional EU measures for that purpose.

Annex

The table below sets out where these data have been obtained.

| Parameter | Sources |
|---|--|
| energy consumption of the main energy carriers | Household energy consumption by fuel type: https://ec.europa.eu/eurostat/databrowser/view/ten00125/default/table?lang=en Industry energy consumption by fuel type: https://ec.europa.eu/eurostat/databrowser/view/ten00129/default/table?lang=en Services energy consumption by fuel type: https://ec.europa.eu/eurostat/databrowser/view/ten00128/default/table?lang=en Transport energy consumption by fuel type: https://ec.europa.eu/eurostat/databrowser/view/ten00126/default/table?lang=en |
| existing tax rates for each of the main energy carriers and energy prices | Household electricity prices: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en Non-household electricity prices: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_205&lang=en Household gas prices: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_202&lang=en Non-household gas prices: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_203&lang=en Petrol and diesel prices: https://www.euronews.com/2018/11/13/rising-fuel-prices-who-pays-the-most-in-europe Heating oil prices: http://data.europa.eu/euodp/data/dataset/eu-oil-bulletin For environmental and energy taxes: Ecofys (2016): Prices and costs of EU energy. Online: https://ec.europa.eu/energy/sites/ener/files/documents/report_ecofys2016.pdf |
| minimum tax rates in the EU | Energy Tax Directive 2003/96/EC: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:283:0051:0070:EN:PDF Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0112 |
| short and long run elasticities | <i>Labandeira, X.; Labeaga, J.M.; López-Otero, X. (2017): A Meta-analysis on the Price Elasticity of Energy Demand. Energy Policy 102, pp. 549–568</i> |