



## INTRODUCTION: INVENTORY OF ESTIMATED BUDGETARY SUPPORT AND TAX EXPENDITURES FOR FOSSIL-FUELS

This inventory provides quantitative estimates of direct budgetary support and tax expenditures supporting the production or consumption of fossil fuels in OECD member countries. This information has been compiled as part of the OECD's programme of work to develop a better understanding of environmentally harmful subsidies (EHS). It is also intended to inform the on-going efforts of the Group of Twenty (G20) nations to reform fossil-fuel subsidies.

The G20 exercise is concerned with “inefficient fossil fuel subsidies that encourage wasteful consumption”, which G20 countries have declared their intent to “[r]ationalise and phase out over the medium term” (G20, 2009). A similar commitment was made by leaders of the Asia-Pacific Economic Cooperation (APEC) forum in November 2009. And through the OECD's 2009 Declaration on Green Growth, 34 countries declared that they would “encourage domestic policy reform, with the aim of avoiding or removing environmentally harmful policies that might thwart green growth, such as subsidies: to fossil fuel consumption or production that increase greenhouse gas emissions ...” (OECD, 2009a).

This inventory proceeds from the fundamental perspective that the identification of “subsidies” to any sector or industry requires first taking an inventory of the full set of measures that may qualify as support to that sector. For one, because of interactive effects among policies, it is difficult to determine *a priori* whether a particular support policy is inefficient, encourages wasteful consumption, or is environmentally harmful. Only with a full picture of the operating policies can various analytical tools be brought to bear on questions about the effects of those policies on human welfare and the environment.

This inventory marks a first attempt to comprehensively list the various direct budgetary transfers and reported tax expenditures that effectively support fossil-fuel production or use in OECD countries. It may be seen as a complement to the information on fossil-fuel consumption price subsidies that has been compiled by the International Energy Agency (IEA). The coverage of this inventory departs, however, significantly from that of the IEA estimates and from the lists of subsidies reported by some governments. The IEA uses the so-called “price-gap” approach, which compares domestic fuel prices to an international reference price, in order to provide one type of estimate of the extent to which different countries support the consumption of fossil fuels. This results in most OECD countries not being covered since they tend to have domestic prices that are at (or due to taxes, often above) market reference price parity. The price-gap approach may also not fully capture those measures that support the production of fossil fuels (to the extent that such support is not reflected in domestic prices).

The scope of what is considered “support” is here deliberately broad, and is broader than some conceptions of “subsidy”. Essentially, it includes both direct budgetary expenditures and tax expenditures that in some way provide a benefit or preference for fossil-fuel production or consumption relative to alternatives. This broader definition thus encompasses policies that may induce changes in the relative prices of fossil fuels. However, while the present inventory covers measures that provide support (either absolute or relative) to fossil fuels, it does not attempt to assess the impact on prices or quantities of the measures considered, nor does it pass any judgment as to whether a given measure is justified or not.

In interpreting the figures, it is important to underscore that tax expenditures are measures of support only relative to the benchmark tax structure of the country in question. Since the figures measure *relative* support

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within the context of that country's tax system, they are not comparable across countries. A country that applies high rates of taxation to fossil-fuel end products within the context of a highly differentiated excise-tax system may thus have higher measured support to fossil fuels than a country with lower but uniform excise-tax rates, even if the tax system of the former country has higher taxes than the latter country on each type of fuel.<sup>1</sup> Further, the comprehensiveness of tax expenditure reporting varies significantly between countries.

It is recognised that the policy features that support fossil fuels have been put in place for various policy reasons. A consequence of this broad conception of support is that while a number of these measures may be inefficient or wasteful, others may not be. The report does not provide any analysis of the impacts of specific support measures, and so does not pass any judgement on which measures might be usefully kept in place and which ones a country might wish to consider for possible reform or removal. Its purpose is to provide information about policies that give some level of support, as a starting point for further analysis about the objectives of particular measures, their impacts (economically, environmentally and socially), and possible reforms and alternatives.

### **Structure of the report**

The inventory is organised by country. The Secretariat has identified budgetary support and tax expenditures relating to fossil fuels in all 34 OECD member countries. Its intention is eventually to extend the exercise to cover selected non-OECD countries.

Each country chapter is structured into three sections. The first section provides an overview of the salient features of the energy economy of the country: the shares of different energy sources in total primary energy supply (TPES); fossil resources; domestic production and international trade; the ownership structure of the industry; pricing and taxation policies in the energy sector; and support policies.

The second section of each country chapter provides documentation of the measures, identified by the OECD Secretariat to date, that support fossil-fuel production or consumption activities involving that country. Measures that do not affect current production or consumption of fossil fuels are also included in the inventory. These are separately itemised in the general services support estimate (GSSE) category and refer mainly to expenditures relating to past production activities (e.g. to compensate victims of mine land subsidence following the underground extraction of coal or hydrocarbons), to research and development not directly relating to production, and to activities such as the funding of strategic stockpiles, the benefits of which are not easily attributable to producers or consumers uniquely.

The entries for individual measures, identified by name and a unique OECD database code, describe the years for which data are available on the cost of the measure. Thereafter follows a succinct description of the

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<sup>1</sup> For example, even though gasoline and diesel fuels may both be taxed in Country X (and it could be argued that neither is subsidised in an absolute sense), a lower level of taxation on diesel compared with gasoline would be included in the inventory if the lower rate is treated as a tax expenditure by Country X. This is considered support, since the tax structure changes market prices in a non-neutral way that is more favourable to the lower-taxed product. Note that Country Y, which taxes diesel and gasoline at the same rate, would not be considered to provide support even though its common tax rate is lower than the lower of the two rates in Country X. (This would also be the case even if Country Y did not tax these fuels at all). The fact that measured support is higher in Country X than Country Y therefore does not mean that the tax system of Country X is more favourable to fossil fuels than that of Country Y. It merely indicates that there is a preference within Country X's tax system of the measured size relative to the benchmark treatment for that country. While not directly comparable, such preferences or non-neutralities are nonetheless important since they can impact production and consumption decisions.

measure, highlighting its formal incidence — i.e. which aspect of production or consumption is targeted and how it operates. Each entry concludes with a reference to the data source or sources.

The third section of each country chapter presents the data itself. These are reported according to the organising framework described in Figure 1.1. This framework, which is similar to the one used by the OECD for organising data on support to agriculture, divides incidence into consumption and production, and production into several sub-categories depending on whether the measure relates to output returns (i.e. the unit revenues received from sales); enterprise income (the overall income of producers); the costs of intermediate inputs, such as fuel or electricity; and the costs of value-adding production factors – labour, land (which includes access to sub-surface natural resources), capital, and new knowledge. The other dimension of the figure, transfer mechanism, refers to how the transfer is created.

### **Coverage, method and data sources**

This first attempt at estimating support to fossil-fuel production and consumption provided by a broad range of countries of necessity concentrates on budgetary transfers and tax expenditures relating to fossil fuels. Data on these transfers are relatively straightforward to obtain from official government documents. These measures correspond, respectively, to the first and second rows in Figure 1.1, and also touch on elements in the third row. Numerous other forms of support – notably support provided through risk transfers, concessional credit, injections of funds (as equity) into state-owned enterprises, and market price support – were not quantified, however. The data requirements for estimating the transfers associated with such measures are greater, and the calculations required to estimate the support elements more complex, than for budgetary transfers and tax expenditures. Nonetheless, the OECD Secretariat intends to include these transfers in the future.

Regarding market price support – which refers to the monetary value of gross transfers from consumers and taxpayers to energy producers arising from policy measures creating a gap between domestic producer prices and reference prices of that specific energy commodity, measured at the mine-mouth or well head – an indication of its possible magnitude can be obtained by examining import tariffs on fossil fuels. Tables 1.1 and 2.1 show most-favoured nation (MFN) tariffs applied by OECD countries on the main fossil fuels. MFN tariffs are the highest tariffs applied on imports from other member states of the World Trade Organization (WTO). Weighted-average import tariffs will tend to be lower than those indicated by the MFN tariffs, as most OECD countries are party to one or more bilateral or regional free-trade agreements, which usually set tariffs on industrial products such as fuels to zero. Petroleum products in general attract the highest tariffs, followed by natural gas and coal. Even based on applied MFN tariffs, however, it appears that import tariffs do not protect domestic producers to any important extent. In the few countries that apply a common import tariff on all goods (e.g. Chile and Korea), a small degree of protection of domestic producers (where applicable) may exist. The effect on consumers is to raise the domestic price by the level of the tariff, and to slightly dampen demand.

Also not covered by this exercise are measures relating to energy-consuming capital, such as support to the manufacturing of motor vehicles designed to run on petroleum fuels, nor to electricity producers, except in a few particular cases where electricity is derived exclusively from fossil fuels. However, support provided through provisions of the income-tax system of many countries that implicitly encourage employers to provide employees with fuel credit cards for buying motor fuels used in company-owned automobiles *would be* covered in the inventory, were those data available.

Consumption of fossil fuels is here understood in a broader sense than just final consumption since it refers to the stage at which fuels are burnt, whether this occurs in motor vehicles, stationary engines, heating equipment or power plants. Production in turn encompasses the following stages: extraction; transportation (e.g. through pipelines); and processing and refining. Measures encouraging the use of fossil fuels in power generation are, however, included under consumption since it is the combustion of fuels that is here directly supported.

Country coverage comprises all 34 OECD member countries. In addition, support provided by sub-national governments (states, provinces, *Länder*) is also included for the following federal countries: Australia, Canada, Germany, and the United States. Time and resource constraints meant, however, that the chapter for the United States was only able to include measures for ten states, the selection of which was based on their relevance in terms of fossil resources. The inclusion in the inventory of measures provided by only selected sub-national jurisdictions in some federal countries calls for additional caution in interpreting the estimates and further precludes country comparisons. This exercise documents that support provided by sub-national governments is, however, not trivial.

Generally, the data provided in this inventory have been obtained from government sources. Support measures were identified mainly through searches of official government documents and web sites. In a few cases, unpublished data were furnished by OECD governments. The data presented are as complete as possible, but they are by no means comprehensive. There is more information presented in the inventory for those countries which have been relatively more transparent in terms of their support to fossil fuel consumption and production in their budget books. This does not necessarily mean that these countries have higher levels of support than other countries, but may reflect that they have been more transparent about the support that is provided.

A limiting factor in respect of tax expenditures relating to fossil fuels is the extent to which OECD countries produce such estimates already. In a recent survey of OECD countries, 16 of the 24 responding countries (Australia, Austria, Belgium, Canada, France, Germany, Greece, Mexico, the Netherlands, Norway, Portugal, Spain, Switzerland, Turkey, the United Kingdom, and the United States) stated that they publish full tax-expenditure reports on a regular basis (OECD, 2010). Most of these reports cover both corporate and personal income taxes. Fewer cover VAT, and fewer still attempt to estimate tax expenditures in respect of excise taxes (which, although significant, may in part be because of conceptual difficulties in defining an appropriate benchmark system for a tax that is applied to a specific commodity).<sup>2</sup>

1. However, few countries include detailed figures in their published tax-expenditure estimates related to the production or consumption of fossil fuels, and in some cases the figures that are published may relate to energy consumption or a range of natural-resource production rather than specifically to fossil fuels. Where data do exist<sup>3</sup>, they reveal that the tax expenditures are varied, with some providing minor relief to selected consumers or industries, and others providing significant relief to broad groups of taxpayers.

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<sup>2</sup> Governments typically take decisions on tax expenditures simultaneously with decisions on broad programme spending in annual budgets. Except from compliance and policy discussions, there has typically been little oversight thereafter. Recently, however, the judicial branches of some countries have begun to look at the equity perspectives of tax expenditures, in light of constitutional provisions requiring equal treatment under the law.

<sup>3</sup> In some cases, countries have multiple procedures and definitions of what constitute tax expenditures. In the United States, for example, the Joint Committee on Taxation (a legislative body) publishes a list of tax expenditures that is different from that published by the Department of the Treasury (an executive body). For this report, estimates were generally derived from the Department of the Treasury, as their numbers are generally more detailed than those produced by the Joint Committee.

**Table 1.1. Matrix of support measures, with examples**

		Statutory or formal incidence (to whom and what a transfer is first given)								
		Production							Direct consumption	
		Output returns	Enterprise income	Cost of intermediate inputs	Costs of production factors				Unit cost of consumption	Household or enterprise income
					Labour	Land and natural resources	Capital	Knowledge		
<b>Transfer mechanism (how a transfer is created)</b>	<b>Direct transfer of funds</b>	Output bounty or deficiency payment	Operating grant	Input-price subsidy	Wage subsidy	Capital grant linked to acquisition of land	Capital grant linked to capital	Government R&D	Unit subsidy	Government-subsidized life-line electricity rate
	<b>Tax revenue foregone</b>	Production tax credit	Reduced rate of income tax	Reduction in excise tax on input	Reduction in social charges (payroll taxes)	Property-tax reduction or exemption	Investment tax credit	Tax credit for private R&D	VAT or excise-tax concession on fuel	Tax deduction related to energy purchases that exceed given share of income
	<b>Other government revenue foregone</b>			Under-pricing of a government good or service		Under-pricing of access to government land or natural resources; Reduction in resource royalty or extraction tax		Government transfer of intellectual property right	Under-pricing of access to a natural resource harvested by final consumer	
	<b>Transfer of risk to government</b>	Government buffer stock	Third-party liability limit for producers	Provision of security (e.g. military protection of supply lines)	Assumption of occupational health and accident liabilities	Credit guarantee linked to acquisition of land	Credit guarantee linked to capital		Price-triggered subsidy	Means-tested cold-weather grant
	<b>Induced transfers</b>	Import tariff or export subsidy	Monopoly concession	Monopsony concession; export restriction	Wage control	Land-use control	Credit control (sector-specific)	Deviations from standard IPR rules	Regulated price; cross subsidy	Mandated life-line electricity rate

Table 1.2. MFN tariffs applied by OECD countries on imported hydrocarbon fuels, as of 1 January 2012

Country	Crude oil and liquid petroleum products							Gaseous hydrocarbons		
	Crude oil	Motor gasoline	Aviation spirit	Kerosene	Jet fuel, kerosene-based	Diesel	Heavy fuel oil	LNG	LPG	Gaseous natural gas
HS code:	2709	2710.11 ex	2710.11 ex	2710.19 ex	2710.19 ex	2710.19 ex	2710.19 ex	2711.11	2711.12	2711.21
Australia <sup>1</sup>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Canada	0%	0%	0%	0%	0%	0%	0%	0%	0-12.5%	0%
Chile	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Iceland	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Israel <sup>2</sup>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
European Union	0%	4.7%	4.7%	4.7%	4.7%	0-3.5%	3.5%	0%	0-8%	0%
Japan	0%	JPY 0.995/L	JPY 0.995/L	0-3%	JPY 0.375/L	JPY 0.819/L	JPY 0-0.819/L	0%	0%	4.1%
Korea	3%	5%	5%	5%	5%	5%	5%	3%	3%	3%
Mexico	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
New Zealand	0%	0%	0%	0%	0%	0%	0%	0%	NZD 0.104/L	NZD 3.17/GJ
Norway	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Switzerland	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turkey	0%	4.7%	4.7%	4.7%	4.7%	0-3.5%	3.5%	0%	0-8%	0%
United States	USD 0.0525-0.105/bbl	USD 0.525 / bbl	USD 0.0525-0.105/bbl	USD 0.105-0.525/bbl	USD 0.525/ bbl	USD 0.0525-0.525/bbl	USD 0.0525-0.105/bbl	0%	0%	0%

1. Australia applies excise duties at the point of import, and lists these duties in its tariff schedule. Since these (AUD 0.38143 per litre for motor gasoline, kerosene, diesel and heavy fuel oil, and AUD 0.03556 per litre for aviation spirit and jet fuel) are the same as the normal excise duty applied to domestically produced fuels, the tariffs here are listed as zero.

2. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: European Union: Business Link ([www.businesslink.gov.uk/bdotg/action/tariff](http://www.businesslink.gov.uk/bdotg/action/tariff)); all other countries: European Commission, Market Access Database ([madb.europa.eu/mkaccdb2/indexPubli.htm](http://madb.europa.eu/mkaccdb2/indexPubli.htm)).

Table 1.3. Tariffs applied by OECD countries on imported solid fossil fuels, as of 1 January 2012

Country	Hard coal				Lignite		Peat	Coke and semi-coke or coal, lignite or peat
	Anthracite	Bituminous coal	Other	Briquettes of hard coal	Non-agglomerated	Agglomerated		
HS code:	2701.11	2701.12	2701.19	2701.20	2702.10	2702.20	2703	2704
Australia	0%	0%	0%	0%	0%	0%	0%	0%
Canada	0%	0%	0%	0%	0%	0%	6.5%	0%
Chile	6%	6%	6%	6%	6%	6%	6%	6%
Iceland	0%	0%	0%	0%	0%	0%	0%	0%
Israel <sup>1</sup>	0%	0%	0%	0%	0%	0%	6%	0%
European Union	0%	0%	0%	0%	0%	0%	0%	0%
Japan	0%	0%	0%	3.9%	0%	0%	0%	3.2%
Korea	0%	0%	0%	1%	1%	1%	1%	3%
Mexico	0%	0%	0%	0%	0%	0%	0%	0%
New Zealand	0%	0%	0%	0%	0%	0%	0%	0%
Norway	0%	0%	0%	0%	0%	0%	0%	0%
Switzerland	CHF 0.80/tonne	CHF 0.80/tonne	CHF 0.80/tonne	CHF 0.80/tonne	CHF 0.80/tonne	CHF 0.80/tonne	CHF 0.80/tonne	CHF 0.80/tonne
Turkey	0%	0%	0%	0%	0%	0%	0%	0%
United States	0%	0%	0%	0%	0%	0%	0%	0%

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: European Union: Business Link ([www.businesslink.gov.uk/bdotg/action/tariff](http://www.businesslink.gov.uk/bdotg/action/tariff)); all other countries: European Commission, Market Access Database ([madb.europa.eu/mkaccdb2/indexPubli.htm](http://madb.europa.eu/mkaccdb2/indexPubli.htm)). The identification of support measures was conducted mainly through searches of official government documents and web sites. In a few cases, unpublished data were requested from, and furnished by, OECD governments.

The level of disclosure and accuracy of sub-national tax expenditures relating to fossil fuels can vary widely as well. Moreover, in their corporate income-tax systems, a number of sub-national governments provide the same tax expenditures as federal governments, creating additional tax relief, even absent specific statutory tax breaks.

The main transformation of data carried out by the Secretariat was to allocate support to particular fuels where government data do not provide such a breakdown, and to allocate support for descriptive purposes in terms of its formal incidence (e.g. support to output returns, labour, land). Following standard practice (see, for example, OECD, 2009b), transfers associated with policies benefitting more than one fuel or sector were allocated according to the relative value of production or consumption, or proportional to the energy-equivalent volume of production or consumption. It is recognised that the actual allocation of support across fuel types may in practice vary based on factors other than the volume or value of production or consumption, but this approach is adapted in the absence of more specific information. For these reasons, while the base data come from government sources, the particular breakdowns may not reflect the views of the responsible governments. In a few cases, mainly pertaining to excise-tax exemptions, the Secretariat also estimated the value of these tax expenditures, based on the published rate of exemption and national or IEA data on the volume of fuel that was exempted.

### **Interpretation of the data**

The data on direct budgetary expenditures constitute a relatively small part of the inventory of transfers compiled for this report. They are concentrated for the most part in three areas: (i) support for energy purchases by low-income households; (ii) government expenditure on research, development and demonstration projects, both through government laboratories and through grants to non-governmental bodies; and (iii) transfers to help redeploy resources in declining fossil-fuel industries, namely coal.<sup>4</sup> Data on direct budgetary support are relatively easy to collect and interpret: the data are usually provided in government budget documents, and there is little need to refer to a hypothetical benchmark – unlike the case for tax expenditures.

### ***Types of tax expenditures relating to fossil fuels***

Tax expenditures, by contrast, are always estimated with reference to a benchmark tax level or system. The following section, therefore, explains the main types of tax expenditures examined for this report, and some of the caveats that must be born in mind when interpreting the data.

Tax expenditures with respect to fossil fuels can be categorised into three broad groups: (i) those relating to final consumption of fossil fuels; (ii) those relating to the use of fossil fuels as inputs to production; and (iii) those relating to the production of fossil fuels, including extraction, refining and transport.

### ***Tax expenditures relating to final consumption of fossil fuels***

This group of tax expenditures is targeted at final consumption, typically by households, and is generally provided through lower rates, exemptions, or rebates with respect to the two main types of consumption taxes:

- Value added taxes (VAT) (which are intended to be broad-based taxes on final consumption, representing a percentage of the value of the good or service sold); and
- Excise taxes (which are levied on specific goods, and for which the value of the tax normally is unrelated to the value of the underlying good).

These are generally the most visible form of tax expenditures relating to fossil fuels, as they have a direct effect on prices and therefore consumption, though they are not always easy to measure.

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<sup>4</sup> In the coal industry, direct payments are still used by a few countries to help keep high-cost producers from going out of business, but the long-run trend in these types of transfers is downwards. Indeed, since the late 1980s, subsidised coal production has halted entirely in Belgium, France, Ireland, Japan, and Portugal.

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Some tax expenditures are levied broadly in the economy through general exemptions or rate reduction in countries' VAT rates. Other tax expenditures are more targeted. In this area, three main categories of tax expenditures stand out: (i) those related to specific groups of consumers, (ii) those related to specific tax bases, and (iii) those related to how the fuels are used. In the first group, qualifying individuals or categories of consumers are taxed less heavily on their fossil-fuel use than users subject to the standard rate of tax. Often, government entities are exempt from fuel taxes (Box 1.1). Sometimes reduced VAT rates are intended to achieve social goals, such as with the exemption of low-income earners from taxes. Such tax exemptions encourage higher rates of consumption of the exempted fuels than would occur in the absence of the exemptions. Governments similarly attempt to achieve social goals through differential tax rates (such as lower tax rates or exemptions on smaller quantities).

#### **Box 1.1. Expenditures relating to governmental activities**

When tax expenditures relating to fossil fuels are discussed, most people think first of the beneficiaries as fossil-fuel producers or private consumers of such fuel. Rarely do they think of governments. Yet, in many instances, governments (and their affiliated bodies) are significant beneficiaries of fossil-fuel-related tax expenditures.

In France, for example, the government taxes natural gas consumption at a rate of EUR 1.19 per megawatt hour (MWh). The tax structure features a number of exemptions that can be categorised in the other types of tax expenditures mentioned above (such as for households and transportation). In addition, until recently, sub-national governments and other public authorities were exempted from the tax. In 2008, this one tax expenditure was estimated at EUR 37 million. There was also a tax expenditure for fuel used by the military, estimated at EUR 30 million (French Budget, 2010). Both these tax exemptions were eliminated starting in 2009 and 2010, respectively. Many OECD countries provide tax exemptions or reductions for other levels of governments or quasi-governmental bodies, including fuel used in hospitals, schools, and public transport. While such measures may not have a net revenue impact if the government that suffers the lost revenue is the same government that benefits from the concession, just as in the private sector a selective exemption for fossil fuels in the public sector can nonetheless bias decisions by government managers responsible for a spending budget (managed independently of the government's tax revenues) toward greater use of fossil fuels than would otherwise be the case.

In the second group, specific fossil fuels sometimes are subject to reduced rates or are exempted from tax altogether, even though they are intended for the same end purpose as other fuels that are taxed. A common example in the transportation fuel area is a lower tax rate (or exemption) on diesel relative to gasoline (petrol). The broader context, however, must be taken into account. In some countries where the excise tax on diesel is substantially lower than on gasoline (petrol), goods vehicles have to pay distance-based road-user charges. Many countries also levy lower excise taxes on fuels deemed to be "cleaner" than gasoline or diesel, such as CNG, LPG and biofuels, in order to encourage consumers to switch to those fuels. Finally, in the third group are tax expenditures occurring as a result of differences in rates based on how the fossil fuels are used (for example, diesel use on highways versus diesel used in primary industries). Aviation fuels are a special case (Box 1.2).

An important point to bear in mind when interpreting any tax expenditures relating to VAT and excise taxes on fuel is that, in most OECD countries, the majority of the fuel – especially fuel used in motorised vehicles – that is consumed is taxed to some degree. That which is not is generally sold at a price that is at least at world-market parity. (The current exception among OECD countries is Mexico.) The overall net effect of this taxation, even after the exemptions, reductions and rebates, is still to provide some degree of disincentive to consume compared with a situation in which no taxes were applied, and hence no tax expenditures would be measured. The deviations from the standard tax rate nonetheless still distort relative prices *within* an economy, and may favour the consumption of certain fuels in preference to others. This type of non-neutrality reported by governments thus constitutes "support" for purposes of this inventory.

### Box 1.2. The taxation of fuel used in international aviation

Fuels purchased for use in international aviation are sold free of tax due to an international agreement dating from December 1944: the Convention on International Civil Aviation (also known as the “Chicago Convention”). While fuel taxes may be applied to domestic aviation, Article 24(a) of the Chicago Convention states that “(f)uel ..., on board an aircraft of a contracting state ... shall be exempt from customs duty ... inspection fees or similar national duties or charges.” This provision was extended by the Council of the International Civil Aviation Organization (ICAO) in a 1999 Resolution, which states: “fuel ... taken on board for consumption” by an aircraft from a contracting state in the territory of another contracting State departing for the territory of any other State shall be exempt from all customs or other duties ... Moreover, the Resolution broadly interprets the scope of the Article 24 prohibition to include “import, export, excise, sales, consumption and internal duties and taxes of all kinds levied upon ... fuel.” Most, if not all, bilateral air-services agreements include similar clauses to the ICAO Resolution’s expanded view of the Chicago Convention prohibition against taxes on international fuel.

This broad tax exemption was brought about to prevent distortions of aviation markets among countries, such as due to the double taxation of fuel, and to avoid inefficient tax-avoidance behaviour, such as airlines shifting routes to reduce tax payments.

Other arrangements generally exempt fuel used in international transport by rail and water as well.

Several OECD countries now apply taxes on fuel used for domestic flights. For example, the United States levies a USD 0.011 per litre (USD 0.043 per gallon) charge on domestic jet fuel, and in the Canadian province of Alberta aviation fuel is subject to both a provincial CAD 0.015 per litre tax and a federal levy of CAD 0.04 per litre. In Japan, fuels used for domestic aviation are taxed at JPY 26 (EUR 0.25) per litre, and in Norway they are taxed at NOK 0.70 (EUR 0.09) per litre.

The relative nature of tax expenditures relating to taxes on consumption can best be illustrated with an example. Assume a country decides to raise additional revenues through a new excise tax on heating oil. Assume also that in an effort to avoid making low-income households worse off, the government exempts them from the new tax. The new tax raises USD 950 million net per year and the government reports a tax expenditure (foregone tax revenue) due to the tax exemption of USD 50 million.

While this new policy results in a net increase in taxes on heating oil of USD 950 million, the country’s own reported tax expenditure for low-income households is included in the inventory as support of USD 50 million since it represents more favourable tax treatment for this particular group of taxpayers relative to the treatment that applies to others. Clearly the tax exemption has an important policy purpose – protecting low-income families from cost increases. The inclusion of such measures in the inventory is merely a recognition that support is provided for use of fossil fuels by low-income families when considered relative to the tax treatment that applies to others. This facilitates discussion about the impacts and goals of the policy. For example, it might be asked whether the goals of raising new revenue while protecting low-income families could be achieved without providing a weaker disincentive to use fossil fuels for low-income families relative to the general population by other approaches such as direct income support rather than a tax exemption. Whether or not the tax is intended to reduce fossil-fuel use, it would clearly tend to have this impact, so the issue of differential incentives for different groups is relevant from an environmental point of view. It is, however, noted that some readers may not generally interpret “support” for fossil fuels in this manner. For example, they may interpret support to be the net impact that policies have on the sector, or organisations and individuals consuming fossil fuels (e.g. in this case, a net increase in taxes of USD 950 million). This net approach to evaluating support is not, however, the approach used for this study.

#### *Tax expenditures relating to fossil fuels as inputs to production*

A significant portion of fossil fuels (e.g. heating in manufacturing plants, inputs to other uses) is consumed by manufacturers and service providers. Some tax expenditures are thus targeted at fossil fuel products that form an input to production. With some types of taxation, such as with VAT, governments attempt to tax only final consumption. In so doing, firms are effectively and necessarily exempted from the VAT that they pay on inputs,

through an input refunding system. Such measures are specifically designed not to discriminate among different production methods. As such, exempting energy, including fossil fuels, from VAT when it is only an input to production, can be consistent with the broader tax-policy aims of VATs.

### Box 1.3. Manufacturer privilege

In most OECD countries, and across the European Union, industries engaged in the upgrading or transformation of energy from one form to another (e.g. oil refineries, coal-briquette plants, and fossil-fuel-fired power plants) are exempted from excise taxes on energy. This is due to what is sometimes called the “manufacturer privilege” – a provision of the tax code which deems that fossil fuel used in the production of final energy products (such as gasoline or coal briquettes or electricity) cannot be taxed. Yet those same fuels, when used by other industries as part of their production processes, are often taxed. From an environmental perspective, it is the combustion of the fuel, regardless of the stage of production, which causes damage.<sup>1</sup> If the subsequent consumption of the energy products resulting from this type of energy transformation process is subject to taxation (e.g. in the case of an electricity tax at the point of distribution), it might be logical to exempt from tax the fuel inputs (e.g. natural gas) that are transformed into energy outputs (e.g. electricity) in order to avoid double taxation. On the other hand, coverage of all fuel consumed as energy would require either taxation of the energy consumed in the transformation process (i.e. the amount by which energy inputs to the transformation process exceeds outputs) or a grossing-up of the tax on the energy outputs (e.g. the electricity) to account for the energy use in the production process.

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This is generally true for pollutants such as carbon dioxide. Other pollutants, such as nitrogen oxides (NOX), are highly dependent on the method of combustion.

Excise taxes, however, intentionally raise the price of the taxed item – e.g. because its use is deemed harmful to society, or because governments can raise revenues easily and relatively efficiently on its consumption. Given this intent, there is much less rationale for exempting businesses who use these goods as inputs to production, as the goal is not to tax final consumption but the specific (potentially environmentally or socially harmful) product or activity. In this case, a tax exemption may actually limit the effectiveness of the tax. Tax expenditures in this area can include exemptions from excise taxes on fuels for certain types of businesses or households and reductions in rates of energy taxes that are related to the energy intensity of firms’ production (e.g. to attenuate the impact that the standard tax rate might have imposed on firms’ competitiveness).<sup>5</sup> Industries engaged in the transformation of fossil fuels into more-refined products or electricity are also often exempted from excise taxes on the fuels used as inputs (Box 1.3). Commonly, fuel used by producers in primary sectors (agriculture, fishing, forestry and mining) is exempted when used in vehicles not operated on publicly financed roads, on the basis that at least part of the tax serves as a means for recovering the cost of building and maintaining those roads or to internalise costs associated with road use (e.g. accidents and noise). The intent of the tax may affect whether or not the country in question considers a particular exemption to be a tax expenditure or not.

#### *Tax expenditures relating to the production of fossil fuels*

Industries engaged in the extraction of hydrocarbons and mineral resources are unique from other businesses in that the key input to their production – the natural resource in the ground – is commonly publicly owned, there is often significant uncertainty about its exact extent and quality, and its value often depends significantly on the cost of production in the particular location. The production of such resources has the potential to generate super-normal profits.<sup>6</sup> Therefore, in addition to levying the regular corporate income tax on profits earned in

<sup>5</sup> It is recognised that if, by contrast, tax rates were applied uniformly, international competitiveness concerns could create pressure to set a lower uniform tax rate, which could result in a lower level of internalisation of external costs.

<sup>6</sup> Unlike manufacturing, many of the costs of production in natural-resource extraction depend on the location and geological characteristics of the resource being extracted. Given that market prices are determined by the marginal producer (usually the highest-cost producer supplying the market at any given time), the normal operation of the market can give rise to profits that are much larger

resource extraction, governments typically levy additional charges that may be seen as representing the “sale price” for the publicly-owned resource. These charges may take various forms such as royalties, additional income taxes, and state participation.

At the same time, many fossil-fuel-producing countries have corporate tax expenditures that are targeted at the extraction or production of fossil fuels (and their transformation into usable inputs to intermediate and final consumption). These are often premised on concerns relating to risk and uncertainty, energy security, capital-intensity, high costs, and long project timelines. The tax expenditures reduce the costs of extraction, putting downward pressure on the final price to consumers.

Tax expenditures in this area are commonly provided through the corporate income tax (CIT) system and may be targeted to fossil fuels or to resource extraction more generally. Such tax expenditures are provided through, among other features of the tax code, accelerated depreciation allowances for capital, investment tax credits, additional deductions for exploration and production, and preferential capital gains treatment for particular fields. Tax expenditures on production can also take less visible forms such as the special treatment of income from state-owned enterprises, tax relief for income earned on industry sinking funds (e.g. for site remediation), tax-exempt bonds, the use of foreign tax credits for what may be considered royalty payments, and exemptions from restrictions on passive losses<sup>7</sup> (Box 1.4).

#### **Box 1.4. Supporting the extraction of fossil fuels in the United States and Canada**

In the United States, one of the largest tax expenditures is the *excess of percentage over cost depletion* option. Outside of the natural-resource sector, taxpayers are normally limited to deducting only their actual expenses from their income. For the minerals sector, producers (with the exception of integrated oil and gas firms) are allowed to deduct a fixed percentage of gross income from the mineral property to account for depletion in reserves (oil, coal, gold, etc.) instead of the value of the actual depletion. This fixed percentage is highly favourable and can even exist well after the expenses to acquire and develop a property have been recovered. It is estimated that this tax expenditure would provide a USD 1 190 million subsidy to fossil-fuel production in FY2011 (US Office of Management and Budget, 2012). As part of the budgets for FY2012 and FY2013, the executive branch proposed to eliminate this benefit for coal mines, as well as for oil and gas wells (in addition to other tax expenditures).

About half of Canada's oil production comes from so-called oil sands, where oil and sand are naturally combined, requiring additional processing steps to produce marketable oil. This requires extra capital and additional water and energy use. Such oil-sands development receives a tax benefit through the use of an accelerated capital cost allowance. This provision allows firms to deduct expenditures on capital assets at a faster rate than other businesses and faster than what economic rates of depreciation would suggest, providing a financial advantage. The cost of this measure in nominal cash-flow terms was estimated at the time of the 2007 federal budget to be on the order of CAD 300 million annually (0.02% of GDP) for the 2007-11 period. The 2007 federal budget announced the phase-out of this measure over the 2011-15 period.

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(i.e. “super-normal”) than those which would have been the minimum to justify investment in a particular well or mine. However, much of the investment in a well or mine is immobile: it cannot be used to produce another product or transferred to another location if prices fall below production costs. In addition, any economic rent going to those producers with lower costs may eventually be capitalised in the resource mineral rights, provided the relevant market is competitive enough. In that case, it is the owners of the resource (as opposed to the firm extracting the resource) that may end up receiving most of the long-run producer surplus.

<sup>7</sup> A passive loss is a loss incurred through a rental property, limited partnership, or other enterprise in which a corporation or individual does not have a working interest. A working interest in an oil and gas property is one by a party that is expected to contribute to the cost of developing and operating the property. Parties merely holding rights to royalties and production payments are not considered to have working interests.

The effect of these tax benefits is to lower the cost of production and (since many are related to capital) provide an incentive for more investment, and potentially greater production, than would otherwise be the case, which would generally be at the cost of reduced economic output elsewhere because of the diversion of investment. This can affect both firm profitability and the price of fuels to be sold (depending, among other things, on the degree to which the price is set internationally). For firms with marginally profitable production, such schemes may not only have incremental effects on production, but can have a bearing on whether or not the firm continues producing at all. In other situations, such as where supply is constrained (by factors such as regulatory restrictions or limitations on labour or materials), tax benefits may simply increase firm profitability or contribute to inflation of input costs.

Tax-expenditure features may also be found in royalty systems, resource-rent taxes, and other specialised fiscal instruments that apply to resource extraction. Such features must, however, be considered in the context of the particular fiscal system of which they form a part.

### ***Measurement and interpretation of tax expenditures***

Unlike direct expenditures, where outlays can usually be readily measured, tax expenditures are estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax relative to some benchmark tax system. There are a number of important caveats concerning both the interpretation and comparability of tax expenditure estimates, however. These affect both: (i) what constitutes a tax expenditure, and (ii) how its size should be gauged. A number of these caveats are discussed below.

The data on tax expenditures that are provided in this inventory reflect estimates generated by national and sub-national governments themselves, and as such reflect the benchmark against which the governments chose to make these comparisons.

#### ***Defining a benchmark***

A key challenge in determining or assessing tax expenditures is to identify the standard or benchmark tax regime against which the nature and extent of any concession is judged. A number of different approaches to deciding on the benchmark regime are possible, and these vary among countries.

- Many countries base their tax-expenditure estimates on a conceptual view about what constitutes “normal” taxation of income and consumption. Typically, the benchmark is defined to include structural features of the tax system, while special features intended to address objectives other than the basic function of the tax (e.g. raising revenues, or internalising externalities) may be considered to be deviations from the benchmark. The line between what is structural and what is special, however, is often not a clear one.
- Some countries take a reference-law approach and identify only concessions which appear as such on the face of the law as tax expenditures. Under this approach, a tax credit would likely be identified as a tax expenditure, while differential tax rates on two products within a broader category might not be.
- A few countries restrict their tax-expenditure estimates to those tax reliefs (e.g. refundable income-tax credits) that are clearly analogous to public expenditure.

Even in a relatively straightforward case, such as reduced VAT rates, the different approaches could lead to different results. Some countries take their standard rate of VAT as the baseline for measuring the revenue forgone from taxation of some goods and services at lower rates, while others regard such lower rates as an intrinsic part of their VAT and would therefore report no tax expenditure. Where countries have many different rates, it may not be clear which rate should be considered the benchmark.

Another approach is not to look at the current or normal tax regime but rather an “optimal” tax regime, something more often done as an analytic exercise than in practice. This is of particular relevance when investigating tax expenditures related to fossil fuels, given the presence of externalities – the cost imposed on others in society by a private action. When externalities are introduced, the issue of a baseline level against which to measure tax expenditures can change significantly. Harmful air emissions is one of the important reasons why countries implement environmentally related taxes, though other externalities, like traffic congestion<sup>8</sup> and noise pollution, also sometimes motivate taxes (supplementing their motivation as a means to raise revenue for public purposes). Through excise taxes, countries can place a price on environmental damage, thereby encouraging a more socially optimal level of emissions, which would be lower than without taxation. Under this approach, such taxes are levied in addition to taxes needed for general revenue raising.

In practice, the pursuit of optimal taxation (that is, the level of taxation that accounts for all externalities, efficiency effects, the revenue raising needs of government, and the interaction of these effects on the overall economy) is complicated. Quite apart from essentially normative issues such as determining revenue needs, countries would need extensive analytical work to determine optimal tax rates, which would vary significantly over time, and across users, locations and fuels. A further complicating factor is that the externalities may vary in scale among uses of fossil fuels, as many of them may be unrelated to the emission of greenhouse gases (e.g. local air pollution such as emissions of particulate matter or NO<sub>x</sub>). For these reasons, in practice externalities are not commonly considered in establishing tax-expenditure baselines. Nevertheless, it is an important concept to consider as work continues on consideration of how tax systems can influence market decisions regarding the production and consumption of fossil fuels.

#### *Importance of tax system context*

Whatever baseline is chosen against which to measure tax expenditures, it is important to consider the overall taxation system. Since most countries do not have theoretically pure tax systems, there are sometimes tax features that may seem to support fossil fuels, but which are in fact a mechanism to compensate or correct for other features of the system. Similarly, a feature of the tax system that may be considered a tax expenditure in one country may not be a tax expenditure in another country, given differing overarching systems in which fossil fuels are taxed.

On the production side, for example, the taxation of natural-resource extraction is, as noted, a complex area that goes beyond normal corporate taxation. Countries use varying approaches, such as royalty systems, resource-rent taxes, and cash-flow taxes to tax the super-normal profits that can be associated with resource extraction and ensure a fair return to the public when publicly-owned resources are sold. All of these issues must be taken into account when assessing any particular feature of a tax system.

- For example, immediate expensing of capital expenses for an oil company may be a tax expenditure under a standard corporate income tax, but would likely not be considered a tax expenditure under a cash-flow based tax regime, where immediate expensing of capital and non-deductibility of financing charges (such as interest payments) would be considered neutral.
- Again, lower royalty rates on less productive or more costly fields may arguably be “tax expenditures” in that they represent a concession relative to standard rates. On the other hand, they may be rough ways of taking into account higher costs and lower margins in systems that otherwise would over-tax (and therefore potentially render uneconomic) economically

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<sup>8</sup> Excise taxes on fuel are, at best, an indirect way to reduce congestion, which is a phenomenon that has more to do with the time of day when a vehicle is being driven, and where it is being driven, than with the act of consuming fuel in a vehicle *per se*.

marginal projects (which generate little or no economic rent). In a fiscal system designed for rent capture, varying royalty rates may be the norm.

- As with tax expenditures, resource royalty concessions are not indicative of the overall level of royalties in a country. For example, a country could increase resource royalty rates across the board, while simultaneously introducing a special credit to reflect cost increases in a particular subsector. Assuming the credit were reported as a royalty concession (equivalent to a tax expenditure), it would be included in the inventory of support even though the two changes together resulted in an increase in the overall level of royalties. This treatment is consistent with the purpose of the inventory in highlighting cases where more favourable treatment is provided for one sector or group relative to the norm under a specifically identifiable concession. It is intended to facilitate discussion about the purpose and impact of such concessions. As with relief from excise duties and carbon taxes, the support provided by particular royalty concessions needs to be considered in the broader context of the fiscal system of which it forms a part.

As with relief from excise duties and carbon taxes, this is an area in which detailed knowledge of the tax regime is needed to establish whether there are indeed tax expenditures and, if so, how they should be quantified.

The hypothecation or ear-marking of taxes to fund specific public expenditures – making the tax a kind of user charge – is an issue that involves similar complexity. Other complications can arise where countries have allowed some reductions in a tax on fossil-fuel inputs to a production process and the scale of these rebates reflects the degree of exposure of an industry to international competition or the deployment of other policy instruments to reduce emissions (as has occurred with some carbon taxes and emission-trading systems).

#### *Measuring tax expenditures*

Even when the baseline is clear, countries use different ways to measure the extent of the tax expenditure.

- The *revenue foregone* method, the most straightforward, looks at the rate of the tax concession multiplied by the base or uptake. For example, a reduced rate of EUR 0.25 per litre of diesel for taxis from a normal tax rate of EUR 0.45 per litre would yield annual tax expenditures of EUR 180 million if taxi drivers used 900 million litres of fuel a year.
- The *revenue gain* method estimates the increase in government revenues expected to be realised if the tax expenditure were eliminated, thereby incorporating anticipated behavioural changes. Using the same example, the tax expenditure under this method would be the difference in tax rates – EUR 0.20 as before – multiplied by the expected use of fuel by taxi drivers. Under this method, the use will be below 900 million litres, since raising the tax rate will likely encourage some people to no longer take taxis, assuming at least some of the cost is passed through to the users. Therefore, the quantity may only be 800 million litres, leading to a lower tax-expenditure estimate. In the context of climate-change discussions, the extent of the behavioural change is in fact of considerable interest, since the impact of reforming tax expenditures relating to fossil fuels on greenhouse-gas emissions is a key motivation of the exercise. However, such behavioural changes can also be incorporated at a later stage in the analysis, but require the use of models.
- The *expenditure equivalent* method estimates the level of funding that would be needed to meet the same outcome using a spending programme. In the previous example, it would estimate what level of direct subsidy would be needed to maintain the level of taxi drivers' income if the tax expenditure were eliminated. Since most direct government payments are taxed (whereas some benefits provided through preferential tax rates are not), the expenditure equivalent will tend to be larger than the tax expenditure measured by either the revenue foregone or the revenue gain method.

Measures that defer payment of tax without changing the ultimate nominal tax liability are another source of valuation differences across tax-expenditure accounts. A common example is accelerated depreciation allowances for capital investments. By allowing the cost of capital assets to be deducted more quickly than they would under the benchmark system, these provisions result in higher deductions and lower taxes in the early years in the life of a particular investment, but lower deductions and higher taxes in the later years of the investment. There are two main approaches to estimating the tax expenditure associated with such measures. The *nominal cash flow approach* measures the extent to which taxes in a particular year are higher or lower as a result of the accelerated allowance than they would have been in its absence. This measure is normally negative in the early years of an investment (indicating a positive tax expenditure) and higher in the later years. In contrast, the *present value approach* measures the discounted value of the time series of annual cash-flow tax expenditures, normally estimated from the time at which the asset is purchased. The two approaches both provide useful information, but they are quite distinct and not directly comparable.

Whichever valuation approach is used, countries typically calculate the value of each tax expenditure on the assumption that all other provisions remain unchanged. Due to interactions and behavioural responses, the revenue impact of eliminating multiple measures is not necessarily equal to the sum of the individual values. Great caution is therefore required in adding together estimates of multiple measures.

### ***International comparability***

Tax-expenditure accounting was not designed with international comparability in mind. The estimates reported in this inventory provide useful information about the relative treatment of different products *within* a national tax system and the economic incentives created for actors in that system. In the absence of a common benchmark, however, tax-expenditure estimates are not readily comparable across countries. Even where countries have adopted broadly the same methodological approach, the way in which they have implemented it in response to practical issues, such as how far a relief should be regarded as a structural part of the tax regime, may well differ (e.g. depreciation allowances used in calculating taxable profits).

A fundamental limitation on comparability is differences among countries in the definition of the benchmark tax system. For this reason, a simple cross-country comparison of tax expenditures can lead to a misleading picture of the relative treatment of fossil fuels.

- For example, assume that Country *X* and Country *Y* both consider their tax rate on petrol to be the benchmark rate for transportation fuel. Country *X* taxes petrol at EUR 1.0/L and diesel at EUR 0.6/L, resulting in a EUR 0.4/L tax expenditure for diesel. In contrast, *Y* taxes both petrol and diesel at EUR 0.4/L. *X* therefore reports a significant tax expenditure relating to diesel, while *Y* reports no tax expenditure, even though *Y*'s tax rate on diesel is significantly lower than *X*'s.

In light of these factors, tax-expenditure estimates must be used carefully. The fact that a particular country reports higher tax expenditures relating to fossil fuels than another does not necessarily mean that the first country effectively provides a higher level of support. The higher tax expenditures may simply be due to factors such as:

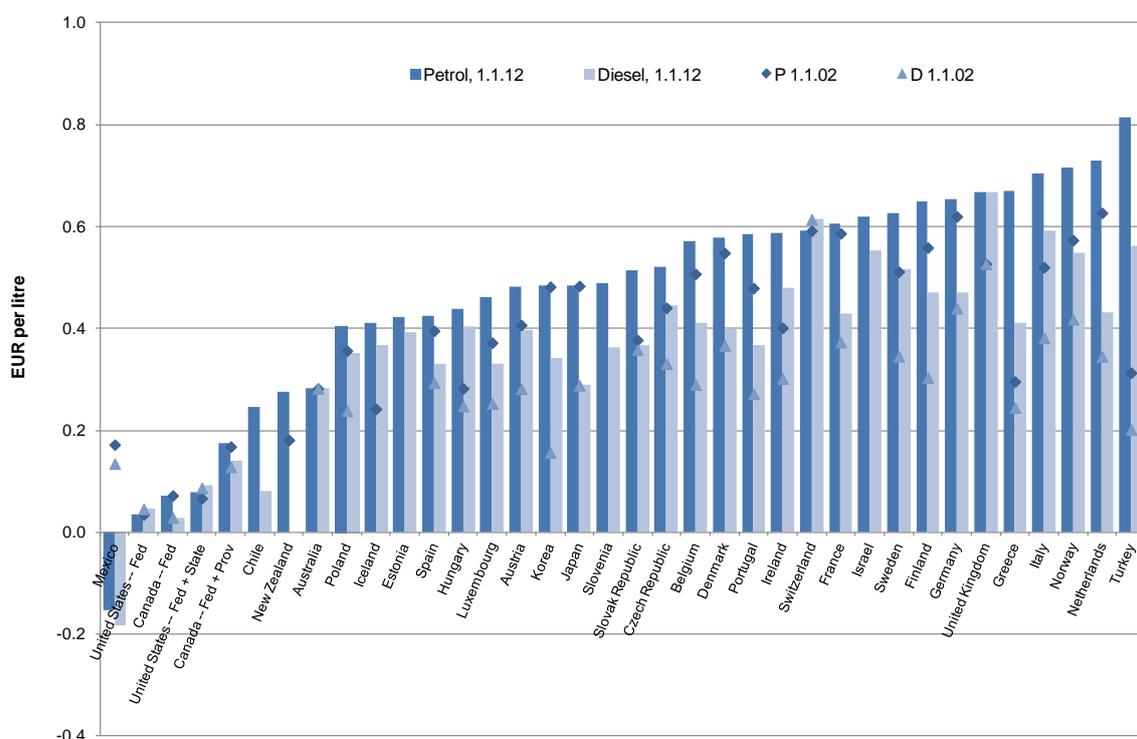
- Higher benchmark tax rates against which tax expenditures are measured;
- A stricter definition of the benchmark tax system that results in more features being singled out as tax expenditures; or
- A more complete set of tax-expenditure accounts.

Higher reported tax expenditures for some countries thus may reflect higher levels of taxation or greater transparency in reporting rather than a higher level of “support”.

The bottom line is that national tax expenditure estimates can only be considered in the broader context of the particular tax system of the country in question. With this in mind, the OECD has work underway that aims to place national tax expenditures related to fossil-fuel consumption in context by illustrating the structure of fuel taxation in each OECD country. This work will facilitate dialogue about energy use in each country, the objectives of fuel taxation, and how the structure and rates of taxes on different fuels and users of fuel may be influencing consumption decisions.

Meanwhile, given differences among countries in levels of reporting with respect to tax expenditures, the OECD encourages all countries to be open and transparent in the reporting of tax-system features that may encourage the production or consumption of fossil fuels. Greater transparency will facilitate ongoing analysis and dialogue about how government policies, including those with respect to taxation, affect the production and use of fossil fuels.

**Figure 1.1. Tax rates on petrol (P) and diesel (D) in OECD countries (excluding VAT), as of 1 January 2002 (excluding VAT) and as of 1 January 2012**



Notes: Average 2011 exchange rates are applied for all years. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law. Source: OECD/EEA database on instruments for environmental policy, accessible at [www.oecd.org/env/policies/database](http://www.oecd.org/env/policies/database).

## Overview and summary results

Overall, the inventory contains more than 550 measures, of which two thirds are tax expenditures and 59% are measures related to consumption. Producer measures account for a further 29%, with the remaining 12% consisting of general-services measures that either support producers as a whole (e.g. industry-wide R&D support) or that do not necessarily encourage current production or consumption of fossil fuels (e.g. budgetary outlays to rehabilitate old mining sites). Most measures seem to directly target the end-use of fossil fuels (48%) or their

extraction (34%).<sup>9</sup> Fewer intervene at the transportation, refining, and processing stages along the supply chain. It should be stressed, however, that these percentages remain indicative only since the final beneficiaries of a given measure may differ from its initial recipients. As indicated earlier in this chapter, a distinction should be drawn between a measure's formal incidence and its real, economic incidence, with the latter depending in part on the value of the relevant supply and demand elasticities.

Bearing in mind the caveats that apply to tax-expenditure estimates (see previous section), it is estimated that the individual support measures inventoried here had an aggregate value on the order of USD 55-90 billion a year over the 2005-11 period. Caution is required, however, in interpreting the support amounts and in aggregating them. In particular, estimates for individual measures do not take into account interactions that may be involved if multiple measures were to be removed at the same time. The inventory nevertheless provides important and valuable information about the incentives created within each national economy. Figure 1.2 shows that, between 2005 and 2011, these incentives tended to benefit crude oil and other petroleum products (70% in 2011) more than coal (12%) and natural gas (18%) in absolute terms. This reflects to some extent the large share of oil in countries' total primary energy supply, along with the fact that petroleum products are now consumed in OECD countries mainly in transport, a usage which is more heavily taxed on average.

In terms of recipients, Figure 1.3 shows that, in absolute terms, measures relating to the consumption of fossil fuels accounted for more than two thirds of total support across the whole period (reaching a maximum of 80% in 2011); producer measures accounted for slightly more than a fifth on average. This difference in part reflects the fact that several major OECD countries included in the inventory do not produce fossil fuels on a significant scale but are important consumers (e.g. France, Italy, and Sweden). Producer support remains, however, significant in those countries that produce fossil fuels in sizable quantities.

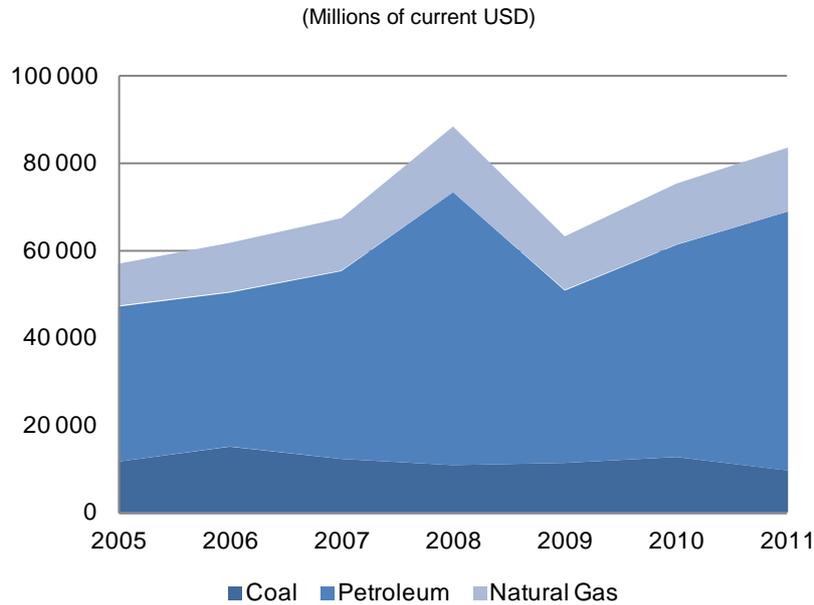
While indicative, OECD-wide percentages do not provide a sense of the variety of situations that prevail at the country level, which in turn reflect the existing differences in countries' resource endowments, tax rates, etc. Figure 1.4 shows for each OECD member country<sup>10</sup> the shares of fossil-fuel support by type of fuel (coal, crude oil and petroleum products, and natural gas) and by indicator (PSE, CSE, GSSE). Unsurprisingly, the estimates for several OECD countries pertain exclusively to consumption, something that has much to do with geological factors and the decline in coal production observed throughout Europe. In the case of countries possessing abundant fossil resources, the share of producer support tends to be evidently higher, though the importance of idiosyncrasies calls for further caution and warrants a closer look at each country's characteristics, something which is done in the chapters that follow.

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<sup>9</sup> The percentage of measures intervening at the extraction stage (34%) exceeds the percentage of measures benefitting producers (29%) as some of the extraction measures belong to the GSSE category, e.g. R&D grants to develop new oil-recovery techniques or to improve geophysical data collection. Examples of measures that belong to the GSSE category but that do not intervene at the extraction stage would be R&D transfers in relation to coal liquefaction and oil refining.

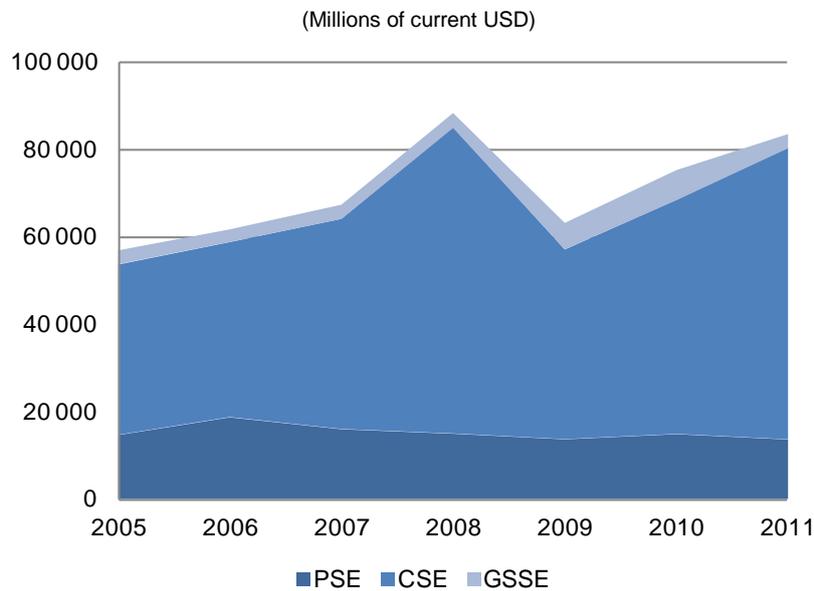
<sup>10</sup> With the exception of Iceland, for which the OECD Secretariat was only able to identify one measure. Estimates were not available for this particular measure.

**Figure 1.2. Support to fossil fuels in OECD countries by year and type of fuel**



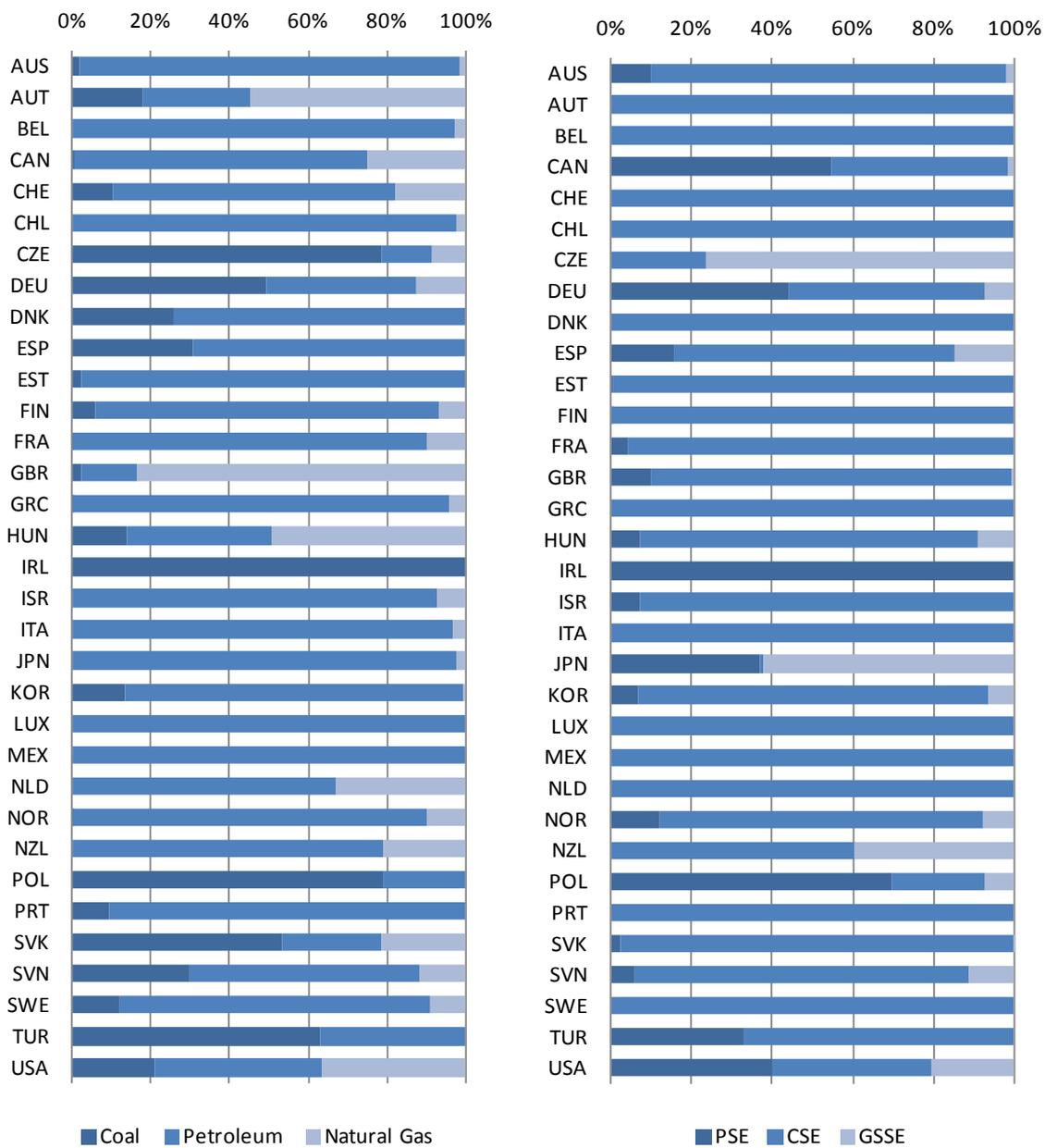
*Note:* The above charts are based on an arithmetic sum of the individual support measures identified for all 34 OECD member countries. It includes the value of tax relief measured under each jurisdiction's benchmark tax treatment. The estimates do not take into account interactions that may occur if multiple measures were to be removed at the same time.

**Figure 1.3. Support to fossil fuels in OECD countries by year and indicator**



*Note:* The above charts are based on an arithmetic sum of the individual support measures identified for all 34 OECD member countries. It includes the value of tax relief measured under each jurisdiction's benchmark tax treatment. The estimates do not take into account interactions that may occur if multiple measures were to be removed at the same time.

Figure 1.4. Shares of fossil-fuel support by fuel and by indicator, 2009-11



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