

# Research note: Discussion of fossil fuel subsidies methodologies

<b>Overview of sources</b>	<b>1</b>
<b>Comparison of methodologies</b>	<b>3</b>
Definition of a subsidy according to the WTO	5
Discussing the IMF methodology and its shortcomings	6
How do the tax rebates and other WTO-based subsidies relate to IMF's explicit and implicit subsidies?	7
<b>A note on the accounting standards</b>	<b>9</b>
System of National Accounts	9
The System of Environmental-Economic Accounting	10
<b>Looking from the other side: effective carbon rates</b>	<b>11</b>
<b>Going beyond the numbers: is the FFS phase-out good for climate?</b>	<b>11</b>

## Overview of sources

Source	Sources of data	Years available	Prices	Estimate of fossil fuel subsidies in the EU
<a href="#">Study on energy subsidies and other government interventions in the</a>	In hierarchical order: <ul style="list-style-type: none"> <li>Countries' administrations</li> </ul>	2015-2023	2022 EUR	EUR 56 billion (2021) - 60% actual costs (EUR 34 billion, around 300 measures) and 40% estimated costs (EUR 22 billion, around 170 measures).

<p><a href="#">European Union (2023)</a>, Enerdata, Trinomics.</p> <p>Report for EU - DG ENER.</p> <p>Dataset <a href="#">here</a>.</p>	<ul style="list-style-type: none"> <li>• Transversal sources - recognised institutions (DG COMP, OECD, TX TAXUD)</li> <li>• Member States' National Energy and Climate Plan progress reports and datasets</li> <li>• Estimations (using national sources)</li> <li>• Estimations (using international sources)</li> </ul>			<p>EUR 123 billion (2022) - outlier due to energy crisis. The increase is due to increased support to households, the transport sector and the energy industry to cope with rising prices and protect consumers.</p> <p>The overwhelming majority of FFS (98% in 2022) are considered environmentally harmful.</p>
<p><a href="#">OECD Inventory of Support Measures for Fossil Fuels 2023</a></p> <p>Dataset <a href="#">here</a>.</p>	<p>Data obtained from official government sources.</p>	<p>2010-2022</p>	<p>2022 USD</p>	<p>USD 73 billion (2021) for the 22 EU Member States in the OECD.<sup>1</sup></p>
<p><a href="#">IMF Fossil Fuel Subsidies Data: 2023 Update</a></p> <p>Data filtered for EU countries <a href="#">here</a>.</p>	<p>IMF calculations based on fossil fuel supply costs and retail prices across countries.</p>	<p>2015-2023</p>	<p>2021 USD</p>	<p>USD 88 billion (2023) in explicit subsidies.</p> <p>USD 326 billion (2023) in implicit subsidies.</p>

<sup>1</sup> Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden.

<p><a href="#">Fossil fuel subsidies (IEA)</a></p> <p>Data can be viewed <a href="#">here</a>.</p>	<p>Data on fossil fuel consumption subsidies missing for several EU countries.</p>
--	--

## Comparison of methodologies

Source	Methodology
<p><a href="#">Study on energy subsidies and other government interventions in the European Union (2023)</a>, Enerdata, Trinomics.</p> <p>Report for EU - DG ENER. This is the source of the data used by the European Environmental Agency.</p>	<p>The methodology is based on the WTO definition.</p> <p>International shipping and aviation not included.</p> <p>Some space should be given here to discuss environmentally harmful fossil fuel subsidies. The study uses the following definition: <i>Fossil fuel subsidies are environmentally harmful if the price or cost reduction that they cause, incentivises maintaining or increasing in the availability of fossil fuels and/or use of fossil fuels, regardless of whether these are unabated or abated.</i></p> <p>In practice, in the study, FFS as not environmentally harmful include, for example, financial incentives for the closing or curtailment of coal mines or other fossil fuel extraction sites.</p> <p>The failure to internalize externalities (government inaction or implicit subsidies) is excluded from the current definition of environmentally harmful FFS.</p>
<p><a href="#">OECD Inventory of Support Measures for Fossil Fuels 2023</a></p>	<p>The OECD relies on the concept of “support”, instead of “subsidy”. As described <a href="#">here</a> (page 26):</p> <p><i>The scope of what is considered “support” is therefore deliberately broad, and is broader than some conceptions of “subsidy”. Essentially, it includes both direct budgetary transfers and tax expenditures that in some way provide a benefit or preference for fossil-fuel production or</i></p>

	<p><i>consumption relative to alternatives. This broader definition therefore encompasses policies that can induce changes in the relative prices of fossil fuels. However, although 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 that sense, the inventory casts a wide net that aligns well with its objective of promoting the transparency of public policies.</i></p> <p>In practice, as outlined <a href="#">here</a> (page 15), there is generally a wide overlap between OECD “support” and WTO “subsidy”, and the two would typically yield a similar set of measures if inventories were built from them.</p> <p>International shipping and aviation are not included.</p>
<p><a href="#">IMF Fossil Fuel Subsidies Data: 2023 Update</a></p>	<p>As seen <a href="#">here</a>, the International Monetary Fund (IMF) uses the price paid by consumers for energy derived from fossil fuels as the criterion for the existence of fossil fuel subsidies.</p> <p>According to the <a href="#">IMF</a>.</p> <p><i>Subsidies [can be] decomposed into explicit and implicit subsidies. Explicit subsidies occur when the retail price is below a fuel’s supply cost. For a non-tradable product (e.g., electricity), the supply cost is the domestic production cost, inclusive of any costs to deliver the energy to the consumer, such as distribution costs and margins. In contrast, for an internationally tradable product (e.g., oil), the supply cost is the opportunity cost of consuming the product domestically rather than selling it abroad plus any costs to deliver the energy to the consumer. Explicit subsidies also include direct support to producers, such as accelerated depreciation, but these are relatively small.</i></p> <p><i>Implicit subsidies occur when the retail price fails to include external costs, inclusive of the standard consumption tax. External costs include contributions to climate change through greenhouse gas emissions, local health damages (primarily pre-mature deaths) through the release of harmful local pollutants like fine particulates, and traffic congestion and accident externalities associated with the use of road fuels. Getting energy prices right involves reflecting these adverse effects on society in prices and applying general consumption taxes when fuels are consumed by household.</i></p>

	<p>Implicit and explicit subsidies were previously called by the IMF pre-tax and post-tax subsidies.</p> <p>There are valid criticisms of this approach, including how to estimate the cost of damages to people, property, and the environment caused by fossil fuel subsidies. The costing of negative externalities does not yet have a standard methodology. It is often opaque and likely underestimates the true costs on society of fossil products.</p>
<p><a href="#">Fossil fuel subsidies (IEA)</a></p>	<p>The IEA only focuses only on consumption subsidies, and is therefore disregarded.</p>

## Definition of a subsidy according to the WTO

Note: the WTO definition has legal force.

### Definition of a subsidy according to the WTO - Agreement on Subsidies and Countervailing Measures (ASCM)

#### Article 1: Definition of a Subsidy

1.1 For the purpose of this Agreement, a subsidy shall be deemed to exist if:

(a)(1) there is a **financial contribution by a government or any public body** within the territory of a Member (referred to in this Agreement as “government”), i.e. where:

(i) a government practice involves a **direct transfer of funds** (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees);

(ii) **government revenue that is otherwise due is foregone or not collected** (e.g. fiscal incentives such as tax credits);

(iii) **a government provides goods or services** other than general infrastructure, or purchases goods;

(iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments;

or

- (a)(2) there is any form of income or price support in the sense of Article XVI of GATT 1994;
- and
- (b) a benefit is thereby conferred.

## Discussing the IMF methodology and its shortcomings

The United for Climate Justice - Stop Fossil Subsidies research group had discussions on the definition of “fossil fuel subsidies” and our understanding of explicit and implicit FFS according to the IMF, especially on how to map the biggest FFS in EU countries in the form of tax rebates to these IMF definitions. This section reports some more detailed work on this.

In summary, the methodology used by the IMF is qualitatively different from most others that are based on WTO definitions, to an extent that a real mapping of variables is not feasible in all respects. While the mapping is more or less simple for IMF explicit subsidies (which are relatively small in the EU, since it primarily entails undercharging for supply costs, i.e. price support for consumers, and different types of producer subsidies), IMF’s implicit subsidies are based on an (unsatisfactory type of) external costs approach that may or may not cover the tax rebates that we know as the EU’s largest type of FFS. The unsatisfactory aspect is in that IMF does not start from the idea that taxes applied should be high enough to cover the costs of external damages (‘make the polluter pay’) but from the more theoretical economical concept that the (observed) retail price would be “economically efficient” if it would represent supply costs plus costs of externalities. With “efficient” it is meant that this price would stimulate users to move to more sustainable options.

This concept does not guarantee that any taxation goes to the government to really cover the social costs of carbon, and for that reason the term “subsidies” is misleading: in the IMF approach there is no specific role for financial transactions between governments and companies/households which, in essence, is the definition of “subsidies”. The term “price deficit” would probably be more appropriate.

For communication on the IMF estimates the following descriptions may be useful:

- Total fossil subsidy is defined as the pricing deficit that occurs when the observed net retail price for the user, including VAT and other taxation as applicable, is less than the supply costs plus environmental costs (also including VAT).

- Explicit subsidy (if present) is what a user (be it consumer or company) has to pay less than the real (physical) supply costs (plus VAT). This type of subsidy can be through a direct price support to the user, or to a kind of subsidy (e.g. favorable tax treatment) to the primary producer (mining company) which suppresses the supply cost.
- If no explicit subsidy is present (the simple case), the implicit subsidy is equal to the total subsidy as formulated.
- If an explicit subsidy is present (that is, user price plus that explicit subsidy together cover supply costs (plus VAT) but not more), then by definition there is always also an implicit subsidy equal to the full environmental costs (plus VAT).

More simply:

- Explicit subsidies are subsidies making it possible for users (consumers, businesses) to buy the products cheaper than their actual supply costs (production price).
- Implicit subsidies are defined as the pricing deficit between the observed net retail price and the “economically efficient” price that both covers production costs and represents the estimated total environmental and social costs.

The term “represents environmental costs” is mostly to be preferred over “covers environmental costs” because the definition is purely based on economic theory and there is no guarantee whatsoever that if implicit subsidy is zero the associated budget is available for governments to actually pay for repairing the environmental effects (since it also assumes that the damage *can* be repaired).

How do the tax rebates and other WTO-based subsidies relate to IMF’s explicit and implicit subsidies?

This [IMF report](#) does not give definite answers on this point. Apart from externalities which they consider part of implicit FFS, the clearest statements they give are:

- Explicit subsidies relate to undercharging for supply costs and also include producer subsidies (e.g., favorable tax treatment for fossil fuel extraction).
- Implicit subsidies relate to undercharging of general consumer taxes, forgone consumption taxes; undercharging for VAT is counted as an implicit subsidy.

Nothing in particular is said about what is probably the major part of our FFS in developed countries, that is the tax rebates for energy intensive businesses (steel industry – coal; fertilizer producers – gas; aviation, marine transport – various oil products; electricity power plants – coal, gas).

We can try to understand how tax rebates are dealt with by the IMF with two case studies from the Netherlands.

The first case is the use of coal, that is the use of a fossil fuel in the production of non-fossil products. The Netherlands has no production (mining) facilities of its own, so all coal used is imported. Consumption of coal is in the steel industry, and power plants (being phased out), both associated with significant energy (coal) tax rebates; residential use of coal is virtually zero. The IMF datasheet for this case gives explicit subsidies equal to zero, and implicit subsidies having significant values. A first conclusion therefore is that tax rebates of this type (fossil fuels used in the production of non-fossil products) are not part of the IMF's explicit subsidies.

A second case that needs to be assessed is that of refineries, with crude oil as the raw fossil material to produce the more practical fossil fuels like gasoline, diesel, kerosene, etc. (that is fossil to fossil). Let's take the case of diesel, which has only marginal oil mining of itself and imports large amounts of crude oil for its refineries in the Rotterdam port area. The refinery process uses large amounts of gas for heating the actual distillers; this gas is not acquired externally but obtained as a by-product of the process itself. Does the IMF consider this an explicit (favorable fiscal treatment of producer of diesel) or as an implicit (external damage due to the resulting emissions) subsidy? In the datasheet explicit subsidies are zero while again implicit subsidies have significant values, so that also here the interpretation is that tax rebates in the case of fossil fuels used in the production of derived fossil products are not part of IMF's explicit subsidies.

Do countries' tax rebates (indirectly) pop up in IMF's implicit subsidies? No, if retail prices are higher than IMF's estimated economically efficient prices (that is, production/supply costs plus externalities), IMF considers the total (and thus also the implicit) subsidy to be zero, irrespective of the potential presence of tax rebates. An example is kerosene in the Netherlands, with IMF total subsidy zero in several years where retail price is higher than efficient price, while we know that the full tax exemption for aviation applies over all years. The IMF criterion for the existence of a subsidy is not tax rebates based on WTO methodology, but the mere presence of a pricing deficit of the retail price with respect to IMF's own estimated economically efficient price.

This means that the IMF model for implicit subsidies is more an external costs approach than an inventory approach using WTO definitions.

However, there is an important difference in the external costs approach of the IMF. When retail prices are higher than efficient prices even if there is no significant taxation, all revenues of fossil usage go to the fossil industry itself, banks, and their shareholders, and none end up in the public domain, so the social costs of externalities are still not covered; yet IMF in this case defines no subsidy to be present. This is at least counter-intuitive. Clearly, this model is purely based on economic theory which does not make much practical sense here since there do not exist market mechanisms for the externalities considered.

A general conclusion is that the methodology used by the IMF is qualitatively different from most others based on WTO definitions to an extent that a real mapping of variables is not really feasible.

## A note on the accounting standards

Accounting standards are essential to record subsidies in a way that is comparable over time and across countries. Without accounting standards, an inventory-based estimate of FFS would be difficult to undertake.

### System of National Accounts

The [System of National Accounts](#) (SNA) is an internationally recognized set of recommendations (i.e. a standard), developed through an international process under the supervision, and finally formal acceptance, of the UN. It outlines how to measure economic activity based on strict accounting rules grounded in economic principles.

This standard defines subsidies as follows. However, it only accounts for subsidies that involve direct payments, excluding those that do not, such as under-recoveries, forgone revenue, or risk transfers. Other types of transfers, like payable tax credits, debt assumptions, cancellations, and contingent liabilities, are addressed under different terms.

“[Subsidies](#) are current unrequited payments that government units, including non-resident government units, make to enterprises on the basis of the levels of their production activities or the quantities or values of the goods or services that they produce, sell or import.”

“[A subsidy on a product](#) is a subsidy payable per unit of a good or service. The subsidy may be a specific amount of money per unit of quantity of a good or service, or it may be calculated ad valorem as a specified percentage of the price per unit. A subsidy may also be calculated as the difference between a specified target price and the market price actually paid by a buyer.”

“Other subsidies on production consist of subsidies except subsidies on products that resident enterprises may receive as a consequence of engaging in production.”

## The System of Environmental-Economic Accounting

The [System of Environmental-Economic Accounting](#) (SEEA) is the accepted international standard for environmental-economic accounting, providing a framework for organizing and presenting statistics on the environment and its relationship with the economy. It brings together economic and environmental information in an internationally agreed set of standard concepts, definitions, classifications, accounting rules and tables to produce internationally comparable statistics.

The [London Group on Environmental Accounting](#) holds yearly meetings which allow practitioners to share their experience of developing and implementing the SEEA

## Looking from the other side: effective carbon rates

Fossil subsidies in the EU are mainly taxes *not* paid due to all kinds of exemptions and reductions. Quantifying FFS is therefore problematic since there exists no unequivocal standard of how much tax *should* be paid. A complementary approach is to look at how much energy tax *is* actually paid: the effective carbon (tax) rate.

Under the flag of Eurostat a research project was started to evaluate this in EU countries (see [here](#)), while the [OECD](#) is also looking at the topic. Statistics Netherlands produced a [first report](#). Presumably, comparable data will become available for other member states. In this study all data were converted to taxes paid per equivalent tonne of emitted CO<sub>2</sub>. Taxes include the purchase of ETS allowance, where free ETS allowances are booked as subsidies. Further this study follows the definitions and methodologies of Eurostat statistics as well as possible. This report shows that there are substantial differences between e.g. households and different industry branches.

Some conclusions for the Netherlands:

- Average total tax varies slightly over years around roughly 100 €/tonne CO<sub>2</sub>
- For 2022, households (responsible for 17% of all emissions) pay 288 €/tonne tax on fossil energy
- Industry branches basic metal, air and sea transport, refineries (together responsible for 24% of emissions) pay fossil energy taxes less than 10 €/tonne CO<sub>2</sub>
- The first one-third of total CO<sub>2</sub> emitted in NL are taxed with less than 50 €/tonne

## Going beyond the numbers: is the FFS phase-out good for climate?

A [study](#) by CPB - Netherlands Bureau for Economic Policy Analysis and PBL - Netherlands Environmental Assessment Agency discusses the potential phase out of fossil fuel subsidies vis-à-vis its impact on climate policy: will the abolishment of fossil fuel subsidies really support decarbonisation (in the context of the Netherlands)?

It is difficult to summarize the insights of the study; full engagement with the paper is recommended. In lieu of a summary, the final paragraph of the study is cited below.

**Reforming fossil fuel subsidies is a complex task for politicians.** All in all, our study shows that abolishing fossil fuel subsidies is a no-brainer only for a limited number of subsidies. Abolishing inventoried fossil subsidies does not appear to help the energy transition in all cases. It is important to assess policies from the perspective of adequate pricing of climate damage and other externalities. This should also take into account overlapping and interacting policies. Abolishing existing policies makes sense especially if this allows for better pricing of external costs. Exemptions and concessions in electricity production and shipping and

aviation should be considered for sure. However, it is also important to take a sufficiently broad view of fossil fuel subsidies [...]. As a result, all kinds of policies that also support fossil fuel use in an indirect way will also be covered. Finally, the possible negative impact on GHG emissions at European or global level deserves attention, as well as possible distributional effects. Attention should be paid to expected developments due to foreseen or intended policy changes in the European Union and the [country] itself. [...]