

# **The Interaction of Carbon Taxation with other National Measures**

## **Part C: Phasing out fossil fuel subsidies**

### **Final Paper by the UN Committee of Experts on International Cooperation in Tax Matters**

**(Advance Unedited Version)**

At its Twenty-third Session in October 2021, the UN Tax Committee established the Subcommittee on Environmental Taxation. The Subcommittee is mandated to:

- Produce practical guidelines on targeted, additional, and emerging issues in the area of carbon taxation, which are not covered or fully developed in the Handbook on Carbon Taxation for Developing Countries. These guidelines could initially be released as stand-alone materials, and later be assembled in a publishable format. Relevant issues might include: (i) the interactions of a carbon tax with other environmental and environmentally-related taxes, (ii) the role of a carbon tax in a broader fiscal reform, including the consideration of distributional effects; and (iii) in collaboration with the Extractive Taxation Subcommittee (if one is created), work on practical tax policies/measures/incentives with the potential to accompany countries' efforts in transitioning from fossil fuel energy to renewable sources.
- Pay particular attention to the needs and priorities of, and the barriers faced by, developing countries, and report on relevant cases of current country practices, policy considerations and administrative issues.
- Work on any additional relevant environmental taxation issues as requested by the Committee.

During its mandate, the Subcommittee engaged in five workstreams, as follows: Workstream 1: The interaction of carbon taxation with other national measures; Workstream 2: The role of carbon taxes and other measures in supporting energy transition; Workstream 3: The interaction between carbon taxes and carbon offset programs; Workstream 4: Border carbon adjustment measures and how developing countries can avoid undesired spillover effects from their implementation by other jurisdictions; and Workstream 5: Environmental tax measures other than carbon taxes that are relevant for developing countries.

This document constitutes Part C of Workstream 1. It was approved by the Committee at its Twenty-ninth session in October 2024.

Part A of Workstream 1, titled "*Interaction between carbon taxes and other environmental measures (emissions trading and climate policy)*," was approved at the Committee's Twenty-eighth session. Part B, "*Assessing the interaction of carbon taxation with excise duties, VAT, and income taxation*," was approved at the Committee's Thirtieth session in March 2025. Advance unedited versions of Parts A and B are available on the Committee's [webpage](#).

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## 1. Introduction

Fossil fuels such as coal, lignite, oil and gas, account for more than 75% of global greenhouse gas (GHG) emissions, and for more than 90% of all carbon dioxide emissions.<sup>1</sup> Reducing the use of fossil fuels is thus critical in fighting global warming. The Paris Agreement aims to make 'finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.'<sup>2</sup> Carbon pricing instruments such as carbon taxation or emissions trading systems are increasingly being adopted around the globe. These mechanisms put a price on greenhouse gas emissions, aiming to disincentivize fossil fuel consumption and other related behaviours, ultimately reducing greenhouse gas emissions and pollution.

Fossil fuel subsidies (FFS) refer to policy instruments that directly or indirectly subsidizes the costs of using fossil fuels at some stage in the production or consumption of the fuels. FFS can include both primary commodities such as coal, crude oil and natural gas, or secondary commodities such as electricity and heat generated from fossil fuels. Direct subsidies lower the costs of fossil fuels and/or energy through monetary transfers. Indirect subsidies may include policies such as expenditure schemes, discounts, and incomplete pricing, but are more complex to estimate than direct subsidies. The direct and indirect subsidy terminology differentiates between the means a benefit to fossil fuels is granted.

Recently, several international initiatives have called for the phasing out of fossil fuel subsidies. The 2021 Glasgow Climate Pact calls upon parties to accelerate efforts towards the “*phase-out of inefficient fossil fuel subsidies, while providing targeted support to the poorest and most vulnerable in line with national circumstances and recognizing the need for support towards a just transition*”.<sup>3</sup> Importantly, at the COP28 in November - December 2023, at Dubai, the United Arab Emirates, parties have been called upon to “*transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science*” and to “*phasing out inefficient fossil fuel subsidies (FFS) that do not address energy poverty or just transitions, as soon as possible*”.<sup>4</sup>

Even though carbon pricing initiatives have gained traction globally, fossil fuel subsidies continue to persist across jurisdictions. Estimations of these subsidies vary due to differing definitions and are subject to intense debate. According to the broad definition by the International Monetary Fund (IMF), global FFS have reached \$7 trillion in 2022, or nearly 7.1% of global GDP.<sup>5</sup> **Explicit** subsidies, accounting for 18% of this total, involve undercharging of fossil fuel supply costs. The remainder (82%) are **implicit** subsidies where environmental costs are undercharged or where consumption tax revenues are foregone. This may arise due to the lack of policy instruments to price such costs or, when relevant instruments are implemented, because the effective price is insufficient to fully account for the relevant costs.<sup>6</sup> Between 2020 and 2022, exacerbated by the impact of Covid-19 and Russian/Ukraine war,

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<sup>1</sup> <https://www.un.org/en/climatechange/science/causes-effects-climate-change>

<sup>2</sup> Paris Agreement Article 2.1.c

<sup>3</sup> Recital 36, Decision 1/CMA.3 Glasgow Climate Pact available at [https://unfccc.int/sites/default/files/resource/cma2021\\_10\\_add1\\_adv.pdf](https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf)

<sup>4</sup> Recital 28 d and h, Draft decision -/CMA.5 available at [https://unfccc.int/sites/default/files/resource/cma2023\\_L17\\_adv.pdf](https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf). The global stocktake recognizes the science that indicates that global greenhouse gas emissions need to be cut 43% by 2030, compared to 2019 levels, to limit global warming to 1.5°C. But it notes Parties are off track when it comes to meeting their Paris Agreement goals. See <https://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era>

<sup>5</sup> IMF Fossil Fuel Subsidies Data: 2023 Update, Simon Black ; Antung A. Liu ; Ian W.H. Parry ; Nate Vernon, August 24, 2023, available at: <https://www.imf.org/en/Publications/WP/Issues/2023/08/22/IMF-Fossil-Fuel-Subsidies-Data-2023-Update-537281>

<sup>6</sup> IMF Fossil Fuel Subsidies Data: 2023 Update, Simon Black ; Antung A. Liu ; Ian W.H. Parry ; Nate Vernon, August 24, 2023, available at: <https://www.imf.org/en/Publications/WP/Issues/2023/08/22/IMF-Fossil-Fuel-Subsidies-Data-2023-Update-537281>; It should also be noticed that the existence of a tax expenditure may be a sign indicating a FFS, but this is not always the case. Sometimes, after applying a tax expenditure (such as a

explicit subsidies surged, more than doubled to \$1.3 trillion. This reflects the recent price hike in global energy markets, and it is expected that explicit subsidies will decline as international prices recede.<sup>7</sup>

The definitions of fossil fuels used by international organizations differ mainly regarding the inclusion of all secondary commodities derived from fossil fuels and the inclusion of all fossil fuels.<sup>8</sup> There are various definitions of ‘subsidies’ used by international organizations in the context of fossil fuels and the wider energy market. These definitions are based on different criteria, such as the form of government policy intervention<sup>9</sup> or the impact of measures on cost prices.<sup>10</sup> The World Trade Organization’s Agreement on Subsidies and Countervailing Measures (WTO ASCM) is the only legally accepted definition by WTO members and is used by the United Nations Environment Programme (UNEP) for monitoring the progress toward the SDG 2030 Agenda. However, it is tailored specifically for analysing trade distortions, thus diverging from the problem at hand when looking at subsidies from a climate-perspective.

The table below presents a typology of subsidies based on the WTO ASCM which captures FFS that have a trade-distorting effect and are specific to certain recipients (rather than being of a general economic nature).<sup>11</sup>

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reduced rate), the effective price still exceeds the marginal social cost (i.e. the relevant “environmental cost”). In this case, this could not be considered a subsidy itself.

<sup>7</sup> IMF Fossil Fuel Subsidies Data: 2023 Update, Simon Black; Antung A. Liu ; Ian W.H. Parry ; Nate Vernon, August 24, 2023, available at: <https://www.imf.org/en/Publications/WP/Issues/2023/08/22/IMF-Fossil-Fuel-Subsidies-Data-2023-Update-537281>

<sup>8</sup> For a comparison see UNEP (2019) Measuring Fossil Fuel Subsidies in the context of the Sustainable Development Goals, Table 5, p. 13 <https://www.unep.org/resources/report/measuring-fossil-fuel-subsidies-context-sustainable-development-goals>

<sup>9</sup> As defined by organizations such as the World Trade Organization in its Agreement on Subsidies and Countervailing Measures (WTO ASCM), the United Nations Environment Programme (UNEP), and the Organisation for Economic Co-operation and Development (OECD).

<sup>10</sup> For example, as defined by the International Energy Agency (IEA). For a comparison see UNEP (2019) Measuring Fossil Fuel Subsidies in the context of the Sustainable Development Goals, p. 15 <https://www.unep.org/resources/report/measuring-fossil-fuel-subsidies-context-sustainable-development-goals>

<sup>11</sup> Article 1 of the WTO ASCM.

WTO ASCM FFS energy subsidies		
Type of Subsidies	Examples	Instruments
Direct transfers of government funds	Direct spending, budget and off-budget transfers Government ownership of energy-related enterprises, if on terms more favourable than private ownership	Cash grants, subsidies
Induced transfers (price support)	Price support, including through regulation	
Tax expenditure/revenue forgone/under-pricing	Tax breaks and other revenue foregone (tax rebate, depreciation) Under-pricing of government owned energy resources Under-pricing of government owned infrastructure Under-pricing of government provided goods and services Below-market lending to energy-related enterprises, including loans to energy exporters, debt restructuring and cancellations	Tax expenditures, taxes foregone
Transfer of risk to government	Credit support through risk transfer mechanisms (loan guarantees) Debt restructuring and cancellations Insurance and indemnification Assumption of risks related to occupational health and accidents Assumption of responsibility for remediating environmental damage (environmental costs and externalities)	Implicit subsidies
Source: Based on UNEP (2019) Table 6		

The above depicts the quest of international organizations to describe, conceptualize and define fossil fuels. This approach is both useful and futile at the same time. It is useful as it furthers the international debate and helps to identify (some) fossil fuels in the various domestic jurisdictions. It is futile because offering a uniformly applicable definition of FFS that captures all subsidies is illusive since its practical relevance is highly dependent upon various factors including the specificities of the energy sector, the economic and social conditions of the country and the tax regime.

FFS at domestic level are not always easily identified because they may include both subsidies given through direct government spending but also tax advantages which are depending on the respective general tax measure that is deviated from. Yet tax measures may already be highly specific and more favourable for fossil fuels based on additional criteria: territories due to a fiscal federalist structure, some strategic sectors or social enterprises and cooperatives, etc.

Typically, a tax expenditures report published by the respective government in the budgetary process is necessary to identify and quantify specific deviations from general national tax rules. However, it should be noted that such deviations may not by default be classified as fossil fuel subsidies. Aggregate numbers cannot always be interpreted as a level of support for fossil fuels, nor as an indicator of the extent to which the considered policies are favourable or unfavourable to climate mitigation. In addition, since the identification and measurement of tax expenditures usually differ between jurisdictions, cross-

country comparisons of tax expenditures can also be misleading due to differences in benchmark tax systems.<sup>12</sup>

FFS can influence the effectiveness and goals of carbon taxes and other pricing instruments. They can be described as ‘countervailing policies’ to carbon taxes, presenting conflicting goals or adverse effects on decarbonization efforts. While FFS may initially serve other goals such as supporting low-income groups, disadvantaged regions, or economic sectors, etc., they often lead to increased carbon emissions and typically create negative effects on a country’s budgetary position. There exists a delicate balance between the long-term goal of combating climate change and the short-term necessity of maintaining political support for policy measures and addressing budgetary concerns. This balance may sometimes lean toward the temporary retention of FFS. However, it is crucial to recognize that the cost of avoiding GHG emissions now may prove less burdensome than the expense associated with sequestration or mitigating damage caused to the population in the future.

Tax expenditures are generally conceptualized as government expenditures that reduce or defer taxes for specific taxpayers. Compared to spending via the annual budget, a reduced tax rate does not always have to be approved by parliament annually. This affects the transparency, efficiency, and equality of the fiscal systems.<sup>13</sup> FFS both via tax expenditures or via government’s budgetary outlays can significantly influence the fiscal position of countries, underscoring the importance of evaluating tax expenditures and the use of FFS.

This paper first examines the relation and interaction between carbon taxation and FFS (section 2). Section 3 provides an overview on assessing FFS resources. Importantly the paper explains the main differences in the international methodological approaches between the various resources and highlights the limits for interpretation (Section 4). Section 5 extrapolates practical implications for developing countries, while Section 6 concludes by highlighting the key takeaways.

**Note:** This paper was finalized and approved by the UN Tax Committee in October 2024. It reflects data, examples, and policy frameworks available at the time of drafting. While fossil fuel subsidy reforms may have progressed further since then, the paper remains a useful reference for understanding key considerations and country approaches to subsidy phase-out.

## **2. The relation and interaction between carbon taxation and fossil fuel subsidies**

### **2.1 Overview**

A carbon tax calculated on carbon emissions does not only raise revenue but also makes carbon intensive goods and services more expensive, thereby making their production and consumption less attractive. By making the social costs of climate change visible to market actors, carbon taxes set incentives for more efficient production and consumption of carbon intensive goods. This effect is referred to as an environmental steering effect that is inherent in environmental taxes.<sup>14</sup>

Because carbon emissions are closely linked to fossil fuel consumption, fossil fuel products are often subject to carbon taxation. Carbon taxes thus reduce fossil fuel use. FFS by contrast support the consumption and extraction of fossil fuels and hence can undermine both the environmental effectiveness and the revenue collecting ability of a carbon tax. FFS are, however, also an important topic for countries that have not (yet) introduced a carbon tax or excise duty on energy because they incentivize fossil fuel consumption and GHG emissions in general.<sup>15</sup> FFS reform can therefore be

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<sup>12</sup> OECD (2023) OECD Inventory of Support Measures for Fossil Fuels, <https://doi.org/10.1787/87dc4a55-en>

<sup>13</sup> <https://publications.iadb.org/en/tax-expenditure-budgets-concepts-and-challenges-implementation>

<sup>14</sup> The [2021 UN Handbook on Carbon Taxation for Developing Countries](#) offers practical guidance on designing and implementing carbon taxation for developing countries.

<sup>15</sup> The IMF and OECD methodology for FFS do not distinguish between carbon taxation or excise duties for energy.

undertaken independently of introducing or maintaining existing carbon pricing mechanisms, contributing to a holistic climate change policy.

FFS do not only affect the fiscal position of countries but also pose risks for future expenses in terms of climate adaptation and damages, and just as importantly perhaps also the fiscal sustainability, and solvency of a country. FFS are granted for various reasons. Among them are infant industry arguments, to help export oriented industries to offer competitive prices, for energy equity considerations but also for public choice type of motivations where subsidies are directed towards one's political clientele, even leading to situations where subsidies are debt-financed. These factors play out based on the political power configuration of a given country.

FFS are very diverse, targeting either producers or consumers or both and they can be either implicit or explicit. The Organisation for Economic Co-operation and Development (OECD) for example has identified more than 1000 individual Support Measures for Fossil Fuels in 43 countries (OECD countries plus Colombia, Argentina, China, Brazil, India, Indonesia, Russia and South Africa).<sup>16</sup> There are also various definitions used by international organizations relying on different methodologies (see Section 3). However, tailor-made solutions are critical because each country's subsidy schemes and tax regimes are different. Each country would need to develop its own operational definition of FFS (adaptive to its varying circumstances) in order to arrive at an efficient and workable path for gradually phasing these out. There is also no easy way to identify all FFS in a jurisdiction.

In the context of federal tax regimes, particularly where underlying definitions are not consistent, accurately assessing the impact of tax expenditures may prove challenging, as different regions may employ varying criteria. However, this should not discourage authorities from undertaking efforts aimed at identifying FFS. Such efforts will contribute to their ability to be able to scrutinize FFS. Such efforts will not only help reduce fiscal spending, freeing funding for targeted aid for the poor and promoting environmental conservation, but also alleviate the burden on tax administrations in certain cases associated with detecting and assessing FFS without a systematic approach. There are initiatives underway to assist countries in developing purely domestic programs aimed at conceptualizing FFS and subsequently phasing them out based on the achieved definition. An important initiative stems from a workplan hosted by the G20 and involves identifying and quantifying fossil fuel subsidies utilized at the national level.<sup>17</sup> Furthermore, the knowledge resources offered by various international organizations, as presented in Section 3, can be instrumental for countries in comprehending the extent of their FFS and benchmarking against countries in similar situations.

## 2.2 Phasing out fossil fuel subsidies

When assessing if specific FFS should be phased out, a country's particular situation should be considered. The costs for producing electricity in developing countries are often high, access to clean energy projects is restricted, and most developing countries are locked into fossil fuel dependency. Moreover, income inequality is typically *higher* in developing and emerging economies.<sup>18</sup> Developing

<sup>16</sup> OECD (2018), OECD Companion to the Inventory of Support Measures for Fossil Fuels 2018, OECD Publishing, Paris, <https://doi.org/10.1787/9789264286061-en>. Data available at: <http://www.oecd.org/site/tadffss/data/>

<sup>17</sup> The G20 has produced a number of reports on the use and removal of harmful and inefficient fossil fuel subsidies covering countries that employ a carbon tax or price domestically. See, for example: G20, *Mexico's efforts to phase out and rationalise its fossil - fuel subsidies*, A report on the G20 peer-review of inefficient fossil-fuel subsidies that encourage wasteful consumption in Mexico (2017), available at <https://www.oecd.org/fossil-fuels/Mexico-Peer-Review.pdf>; G20, *Germany's effort to phase out and rationalise its fossil -fuel subsidies*, A report on the G20 peer-review of inefficient fossil-fuel subsidies that encourage wasteful consumption in Germany (2017), available at <http://www.oecd.org/site/tadffss/Germany-Peer-Review.pdf>; and G20, *China's efforts to phase out and rationalise its inefficient fossil-fuel subsidies*, A report on the G20 peer review of inefficient fossil-fuel subsidies that encourage wasteful consumption in China (2016), available at [https://www.oecd.org/fossil-fuels/publication/G20%20China%20Peer%20Review\\_G20\\_FFS\\_Review\\_final\\_of\\_20160902.pdf](https://www.oecd.org/fossil-fuels/publication/G20%20China%20Peer%20Review_G20_FFS_Review_final_of_20160902.pdf).

<sup>18</sup> <https://www.worldbank.org/en/news/feature/2023/05/16/breaking-down-barriers-to-clean-energy-transition>



countries struggle to address the energy trilemma of energy security, energy equity and environmental sustainability.<sup>19</sup> Fossil fuels often play an important role in the context of economic growth and the fight against energy poverty. However, their utilization undermines sustainability as they account for the vast majority of global GHG emissions.

Addressing FFS is crucial given projections of their growth, particularly as developing countries, which some say tend to have higher-polluting power plants, factories, and vehicles, along with dense populations living and working in proximity to these pollution sources, increase fossil fuel consumption toward the levels of advanced economies.<sup>20</sup> If governments removed FFS and imposed environmental taxes, fuel prices would increase, influencing the investment and consumption decisions of firms and households.<sup>21</sup>

According to the 2023 IMF Fossil Fuel Subsidies Data update, full price FFS reform in 121 emerging market economies and developing countries could generate revenues of up to USD \$3 trillion by 2030. This amount is comparable to those countries' additional spending needs for Sustainable Development Goals.<sup>22</sup> Reducing general FFS is fiscally advantageous, as it helps to mitigate the long-term costs of climate change and adaptation. It can also play a crucial role in creating fiscal space, which (i) may enhance political support for a carbon tax, to the extent the initial tax rate can be administered at a lower level while still achieving comparable mitigation outcomes; and (ii) increase the budgetary resources available for priority sectors. This last point is particularly important for countries where it is more difficult to obtain public support and political acceptance towards the introduction of carbon taxes.<sup>23</sup>

However, phasing out FFS carries the risk of exacerbating inequalities among households. Therefore, well targeted FFS aimed at supporting the most disadvantaged members of society are essential. Its operation will often depend upon the overall governance system prevailing in the country and its ability to generate data segregating target segments with near-precision. Such targeted FFS need to be easy to implement to ensure administrative feasibility.

Developing countries could seek out successful examples of ways to reduce FFS from countries that have taken such steps and still being able to adequately support the most vulnerable groups in society. They could find success stories in similar countries with or without explicit carbon prices and learn how they have achieved this goal. For example, Vietnam nearly phased out all fossil fuels subsidies in 2015.<sup>24</sup> Only 16 countries had included a commitment to reform their FFS in their new or updated Nationally Determined Contributions (NDCs).<sup>25</sup> However, this is anticipated to change following COP28, which, among other objectives, calls for accelerating efforts towards the phase-down of unabated coal power and the phasing out of inefficient fossil fuel subsidies. The global stocktake contains all elements that were under negotiation and can now be used by countries to develop stronger climate action plans due by 2025. The global stock-take calls on Parties to accelerate efforts towards the phase-down of unabated coal power, phasing out inefficient FFS, and other measures that drive the transition away from fossil fuels in energy systems, "in a just, orderly and equitable manner, with developed countries continuing to take the lead".<sup>26</sup>

In practice, most countries committing to reform their FFS schemes are low-income and small economies that do not provide a large volume of FFS. Obviously, the task of removing FFS is even

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<sup>19</sup> See <https://www.worldenergy.org/transition-toolkit/world-energy-trilemma-index>

<sup>20</sup> <https://www.imf.org/en/Blogs/Articles/2023/08/24/fossil-fuel-subsidies-surged-to-record-7-trillion>

<sup>21</sup> <https://www.imf.org/en/Blogs/Articles/2023/08/24/fossil-fuel-subsidies-surged-to-record-7-trillion>

<sup>22</sup> IMF (2023) IMF Fossil Fuel Subsidies Data: 2023 Update, Simon Black, Antung A. Liu, Ian Parry, and Nate Vernon, WP/23/169, p. 20 Under the full reform scenario countries progressively raise fuel prices over time to reach their efficient levels by 2030.

<sup>23</sup> Falcão, Qualifying Carbon Prices for Tax Purposes, *Tax Notes International*, 11 Mach 2024.

<sup>24</sup> Although FFS were reintroduced in 2020 (in the Covid-19 period), according to the <https://fossilfuelsubsidytracker.org/country/>

<sup>25</sup> van Asselt et al. (2023).

<sup>26</sup> COP28 Agreement Signals "Beginning of the End" of the Fossil Fuel Era, UN Climate Press Release, 13 December 2023. <https://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era>



more complicated when their relevance in a national economy is higher (either in qualitative or quantitative terms). There are no G7 countries nor any G20 countries nor the EU that have included FFS reforms in their NDCs.<sup>27</sup> However, a Dutch international initiative to reduce FFS, the ‘Joint statement on Fossil Fuel Subsidies’, was launched in 2023 (the coalition included at the time of its launch The Netherlands, Austria, Belgium, Ireland, Spain, Finland, Antigua and Barbuda, Canada, France, Denmark, Costa Rica and Luxemburg).<sup>28</sup> These countries work together to identify and address international barriers to phasing out fossil subsidies. The Netherlands recently conducted an inventory showing that half of all subsidies stem from international agreements.

### 3. Assessing fossil fuel subsidies

#### 3.1. Overview

Assessing and benchmarking the scale of FFS is crucial for formulating a strategy to phase them out. However, evaluating the magnitude of FFS alone may provide little insight into their actual environmental impact, particularly in terms of transition of the economy towards carbon neutrality and greenhouse gas emission reductions.<sup>29</sup> The resources offered by international organizations can be of help for developing and as well as for developed countries. However, to effectively utilize these resources, it is necessary to understand the underpinning methodologies. In the concept of fossil fuel subsidy analysis, the methodologies employed by the International Energy Agency (IEA), the IMF, and the OECD present distinct approaches. The OECD's methodology<sup>30</sup> adopts a comprehensive, bottom-up approach that considers a country's actual policies. It encompasses direct budgetary transfers and tax expenditures<sup>31</sup> (i.e., tax exemptions or reduced tax rates of certain fuels or activities) that provide benefits or preferences to fossil fuels, and measures that create long-term enabling conditions for the fossil-fuel sector. It should be noted that the OECD's methodology depends on the baseline rates that tax expenditures relate to. A country with a high carbon tax and significant tax expenditures would have considerably higher levels of fossil fuel support with this measurement than a country with low carbon tax and few or no exceptions. As such it is better suited to study policies within a country than to compare different countries.

The IEA and IMF,<sup>32</sup> on the other hand, utilize a 'price gap' approach based on energy prices,<sup>33</sup> which involves comparing the actual end-use fuel prices with reference prices. This approach distinguishes between 'explicit' subsidies, where retail prices are below the supply cost, and 'implicit' subsidies, which do not account for external costs such as environmental and health impacts. The differences in the approaches lead to very different estimates of the size of FFS between the OECD and IMF, with the IEA and IMF arriving in 2022 at a number three times the number of the OECD.<sup>34</sup> It is important to note that, since carbon taxation seeks to internalize the external costs of greenhouse gas emissions, adopting a broader definition of fossil fuel subsidies that includes such externalities would be more aligned with environmental goals.

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<sup>27</sup> van Asselt et al. (2023).

<sup>28</sup> COP28: Netherlands launches international coalition to phase out fossil fuel subsidies. <https://www.government.nl/latest/news/2023/12/09/cop28-netherlands-launches-international-coalition-to-phase-out-fossil-fuel-subsidies>

<sup>29</sup> CPB/PBL (2023) Abolishing fossil fuel subsidies: a brain teaser rather than a non-brainer, October 2023.

<sup>30</sup> OECD (2021).

<sup>31</sup> For a general discussion of tax expenditures and their estimation see Altshuler and Dietz (2011).

<sup>32</sup> Black, Simon, et al. (2023).

<sup>33</sup> Examples of studies using the price gap approach is (Coady et al (2017), Clemens et al (2017) and Larsen and Shah (1992)).

<sup>34</sup> Cost of support measures for fossil fuels almost doubled in 2022 in response to soaring energy prices – OECD, <https://web.archive.org/temp/2023-12-06/670493-cost-of-support-measures-for-fossil-fuels-almost-doubled-in-2022-in-response-to-soaring-energy-prices.htm>

### 3.2 Tax expenditures and budgetary support for fossil fuels

Generally speaking, tax expenditures include tax concessions that are typically provided through lower rates, exemptions, or rebates of consumption taxes (e.g., value-added taxes and excise taxes) on fossil fuels. Additionally, tax expenditures also encompass measures that reduce fossil fuel extraction costs, such as accelerated-depreciation allowances for capital expenditure<sup>35</sup>, investment tax credits, deductions for exploration and development expenses, and preferential capital-gains treatment that provide a benefit or preference for fossil-fuel production or consumption. Budgetary support, on the other hand, involves direct government spending that supports the fossil fuel industry. Payments by governments or entities acting on their behalf to specific recipients encompass direct expenditures, such as funding for targeted support programs, and government stakes in energy-related enterprises, either through complete ownership or equity shares.

The OECD Inventory of Support Measures for Fossil Fuels covers direct budgetary transfers and tax expenditures. Thus, it primarily encompasses direct government financial transfers and tax benefits that favour fossil fuel production or use over other options. It also covers initiatives that support the fossil fuel industry, such as the development of various services, institutions, and infrastructure, which could aid fossil-fuel production or consumption over time. This also involves financing projects that deal with the aftermath of historical mining or drilling activities.

As mentioned above, tax concessions for fossil fuels often manifest as reduced rates, exemptions, or rebates on consumption taxes like value-added and excise taxes. Additionally, these concessions could include measures aimed at lowering the extraction costs of fossil fuels. Examples include accelerated depreciation allowances for capital expenditure, investment tax credits, deductions for exploration and development expenses, and favourable treatment of capital gains. These expenditures effectively reduce the cost of fossil fuel production or consumption, encouraging their use over alternative energy sources.

The OECD and IEA use a bottom-up approach to model subsidies for fossil fuels. In its Inventory, the OECD assesses the value of support from over 1,000 individual policies that either promote the production or consumption of fossil fuels. The Inventory encompasses 44 countries, inclusive of all 36 OECD Members, as well as various sub-national jurisdictions within federations. This inventory covers direct budgetary transfers and tax concessions that provide benefits or preferences for fossil fuel production or consumption (tax expenditures). Yearly data is available starting in 2012 in local currency. The effect for different measures is shown separately. Given that the data is available for several countries and policies, they can be used to benchmark a country's individual policy to other countries and compare estimates.

### 3.3 Price gap approach

The "price gap approach" abstracts from actual policies and instead compares actual end-use prices of fossil fuels with predetermined reference prices. A reference price may be the relevant global market price for a specific fossil fuel. The approach is bifurcated into two key components: 'explicit' and 'implicit' subsidies.

In the price gap approach explicit subsidies are calculated as the difference between the end-use fuel prices paid by fuel consumers and the relevant world market prices. These price gap estimates capture subsidies to fossil fuels that are (1) consumed directly by end-users or (2) consumed as inputs for electricity generation and considers the amount of the fuels consumed in a specific country. The basic calculation of subsidies for a product is:

$$\text{Explicit Subsidy} = (\text{Reference price} - \text{End user price}) \times \text{Units consumed}$$

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<sup>35</sup> Though it should be noticed that oil and gas taxation tends to be covered through special corporate/income taxation, which can carry higher tax rates as well as increased depreciation.

The subsidies can be of explicit nature when consumers can buy fuel below the international market price in a country that imports fuel. The subsidies can also be of more implicit nature when looking at a country that is an exporter of such fuels, but which sells the product to consumers below market prices.

Extensive data is necessary for conducting price-gap calculations. The data used in those calculations includes end-user price and consumption information sourced from IEA data, supplemented by government sources and various reports as needed. Additionally, the accuracy of the estimate depends on reference prices, which are determined based on international prices. Reference prices for electricity are established through the method of annual average-cost pricing. When considering sales to final customers applicable value-added tax is included in the reference price.

Implicit subsidies arise when the retail price of a product does not encompass externalities. These external costs consist of various factors such as contributing to climate change due to greenhouse gas emissions, causing local health issues (often resulting in premature deaths) due to the release of harmful pollutants like fine particulates, as well as generating traffic congestion and related accident costs associated with using road fuels. Achieving accurate energy prices necessitates factoring in these negative impacts on society within the pricing structure and implementing general consumption taxes when household consumption of fuels occurs. By not including these costs, the price paid by consumers does not reflect the true societal cost of fossil fuel consumption, thereby subsidizing its use indirectly. This method is instrumental in quantifying the extent of governmental support for fossil fuels and understanding the broader economic and environmental implications of such subsidies.

The IEA database presents explicit FFS for 2010-2022 (in real 2022 US\$) linked to oil, electricity, natural gas, coal for 48 countries / territories from Asia, Africa, Europe, and South America. There are separate calculations for subsidies linked to transport fuels.

The IMF database (IMF FFS Data: 2023 Update) separates out explicit and implicit subsidies to consumers and producers for different kinds of transport fuels, coal, natural gas, and electricity. The database also includes forecasts (up to 2030) and reform impacts. Reform impacts include (1) welfare effect which is the difference of environmental benefits and economic costs, (2) revenue raised from a reform, and (3) the impact on emissions and air pollution deaths.

## **4. Methodological issues and implications of the international resources**

### **4.1 Overview**

While the approaches of both the OECD, IEA and the IMF (covered in section 3 above) offer insights into the (static) size of FFS, significant differences exist that could impact how they can directly be used in domestic policy making. For example, the OECD and IEA inventory provides bottom-up estimates of actual policies. These estimates are based on government publications (e.g., tax expenditure reports of specific measures). Given that the estimates are based on government data the quality of the numbers depends on the quality of the data provided by governments. However, given the relevance of the policies for each country tax expenditure reports will allow policy makers to understand the revenue effect of changing existing exemptions to be aligned with a country's general tax rules. However, as tax expenditures are based on government defined norms it is difficult to compare these between different countries.

It should also be noted that it is not possible to assess the overall incentives structure for emissions reductions in a specific country by simply looking at the level of fossil fuel related tax expenditures. The incentives to reduce emissions in country A with a uniform but modest carbon price would be lower than in country B where, despite the existence of a few reduced rates or exemptions, emissions are priced at a higher rate overall. Yet, comparing the two countries the level of FFS (measured in terms of tax expenditures) would be higher in country B. In addition, countries may change their norms over time giving rise to changes in tax expenditures that are not necessarily reflected in policies.

## 4.2 Advantages and limitations of the approaches

The price gap approaches for explicit subsidies primarily rely on data on prices and consumed quantities and compare local prices to market prices. For purposes of policy analysis this can then be extended to encompass implicit price gaps to include the social cost of carbon, and other, emissions. The latter builds on estimates from the economic literature. However, estimates of the social cost of carbon vary greatly.<sup>36</sup> For instance, the IMF also include damage costs related to health effects from the combustion of fossil fuels (local air pollution). The price gap approach has the advantage that it is not necessary to model individual policies at the country level and that it is easier to conduct cross country studies.

When thinking about changes to legislation, governments will commonly need to provide estimates of fiscal effects of measures and to discuss behavioural effects concerning the changes in consumption that are the result of a change in prices. As such the tax expenditure approach may provide for more appropriate estimates related to rule changes concerning a few policies, e.g., removing the tax exemption or budgetary support for a certain type of fuel used in a specific sector. Given that tax expenditure reporting not only helps to increase accountability and transparency but also to provide some first estimates of the fiscal effect of a change specific policy they can be of great help for governments. However, estimates based on tax expenditures are dependent on the quality of the reported numbers from governments.

The advantage of the price gap measures is that they do not rely on the estimates of single policies. As such they can give a broader estimate of what might be the fiscal effect of a larger tax reform concerning fossil fuels. When considering the benefits of tax reforms concerning fossil fuel support it is necessary to also consider behavioural effects (price elasticity of demand) and to consider other health benefits. A purely static analysis is likely to underestimate the benefit of a reduction in FFS.<sup>37</sup>

## 5. Practical considerations for developing countries

Fossil fuel subsidies can counteract policies aiming at curbing global warming by encouraging increased carbon emissions. They are also costly. Although FFS might be kept for political reasons, they will stand in the way for emissions reductions. The above sections have shown that phasing out FFS is not an easy task and that developing countries in particular face various challenges (either related to embedded economic inequalities or political economy mechanisms), some of which have been explained above. This section therefore highlights some relevant considerations for developing countries to be taken into account when initiating an FFS reform.

It is important to acknowledge that there is no one-size-fits-all solution for FFS reform that can be universally applied across jurisdictions. Several knowledge resources by international organizations are available but, given the diversity in definitions, methodologies and national tax and subsidy regimes, tailor made solutions are required. However, there are some practical considerations that have been proven valuable.<sup>38</sup>

The reduction of FFS can make an important contribution towards an energy and climate transition. Long-term objectives and a plan on how to realize them is important. FFS reform will often lead to price increase of fossil fuel generation and/or consumption and therefore impact economic actors as

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<sup>36</sup> See, e.g., Rennert et al 2021. One reason relates to the question of how to ascertain discount losses that arise in the distant future.

<sup>37</sup> See e.g., Davis, L. W. (2014).

<sup>38</sup> See <https://www.imf.org/en/Topics/climate-change/energy-subsidies>

well as the government budget. Extensive and clear communication and consultation with stakeholders can help to secure political acceptability and facilitate adaptation processes towards the policy changes and avoid stranded assets. Changes in energy prices will generally have a regressive effect, so the economic situation of the poor members of society should be closely monitored. Phasing out fossil fuels will affect them relatively more. A shift from general subsidies towards subsidy measures that are targeted towards the poor can secure political acceptability and prevent triggering social unrest while still reducing government expenses and advancing the needed transition of the economy towards the national energy and climate objectives. Cash-transfers are generally preferable as they offer most flexibility to the beneficiaries.

One critical element when devising fossil fuel subsidy reforms is data availability and the limited institutional capacity in most developing countries. ‘The poor’ may not be easily identifiable, the amount of support may not be objectively calculated or cash transfers may not be easily distributed to them, undermining the efficacy of the targeted measure. Identifying FFS and determining if they are efficient or inefficient and assessing their impacts on the economic actors and the poor in particular, will place an additional burden on civil servants or implementing authorities. FFS reform may thus not be very popular unless they are designed with careful consideration of administrative feasibility. If direct targeting for fuel costs is not feasible, an alternative could be to expand existing targeted programs by lump-sum payments for fossil fuel costs. Albeit imperfect, such an approach may avoid that the perfect is the enemy of the good and that other societal benefits can be realized (budget savings, climate and health benefits, etc.).

Transparency and a good sense of proportion is clearly needed for a successful FFS reform. It also needs to be pointed out that caution is required when interpreting tax expenditure estimates and comparing them across jurisdictions.<sup>39</sup> This is because estimation methodologies and benchmark tax rates vary widely across countries and can be determined by the respective country. If a country report shows higher tax expenditures for fossil fuels, this does not necessarily mean that the country provides a higher level of support. The higher tax expenditures may be due to factors such as:

- The scope and comprehensiveness of tax expenditure reporting;
- A higher national benchmark tax rate 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;
- A higher level of fossil fuel consumption. Revenue foregone is usually calculated per physical or energy unit and estimates are therefore sensitive to a country’s fossil-fuel consumption pattern.

Quantifying subsidies or expenditures is therefore inherently difficult and a comparison across countries is, as a result, quite complex. This should also be borne in mind when examining data from various international organizations. In the process of phasing out FFS, it is important to focus on the policymaking and administrative perspectives. This includes aiming at establishing clear guiding principles, such as progressively reducing subsidies while considering the ability of various stakeholders to transition away from fossil fuels at different rates and pace. Setting reasonable deadlines, possibly with sunset clauses when fossil fuel subsidies will be phased out completely, aligned with the availability of alternative energy sources, or substitute products or services, is crucial. Additionally, effective communication of these principles and deadlines, through publications or notices that provide legal certainty to those benefiting from FFS, is essential. By taking these steps, pressure on civil servants or implementing authorities can be reduced, and the likelihood of jurisdictional conflicts can be minimized.

Several countries have successfully engaged in reciprocal peer review of their fossil-fuel subsidies. The Energy Working Group (EWG) of the Asia-Pacific Economic Cooperation has conducted a peer review on fossil subsidy reform, with the participation of countries such as Peru (in 2014), New Zealand (2015),

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<sup>39</sup> See <https://fossilfuelsubsidytracker.org/methodology>

and the Philippines (2015). Peer reviews have also taken place under the G20, with the OECD serving as Chair. Countries that have engaged in such peer-reviews include China and the USA, Mexico and Germany, Indonesia and Italy. Mexico's peer review reportedly identified ten subsidies worth USD 2.6 billion (MXN 50 billion) in 2016, two of which were phased out as part of the country's large energy reforms. Such peer review processes can offer important points of reflection and stimuli for identifying fossil fuel subsidies and pathways for reducing subsidies. They can also encourage a country to think about the sequencing of reforms, what to commit publicly, and can generally provide for mutual learning opportunities of all parties and actors involved.

## 6. Conclusions

FFS can influence the effectiveness and goals of carbon taxes and other pricing instruments. FFS should, however, also be scrutinized in countries that do not employ carbon pricing instruments because fossil fuels account for the lion share in GHG emissions and are estimated by the IMF to be subsidized by around 7.1% of global GDP.<sup>40</sup> Reducing FFS will help mitigate global warming and associated damage costs, thus facilitating the achievement of NDCs. Furthermore, such efforts could also have a positive effect on the budgetary position of implementing countries. Moreover, a reduction in general FFS schemes could be combined with more targeted support for the most vulnerable groups of society.

Identifying all FFS is not easy. There are many international resources, definitions, methodologies and peer learning opportunities that offer help and guidance. Yet each country's tax system and socio-economic needs are different, and each requires its own approaches to identify FFS that should and could be phased out (and when and how) to meet the country's objectives. The better a country can identify FFS, the more effectively it can scrutinize whether they are necessary or beneficial for society, as well as for the country's budgetary and environmental position.

When examining FFS, clear communication with stakeholders is a means to secure political and public acceptability as is close consideration for their needs (inequalities, competitiveness etc.). Fossil fuel price increases often have a regressive effect and well-targeted support measures for the poor may be needed. Data availability and limited institutional capacity may be an important consideration for phasing out fossil fuels and any FFS reform would be well advised to bear tribute to the underlying constraints. Caution is required when interpreting and comparing tax expenditure estimates because both methodologies and benchmarks can differ.

Overall, while there may be valid reasons for the use of fossil fuel subsidies by various countries, their utilization ought to support the advancement toward achieving sustainable development.

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<sup>40</sup> IMF Fossil Fuel Subsidies Data: 2023 Update, Simon Black ; Antung A. Liu ; Ian W.H. Parry ; Nate Vernon, August 24, 2023, available at: <https://www.imf.org/en/Publications/WP/Issues/2023/08/22/IMF-Fossil-Fuel-Subsidies-Data-2023-Update-537281>