Taxing Energy Use

A Graphical Analysis

This document is a summary of the OECD report *Taxing Energy Use – A Graphical Analysis* (2013).

Executive Summary

Energy use is a critical component of modern economies: it is a key input to production and an important element of consumer spending. However, many forms of energy – particularly fossil fuels – also contribute to significant environmental problems, such as climate change and local air pollution. The taxation of energy is a key policy instrument that, whether intended or not, has a significant impact on energy prices, energy usage and the resulting environmental impacts.

This publication provides a systematic comparative analysis of the structure and level of taxes on energy use in all OECD countries. It presents effective tax rates on energy use in terms of both energy content and carbon emissions, together with detailed graphical profiles of the structure of energy use and taxes on energy in each country. The first part of the report outlines the methodological approach taken, summarises various effective tax rates across countries, and highlights a number of key implications of these results. The second part of the report is made up of individual country sections that describe in more detail energy taxation in each country and present the graphical profiles of energy use and taxation in each country.

The report highlights wide variations in these effective tax rates, both across countries, and within countries between different types of fuel (diesel, natural gas, coal, etc.), even when they are used for similar purposes. These uneven price signals with respect to different energy products, and low rates and exemptions on some of them, result in wide differences (and often considerable weakness) in the tax disincentives to emit carbon dioxide (CO_2). Since CO_2 has broadly the same impact on atmospheric greenhouse gas concentrations however and wherever it is emitted, these differences underline the fragmentation in current efforts to mitigate climate change. In many countries, a reappraisal is warranted to ensure that advantage is being taken of the lowest-cost opportunities to reduce carbon emissions.

Energy taxation and structure of country profiles

Governments tax energy, particularly fossil fuels, for a variety of reasons. Taxes on fuel are a powerful tool for internalising in prices the cost of environmental damage caused by emissions of CO_2 and local air pollutants from burning fossil fuels. In the case of motor vehicle fuels, taxes may also be used to approximate costs attributed to road congestion, accidents and noise. Fuel taxes are also an important source of government revenues. In some countries, the revenues are earmarked for specific purposes like road infrastructure and may be seen as a type of user charge (albeit based on some measure of average rather than marginal cost).

Regardless of their formal purpose, however, energy taxes send important price signals that influence energy use patterns. The graphical profiles for each OECD country illustrate on a consistent basis across countries the impact of taxes on price signals sent in relation to energy and carbon content. The graphical have been constructed by "mapping" the tax rate applying to each type and use of energy against the quantum of those different uses. Both the tax rates and energy use data have been converted into common units – based alternately on energy content (measured in gigajoules) and carbon emissions (measured in tonnes of CO_2 emitted).

The graphs also present tax expenditures with respect to energy use that are reported by many countries. In each case, the graphs illustrate the country "benchmark" rate of tax that would normally apply, the concessional rate, the tax revenue foregone and the significance of the related energy use in terms of energy content and CO_2 emissions. By setting tax expenditures in the context of each country's overall energy tax system, the graphs are a useful complement to the budgetary information on tax expenditures presented in the OECD's *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels – 2013*. They are also a useful tool to aid countries in establishing or revising benchmarks for tax expenditure purposes in order to provide greater transparency regarding differences in tax rates for similar fuels and uses.

Effective tax rate differences across countries

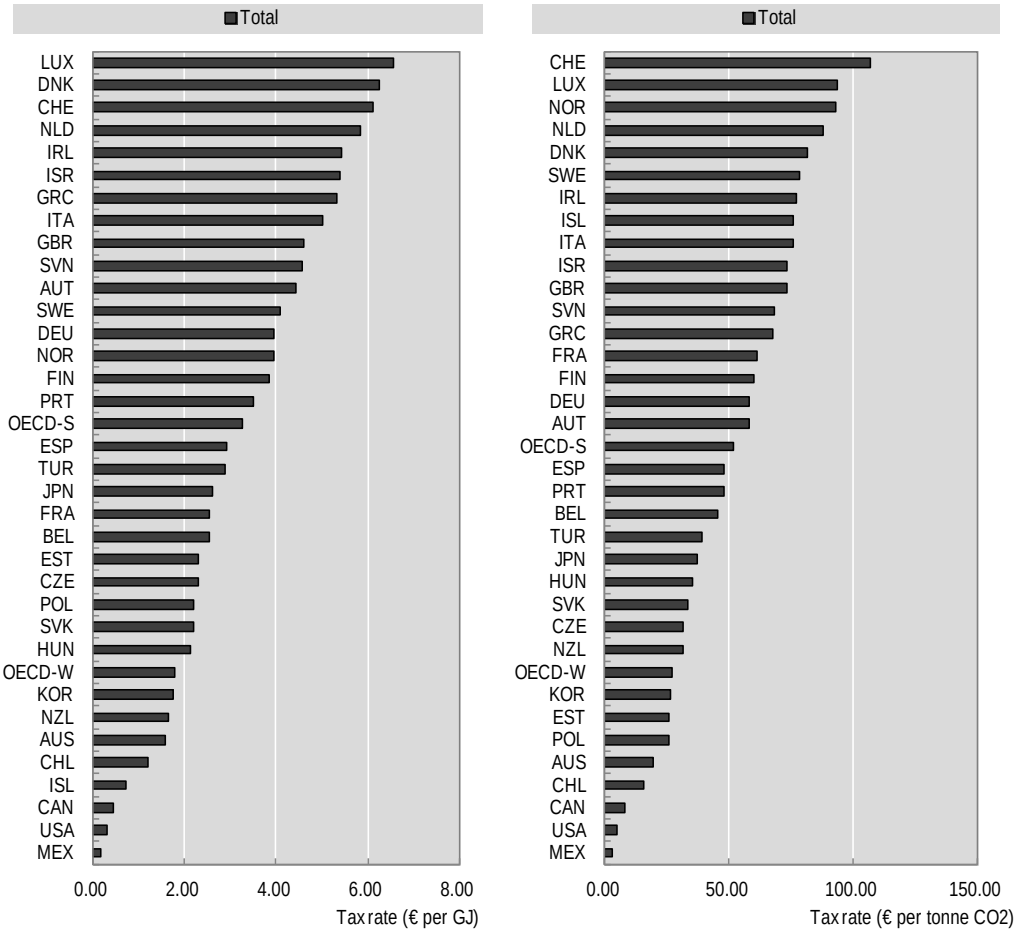
The graphical profiles show that countries differ markedly in terms of both the composition of energy use and the way that energy use is taxed. In particular, countries differ in the range of energy products that are taxed, in tax base definitions and in tax rate levels and rebates.

Based on statutory rates in effect on 1 April 2012, overall effective tax rates on energy (Figure 1) range from EUR 0.18 per GJ in Mexico (not taking into account the variable rate component of its fuel excise tax, which has been negative in recent years) to EUR 6.58 per GJ in Luxembourg, with a simple average for all OECD countries of EUR 3.28 per GJ and a weighted average of EUR 1.77 per GJ. Meanwhile, effective tax rates on carbon range from EUR 2.80 per tonne of CO_2 in Mexico to EUR 107.28 per tonne of CO_2 in Switzerland, with a simple average for all OECD countries of EUR 52.04 per tonne of CO_2 and a weighted average of EUR 27.12 per tonne of CO_2.

The highest overall effective tax rates tend to be in European countries, where energy-tax policy is significantly shaped by the 2003 European Union Energy Taxation Directive, which sets minimum tax rates for a variety of energy commodities. Many of the countries with the highest effective tax rates on carbon are countries with explicit carbon taxes (*e.g.* Denmark, Iceland, Ireland, Norway, Sweden, Switzerland). Explicit carbon taxes generally exist alongside other taxes on energy products, which are sometimes based on the energy content of different fuels. These countries tend to tax a broad range of energy products and to have more consistency in rates across different fuels and uses, particularly with respect to heating and process use.

Many Central European and Asian OECD member countries (*e.g.* the Czech Republic, Estonia, Hungary, Japan, Korea, Poland, the Slovak Republic, Turkey) tend to have lower effective tax rates on carbon than the countries mentioned above. The lowest effective tax rates on carbon are found in Australia, New Zealand and the Americas (Chile, Canada, Mexico and the United States). These last countries typically only tax fuels used in transport and generally do so at lower rates than the OECD average (an exception being at the provincial level in Canada).

Figure 1: Average effective tax rates on energy (left) and CO2 (right) in OECD countries



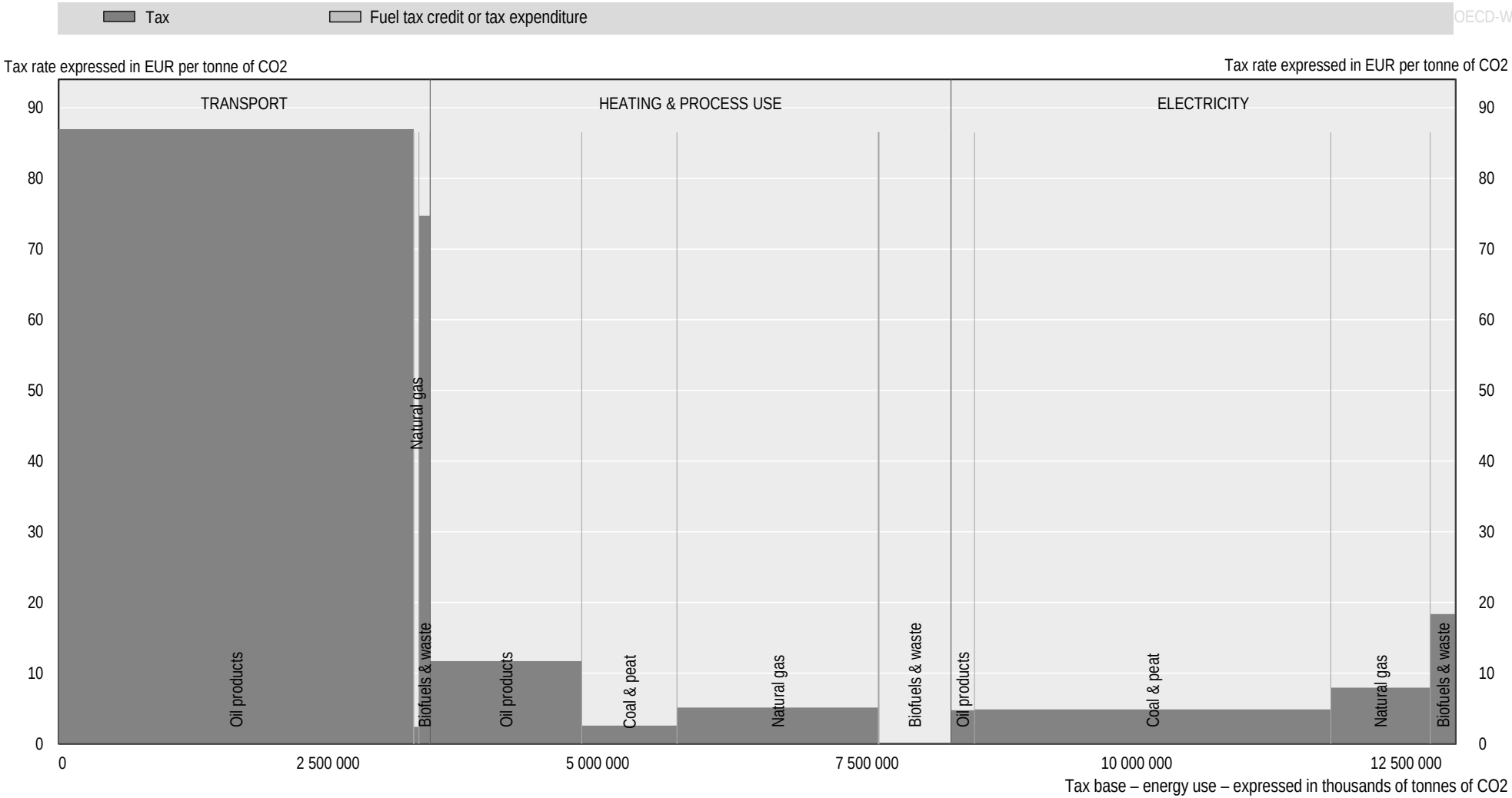
Source: OECD calculations. Tax rates are as of 1 April 2012 (except 1 July 2012 for Australia); emissions are based on data for 2009 from the IEA. Figures for Canada and the United States include only federal tax rates.

Effective tax rate differences within countries

Within countries there are often substantial differences in the way in which different forms, uses and users of energy are taxed, whether they are compared in terms of energy content or CO_2 emissions. The report considers effective tax rates in three broad categories of energy use: transport; heating and process use; and electricity. In almost every country, energy products used in transport (mainly gasoline and diesel) are taxed significantly more than energy products used for heating or process use, or to generate electricity. This is unsurprising given the broader range of policy goals that governments may be attempting to address in the transport category compared to other areas of energy use. While the combustion of fossil fuel will emit CO_2 and certain air pollutants regardless of use, fuels used in road transport also contribute to other externalities, such as congestion, traffic accidents and noise, which may have an even higher social cost than these emissions. In the absence of road pricing, which may be the best approach, road fuel consumption can be a rough proxy for these other external costs, since fuel use is correlated with distance driven. In addition, a number of countries formally or informally earmark road fuel taxes to fund road construction and maintenance.

Within the heating and process use category, in many countries energy products used for industrial or energy transformation purposes are taxed at lower rates (whether through explicit taxes or through emissions trading systems) than the same energy products used for residential or commercial purposes,

Figure 2: Taxation of energy in the OECD area on a carbon content basis



Source: OECD calculations. Tax rates are as of 1 April 2012 (except 1 July 2012 for Australia); emissions are based on data for 2009 from the IEA.

perhaps driven by concerns about not undermining industrial competitiveness. In a number of other countries, however, the reverse holds, which may reflect a government strategy to try to protect households from high energy costs. However, since exemptions that hold down energy prices for particular sectors can distort energy use in an environmentally damaging manner, there may be better mechanisms for addressing these concerns. For example, it is usually more effective from an environmental point of view to preserve the price signal sent by fuel taxes and address other impacts on industry or low-income families by more direct means, such as cash transfers that do not directly subsidise energy use.

The third category shown in each country profile is electricity. Electricity is a secondary energy product generated from some primary energy source, like natural gas, coal or wind. Rather than simply showing the final electricity consumed, the maps show the fuels used to generate electricity, which captures the significant amount of energy lost in converting fossil energy into electricity. Countries tax electricity in two ways: by taxing the fuels used to generate electricity, and/or by taxing the consumption of electricity. The country profiles take into account both types of tax. Where the consumption of electricity is taxed, the effective tax rates are calculated as if the electricity tax were an implicit tax on the underlying fuels used to make electricity, according to their relative proportions in the mix of primary energy used for electricity generation in the particular country.

The broad pattern of these differences can be seen in Figure 2, which shows weighted average effective tax rates (expressed per unit of CO_2 emissions) on various types of energy for the OECD area as a whole. A similar pattern is observed when tax rates are expressed in terms of the energy content of different fuels. The report contains graphs of this kind for each of the 34 OECD member countries, showing in more detail the effective tax rates on a finer breakdown of fuels and uses, along with reported tax expenditures.

Significance of variations in effective tax rates

While some variations in effective tax rates across energy uses are clearly justified, in many cases, the rationale for the observed variations is not obvious and rates may not be reflective of the external costs associated with different forms of energy and energy use. This is particularly the case where effective tax rates vary across energy products that are used for the same or similar purposes. Such variations may suggest that some countries have not given great weight in their tax policy design to environmental damage from fuel use, such as that caused by carbon emissions. Many differentials may, however, have simply arisen out of the piecemeal design and introduction of taxes on different energy products at different points in time. The report notes various situations that suggest a need for reappraisal of tax settings:

- The effective tax rate on diesel for road use in terms of both energy and carbon content is typically lower than the comparable rate on gasoline. Figure 3 shows the difference in the effective tax rates in energy terms for the two fuels for all OECD countries.

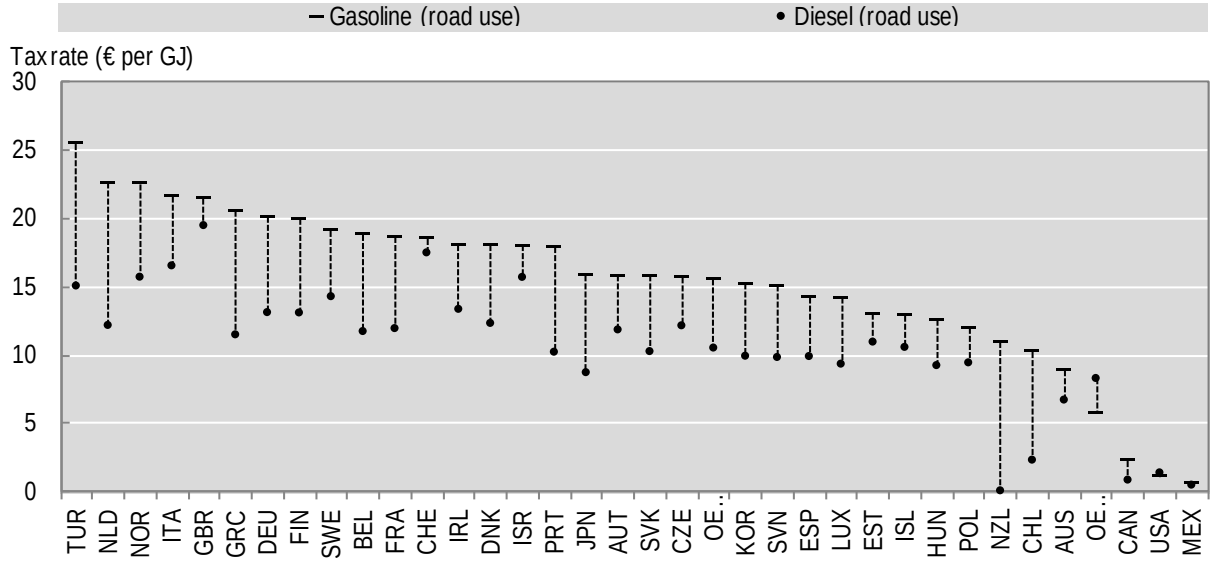
- In both the transport and the heating and process categories, oil products (predominantly gasoline and diesel) tend to be taxed significantly more heavily and more frequently than other energy products, such as natural gas and coal.

- Among heating and process fuels, there is often a very low (or zero) tax rate on coal, despite its significant negative environmental impacts, particularly its greater contribution than other fuels to greenhouse gas emissions and other air pollutants per unit of energy.

- Fuel used in agriculture, fishing and forestry is often exempt from tax, providing no signal with respect to external costs, thereby encouraging over-use.

- In the electricity category, coal, which is widely used, is often taxed at a lower rate than natural gas and biofuels and waste; and taxes on the consumption of electricity provide no signals in terms of the differing environmental impact of the various primary energy sources from which electricity may be generated.

Figure 3: Effective tax rates on energy: Gasoline vs. diesel (road use)



Source: OECD calculations. Tax rates are as of 1 April 2012 (except 1 July 2012 for Australia); emissions are based on data for 2009 from the IEA. Figures for Canada and the United States include only federal tax rates.

Conclusion

These uneven price signals with respect to different energy products, and low rates and exemptions on some of them, suggest that some of the lowest-cost opportunities to reduce carbon emissions are being foregone. In many countries, a reappraisal is warranted to explicitly determine whether current energy tax settings are appropriately adapted to their environmental, social and economic goals. The profiles of energy taxation in this report provide policy makers and analysts with a data-rich tool to aid in the review and reappraisal of energy tax systems.

For further information, please consult the full report *Taxing Energy Use – A Graphical Analysis (2013)* at http://www.oecd.org/tax/tax-policy/taxingenergyuse.htm, or contact:

James Greene
OECD, Centre for Tax Policy and Administration
Tel.: +33 (0)1 45 24 88 86
Email: James.Greene@oecd.org

Michelle Harding
OECD, Centre for Tax Policy and Administration
Tel.: +33 (0)1 45 24 93 68
Email: Michelle.Harding@oecd.org