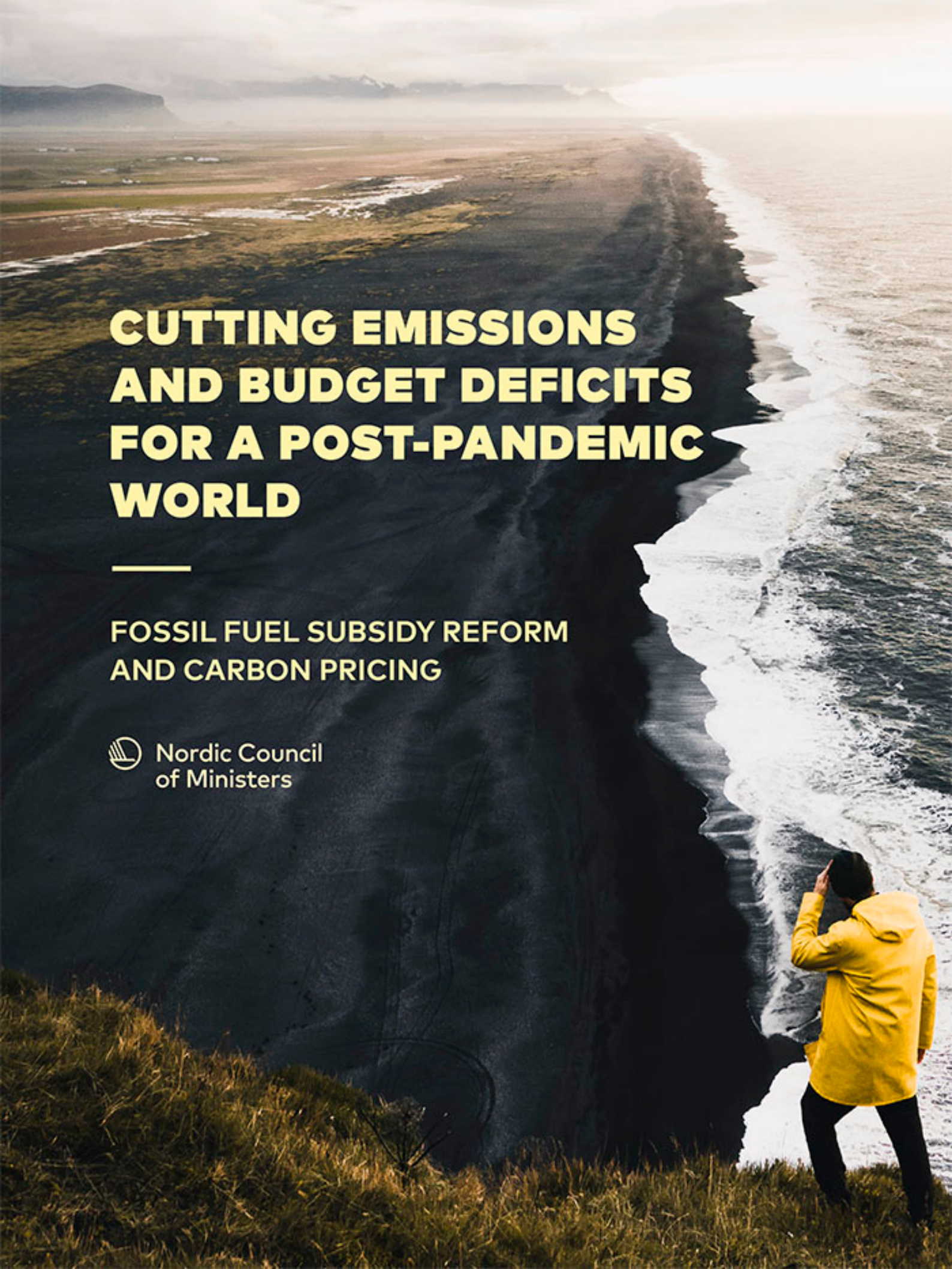


A person wearing a bright yellow raincoat stands on a grassy cliff edge, looking out over a vast black sand beach and the ocean. The sun is low on the horizon, creating a warm, golden glow over the water and the distant coastline. The beach is dark and stretches out towards the sea, with white waves breaking on the shore. The sky is hazy with soft clouds.

# **CUTTING EMISSIONS AND BUDGET DEFICITS FOR A POST-PANDEMIC WORLD**

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**FOSSIL FUEL SUBSIDY REFORM  
AND CARBON PRICING**



Nordic Council  
of Ministers



Nachtigall (OECD), Angela Naneu Churie Kallhauge (World Bank), Malena Selland Hanna-Mari Ahonen (Ministry of Foreign Affairs, Finland) for an external review of this brief. Lourdes Sanchez conducted an internal review. This is a working paper; for further comment, please contact Richard Bridle, IISD ([rbridle@iisd.org](mailto:rbridle@iisd.org)).

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# Foreword

Climate change is a global challenge that requires global action across the whole economy. But how can we ensure that the actions of individual investors, companies, and citizens converge into meaningful emissions reductions in the aftermath of disruption to public health and economies caused by the COVID-19 virus?

The spotlight has been on governments to create a coordinating mechanism that puts society on a coherent path toward a climate-friendly economy. One of the most powerful levers for coordinated climate action is placing an adequate price on fossil fuels and other emissions-intensive goods and services. Such price signals can help reflect the need for climate action in our economic decision making—every day, everywhere, for everyone. Price signals help households switch to climate-friendlier cars, heating, and cooking methods, incentivize companies to decarbonize their supply chains and production methods, and convince investors that the most rewarding investments will be those that count on sustainable energy sources instead of fossil fuels. In the context of economic recovery, these levers are more necessary than ever.

Two of the tools in the service of “getting the prices right”—fossil fuel subsidy reforms and carbon pricing policies—are powerful levers to help governments coordinate and accelerate climate change mitigation efforts. This report highlights the importance of understanding how these two measures interact with each other and how synergies between them can be used to make national climate action more effective, coherent, and fair.

Seeing fossil fuel subsidy reform and carbon pricing as two sides of the same coin encourages policy-makers to spot common lessons from pricing initiatives and subsidy reforms around the world. One such lesson is that governments have a responsibility to address the concerns of those who stand to lose from the removal of subsidies and the introduction of carbon prices. The savings and revenues that fiscal reforms unlock need to be used in ways that make people’s lives better, create new jobs and new opportunities, and help us accomplish a common vision of a sustainable economy, and, most importantly, compensate and support citizens in the transition away from fossil fuels. Transparency, trust, and a reliable and socially fair plan for investing the funds that fiscal policies unlock, are key to successful reforms.

This report is timely: in 2020, countries are facing the task of developing policies to drive recovery following the economic disruption wrought by the COVID-19 virus. During 2020, countries are also preparing to revise and increase ambition within their Nationally Determined Contributions (NDCs), a reminder that even with the current focus on the virus, climate change remains an ongoing challenge.

As carbon pricing and fossil fuel subsidy reforms are on the rise, it is safe to say that they will play an important role in increasing ambition toward meeting the goals of the Paris Agreement and the SDGs. The need for phasing out harmful subsidies and putting a price on carbon is further echoed by the newly founded Coalition of Finance Ministers for Climate Action, which recognizes the unique capacity that finance ministries have for accelerating climate change mitigation. This research can inform national mitigation strategies that want to unlock the full potential of fiscal

climate action. Serving the same purpose, fossil fuel subsidy reform and carbon pricing have to be thought through together, rather than alone.

**Jan Wahlberg, Climate Ambassador, Finnish Ministry for Foreign Affairs**

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# Acronyms

|        |                                                        |
|--------|--------------------------------------------------------|
| APEC   | Asia-Pacific Economic Cooperation                      |
| ETS    | Emissions Trading Scheme                               |
| EU ETS | European Union Emissions Trading Scheme                |
| EUA    | European Union Allowance                               |
| FFS    | fossil fuel subsidies                                  |
| FFSR   | fossil fuel subsidy reform                             |
| GHG    | greenhouse gas emissions                               |
| GSI-IF | Global Subsidies Initiative Integrated Fiscal Model    |
| IEA    | International Energy Agency                            |
| IMF    | International Monetary Fund                            |
| IPCC   | Intergovernmental Panel on Climate Change              |
| LPG    | liquified petroleum gas                                |
| MSR    | Market Stability Reserve                               |
| OECD   | Organisation for Economic Co-operation and Development |
| SME    | small and medium-sized enterprise                      |
| SOE    | state-owned enterprise                                 |
| UNFCCC | United Nations Framework Convention on Climate Change  |
| UNSG   | United Nations Secretary-General                       |
| VAT    | value added tax                                        |

# Executive summary

In 2020, the long-term crisis of climate change is overlaid by the COVID-19 emergency, pushing many governments into deep budget deficits. As countries press ahead with efforts to mobilize funds to fight the pandemic and bolster their recession-ridden economies, they still have an opportunity to address Article 2.1.c of the Paris Agreement on climate change: “making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development.” The two fiscal tools available in this respect are fossil fuel subsidy (FFS) reform and carbon pricing — putting a price on greenhouse gas (GHG) emissions through taxation or carbon markets. While both measures cut GHG emissions, they also mobilize the much-needed resources for the public purse, cutting budget deficits.

However, when it comes to the application of these two fiscal tools, the world has to start from a relatively low base, as outlined in this report. Governments continue to subsidize the consumption and production of fossil fuels. Fossil fuel subsidies act as a negative price on carbon and increase the risk of locking investment in fossil fuels that are incompatible with the low-carbon transition required to meet the Paris Agreement’s objectives. As we document in the report, the current coverage and levels of carbon pricing are also deeply insufficient to meet the goals of the Paris Agreement limiting the increase of the global average temperature to “well below 2 °C” while “pursuing efforts to limit the temperature increase to 1.5 degrees C.

This Working Paper explores the interplay between FFS reform and carbon pricing at the international and national levels. We note that effective carbon pricing, promoted by the Organisation for Economic Co-operation and Development and the International Monetary Fund, is a valuable tool to send effective carbon mitigation signals to the market. However, without including the impact of fossil fuel subsidies, these analyses present only a partial picture.

To fill in this gap, this paper finds the following:

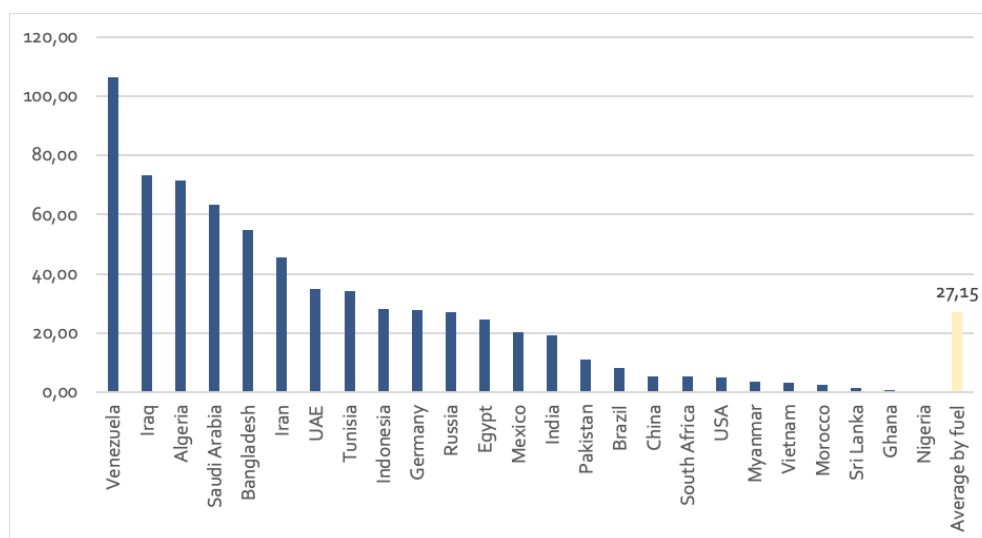
- Globally, subsidies to fossil fuels are worth USD 350–600 billion per year, depending on international fossil fuel prices.<sup>1</sup> This is an order of magnitude higher than current global revenues from explicit carbon taxes and emissions trading systems (around USD 44 billion in 2018).
- Fossil fuel subsidies act as a negative carbon tax. In a subset of 25 countries in 2016, fossil fuel consumption subsidies were **equivalent to a negative carbon price close to USD 27 per tonne** of carbon emitted (Figure ES1).
- Energy taxes, in particular excise duties, act as an implicit carbon price. Revenues from these taxes are more significant than both explicit carbon pricing and fossil fuel subsidies.
- The observation that fossil fuel subsidies act as an incentive to increase

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1. A large portion of fossil fuel consumption subsidies cover the margin between the international price of these commodities and the regulated domestic prices. E.g., according to the IEA (2019), global fossil fuel consumption subsidies amounted to USD 506 billion in current prices in 2012, when the global oil price averaged USD 112 per barrel. In 2016, when the oil price averaged only USD 44 per barrel, global fossil fuel consumption subsidies decreased to USD 264 billion in current prices. In contrast, subsidies to fossil fuel production tend to remain constant or grow during periods of low fossil fuel prices, at roughly USD 100 billion per year (Bast, 2015; Gerasimchuk et al., 2017; Laan, 2010).

carbon-intensive activities, while energy taxes and carbon pricing act as a brake on these activities, shows how intrinsically linked these mechanisms are. It is only by considering all of these together that the true mitigation signal can be understood and aligned with political imperatives (Figure ES2).

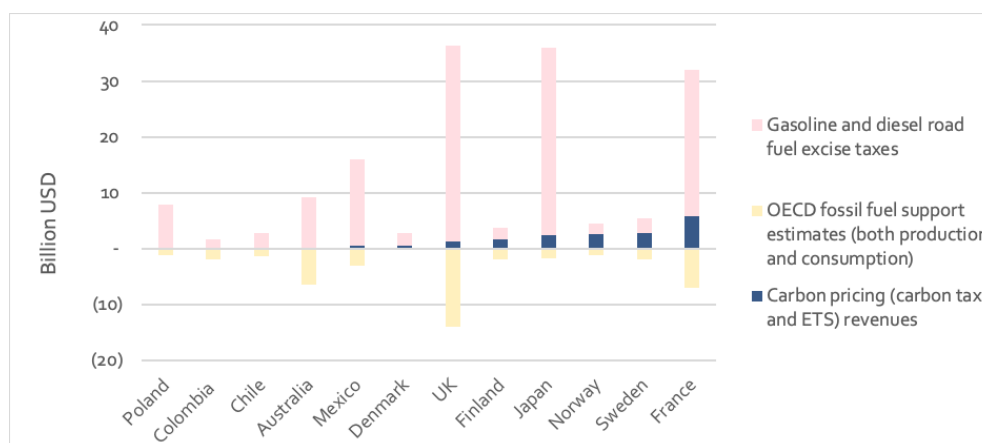
**Figure ES1. Consumer subsidies per tonne CO<sub>2</sub>e emitted from energy, 25 countries (USD, 2016)**



**Source:** Authors' calculations based on International Energy Agency (IEA) and International Monetary Fund (IMF) subsidy data as well as Global Subsidy Initiative–Integrated Fiscal (GSI-IF) modelling (GSI, 2019).

**n.b.** Further description of the model is available in Annex 1 and GSI, 2019.

**Figure ES2. Carbon pricing revenues and fossil fuel subsidies in select economies, billion USD (2017)**



**Source:** Authors' calculations based on FFS and excise taxes by the OECD (2018b, 2019b) and estimates of carbon pricing revenues by Métivier & Postic (2018) and OECD (2019b).

**n.b.** Carbon pricing revenues include only carbon taxes and emission trading schemes. Federal-level subsidy estimates are for Australia only.

In 2020, the plunge in oil prices to new lows creates opportunities for reform of subsidies to oil consumption and increasing its taxation. On the one hand, such a deep drop in oil prices creates pressure on oil-exporting nations as their budget breaks even at a much higher oil price than today's USD 25–30 per barrel in March 2020. As a result, some developing country governments (e.g., Nigeria) are already discussing a cut in fuel subsidies to fund its COVID-19 response (Oliisah, 2020). On the other, both exporting and importing countries can raise oil consumption taxes without hurting consumers. For example, in March 2020, India raised its excise duty on gasoline and diesel to raise the revenue needed for the response to the COVID-19 crisis, as was stressed in communications around this policy change ("Excise Duty on Fuels," 2020). These findings lead to several conclusions and recommendations:

1. For governments, making finance flows consistent with the Paris Agreement targets while mobilizing budget resources for a recovery from the COVID-19 shock and other public causes involve the following progressive stages:
  - a. On the consumption side:
    - i. Phasing out consumer fossil fuel subsidies while protecting vulnerable consumer groups and supporting them via targeted measures.
    - ii. Using the opportunity provided by current low oil prices to impose and increase taxes on fossil fuel consumption without hurting consumers. Such measures will support the clean energy transition— otherwise low fossil fuel prices could jeopardize the switch to energy efficiency and renewable energy technologies.
    - iii. Further increasing fossil fuel consumption taxes to the levels consistent with external social costs such as negative health impacts and climate change while adequately communicating the rationale of such measures and protecting vulnerable consumers.
  - b. On the production side:
    - i. Phasing out producer fossil fuel subsidies and resisting the industry pressure to introduce new tax breaks and other subsidies during the period of low fossil fuel prices.
    - ii. Maintaining and, where appropriate, increasing taxes on fossil fuel production that can be used to fund budget deficits and other public needs, including just transition for workers and communities currently dependent on fossil fuels.
2. Governments and international institutions should consider building fossil fuel subsidies into effective carbon pricing calculation methodologies, noting that carbon taxation of certain sectors does not automatically mean that the country does not have fossil fuel subsidies in the same sectors, and the overall "mitigation signals" from these policies can be mixed.
3. Governments should facilitate the exchange of lessons learned on FFS reform and carbon pricing. In this respect, there is a particular role for Nordic countries and the Nordic Council of Ministers, all of which have been pioneers in the development of carbon pricing, energy taxation, and FFS reform. The

first carbon tax in the world was introduced by Finland in 1990, followed closely by taxes in Norway and Sweden in 1991 and Denmark in 1992 (Kagan, 2020). Nordic taxes for gasoline, diesel, heating oil, and other energy carriers are generally toward the top half of the range within the EU, itself a leader in global terms on implementation of energy taxes (Nordic Council of Ministers, 2014). All four countries are members of the Friends of Fossil Fuel Subsidy Reform (FFFSR), an informal group of non-G20 countries working to build political consensus on the importance of fossil fuel subsidy reform (FFFSR, 2020).

4. The savings and funds mobilized through FFS reform and carbon pricing can serve countries' need to fight the COVID-19 crisis by bolstering public health systems and social safety nets. In the meantime, governments' stimulus and other measures should shift support and investment from fossil fuels to renewable energy and energy efficiency (i.e., "clean energy subsidy swaps") and ensure just transition for consumers, communities, and workers. The choices governments make in 2020 will lock in high- or low-carbon development patterns for decades to come. If tackled in the spirit of the Sustainable Development Goals (SDGs) and the Paris Agreement, policies and investments put in place today can send long-term signals to investors and other market participants that will secure long-term resilience and safe climate trajectories for a post-pandemic world.

# 1. Introduction

In 2019, energy-related carbon dioxide emissions remained close to the record highs recorded in 2018 (IEA, 2020; Organisation for Economic Co-operation and Development [OECD], 2019b). This policy brief argues that fossil fuel subsidies (FFSs) act as a brake on realizing a global carbon price that would create a mitigation signal in line with global climate targets. The Paris Agreement requires all governments to make “finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development” (Article 2.1.c) (UNFCCC, 2015). There are numerous calls to make government stimulus and other support measures in response to the COVID-19 pandemic consistent with the climate targets, as advocated by UN Secretary-General António Guterres:

“[We] must reaffirm our common responsibility to “recover better,” with more inclusive and sustainable models of development.

The current [COVID-19] crisis is a stark reminder of humanity's common fate and of the need for upfront investments to reduce the catastrophic downstream risks of the pandemic. It also provides a watershed moment for investment in critical public services and global public goods . . .

The world has agreed on a framework for action — the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change — and they continue to offer a guiding light for people and planet. We must ensure that the recovery strategy out of this crisis keeps us on track toward these longer-term objectives, building a sustainable and inclusive economy.” - *Source: United Nations, 2020.*

Financial flows at stake include not only private finance but also, importantly, government revenues such as those collected through carbon pricing and energy taxation, and their use—for instance, to provide fossil fuel subsidies or support to renewables and energy efficiency.

Carbon pricing refers to policies that put an explicit price on GHG emissions. Examples of policy instruments used to price carbon include carbon taxes and emissions trading systems (ETSs). By imposing a cost per tonne of CO<sub>2</sub> or CO<sub>2</sub> equivalent<sup>2</sup> (CO<sub>2</sub>e) emitted, carbon pricing policies effectively increase the cost of emitting GHGs for consumers, encouraging a switch to activities and products that emit less. In certain cases, carbon taxation can also be applied at the point of production or dispatch, as is the case with the coal cess (tax) in India (Republic of India, 2015). The objective of carbon pricing is to send a “mitigation signal” by changing the relative price between goods and services that emit more GHGs and those that emit less.

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2. CO<sub>2</sub> equivalent is a measure of the aggregated global warming potential of various greenhouse gases expressed as an equivalent amount of carbon dioxide (Eurostat, 2017).

Several other types of policies also send a mitigation signal, although it is not their main objective. Some policy instruments (such as fuel taxation) impose a cost on activities that emit GHGs, while others (such as renewable energy production or energy efficiency gains) incentivize low-carbon activities. Such policies *implicitly* price carbon and also play a critical role in fighting climate change (World Bank, 2019, IMF, 2019; OECD, 2018). However, not all energy taxes necessarily encourage emission reductions: for instance, value added tax (VAT) and electricity taxes often do not differentiate between energy sources (OECD, 2019b).

The OECD (2018a) and IMF (2019) have recently examined the combined effect of implicit and explicit carbon pricing, referred to as the “effective carbon price.”<sup>3</sup> While praiseworthy, such research does not integrate the contribution of fossil fuel subsidy reform (FFSR) to energy prices. Yet government reforms of fossil fuel subsidies also *implicitly* price carbon by increasing the cost of fossil fuels. In fact, fossil fuel subsidies act as a *negative* price on carbon, and considering their size—from USD 350 to 600 billion per year—their impact on implicit and effective carbon prices could be significant.

To achieve the Paris Agreement goals, the ultimate objective of government policy should be to strengthen the “mitigation signal” sent to consumers. In other words, countries need to understand and tackle the risk that fossil fuel subsidies cancel or dampen the “mitigation signal” sent by implicit and explicit carbon pricing policies. It is important to explore ways to integrate FFSR into effective carbon price estimates. This working paper aims to contribute to such endeavours, aiming to better estimate the combined effect of positive and negative carbon prices, and ultimately the mitigation signal. Indeed, the rationale for governments to consider carbon pricing and FFSR as two tools serving the same purpose is compelling.

Section 2 presents a state of play on fossil fuel subsidies and (both explicit and implicit) carbon pricing. Section 3 explores linkages between subsidies and carbon pricing in terms of their scale and impact on global GHG emissions. Section 4 explores social compensation measures that can counter possible negative impacts on poor and vulnerable groups of FFS and carbon pricing reforms, along with the challenge of communicating reforms. The paper concludes with a summary of the case for considering FFSR alongside carbon pricing as a tool for establishing an effective carbon price that sends a powerful mitigation signal.

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3. The OECD define the effective carbon price as “the sum of fuel excise taxes (of which the statutory rates are usually expressed in common commercial units, such as litres of gasoline) and explicit carbon taxes (understood as taxes called carbon taxes where statutory rates are typically also expressed in common commercial units or per unit of CO<sub>2</sub> emissions)” (OECD, 2019b, p. 2).

## 2. Global Impacts: Fossil fuel subsidies and carbon pricing

Carbon pricing sets an explicit price on GHG emissions, helping factor GHG emissions into economic decision making while creating an economic incentive to avoid or reduce emissions.

Fossil fuel subsidies, on the contrary, act as a negative price on carbon, providing economic support to the production and consumption of fossil fuels, thereby encouraging—rather than deterring—activities and products that generate GHG emissions. Similarly, energy taxes can create an implicit price on carbon. To understand the overall signal being sent to the market and ensure it is consistent with climate policy, it is essential to understand how all these policies interact.

Carbon pricing and FFS reform are different tools, but they seek a similar outcome and can reinforce each other. Both usually lead to an increase in the cost of fossil fuels at either the consumer or producer level that can help drive down GHG emissions. This way, both carbon pricing and FFS reform can guide energy production and consumption away from fossil fuels toward renewable energy and more efficient uses of energy, reducing GHG emissions.

This section summarizes the current status of both FFS and (explicit and implicit) carbon pricing instruments.

### 2.1 State of Play on Fossil Fuel Subsidies

Fossil fuel subsidies come in many shapes and sizes on both the producer and consumer side. They include energy sold below the market price, tax breaks, direct budgetary transfers to producers and consumers, and subsidized loans (Gerasimchuk et al., 2017; OECD, 2019a). In recognition of the impact of fossil fuel subsidies on GHG emissions, 14 countries have included FFS reform in their Nationally Determined Contributions (NDC) under the Paris Agreement on climate change (Merrill et al., 2019).

The size of global subsidies to fossil fuels is significant, ranging from USD 350–600 billion per year depending on fossil fuel prices.<sup>4</sup> The combined International Energy Agency (IEA) and Organisation for Economic Co-operation and Development (OECD) estimate puts fossil fuel subsidies among a subset of 76 economies at USD 340 billion in 2017 (OECD & IEA, 2019). This combined figure includes both the IEA's price gap and the OECD's producer–consumer support estimates (see Annex 2 for

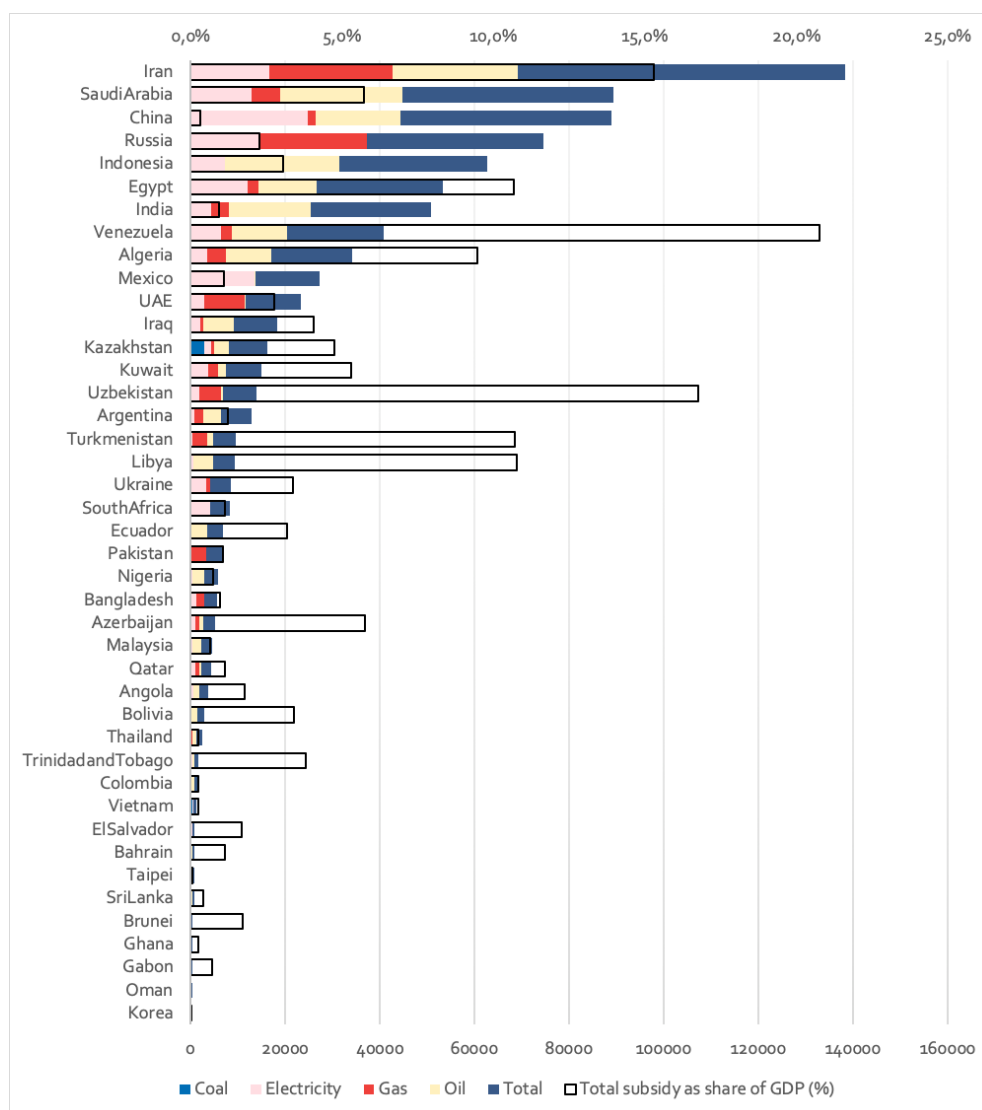
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4. A large portion of fossil fuel consumption subsidies cover the margin between the international price of these commodities and the regulated domestic prices. For example, according to the IEA (2019), global fossil fuel consumption subsidies amounted to USD 506 billion in current prices in 2012, when the global oil price averaged USD 112 per barrel. In 2016, when the price of oil averaged only USD 44 per barrel, global fossil fuel consumption subsidies decreased to 264 billion in current prices. In contrast, subsidies to fossil fuel production tend to remain constant or grow during periods of low fossil fuel prices, at roughly USD 100 billion per year (Bast, 2015; Gerasimchuk et al., 2017; Laan, 2010).

further detail on methodologies). In contrast, the IMF, which has a more encompassing approach that includes negative environmental externalities such as local air pollution and global warming, puts the total value of fossil fuel subsidies at USD 5.2 trillion in 2017 (Coady et al., 2019).

Subsidies to fossil fuels act as a massive implicit negative price on carbon. According to the IEA, the largest subsidies to fossil fuel consumption are provided in China, Iran, Russia, and Saudi Arabia. Some countries (including Egypt, Iran, Libya, Uzbekistan, and Venezuela) spend between 10–20% of GDP on fossil fuel subsidies, whereas countries such as Kuwait, Saudi Arabia, and the UAE spend over USD 1,000 per person per year on fossil fuel subsidies alone (see Figure 1).

**Figure 1. Fossil fuel consumption subsidies by country, 2018**



**Source:** IEA, 2019b.

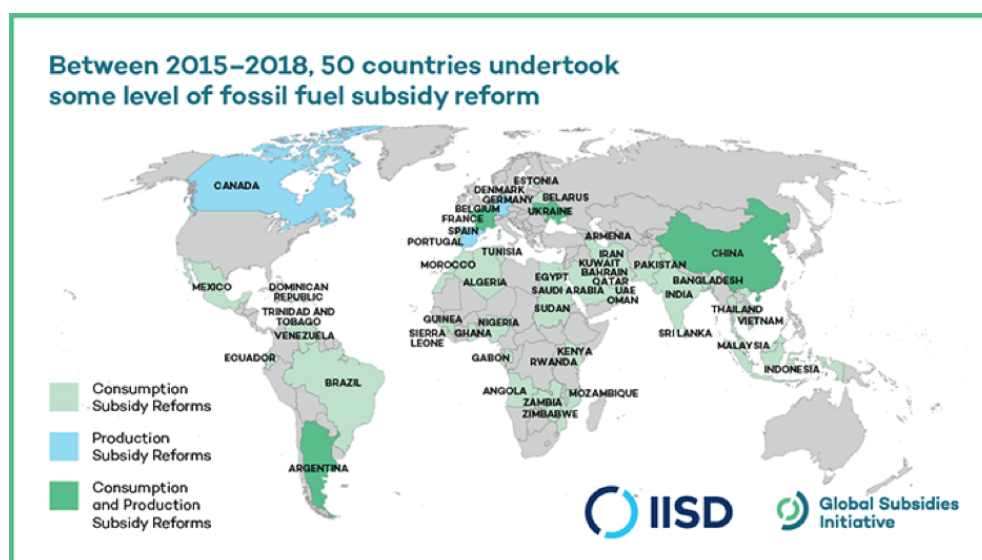
**n.b.** based on IEA data for selected non-OECD countries.

In 2014, the fall in international oil prices led countries such as Indonesia, Malaysia, and Mexico to considerably reduce their fossil fuel subsidies (Benes et al., 2015). In particular, Indonesia reduced gasoline subsidies and eliminated subsidies to diesel in 2015, but the subsequent rise in oil prices has threatened this progress. It is not uncommon for countries to experience such backsliding, which shows the difficulty in maintaining reforms in the long run. However, there has been progress overall, with some 50 countries implementing some level of FFSR between 2015 and 2018 (see Figure 2, a non-exhaustive graphic of subsidy policy changes).

In 2020, the price of oil has plunged to new lows, creating similar opportunities for consumption subsidy reform. Such a deep drop also creates pressure on oil-exporting nations, since their budgeting requires a much higher oil price to break even than today's USD 25–30 per barrel as of March 2020. As a result, some developing country governments (e.g., Nigeria) are already discussing a cut in fuel subsidies to fund their COVID-19 response (Olisah, 2020).

Leaders of the G7, the G20, the European Union (EU), and the Asia-Pacific Economic Cooperation (APEC) committed to phase out fossil fuel subsidies (G20, 2009; G7, 2016; APEC, 2009). The leaders' statement from the 2009 G20 summit pledged to "phase out and rationalise over the medium term inefficient FFS" "that encourage wasteful consumption" "while providing targeted support for the poorest" (G20, 2009). Yet progress has been slow; 10 years on, despite many subsidy reform efforts (see figure 2), only six G20 countries<sup>5</sup> have a peer review, a key first step on transparency around fossil fuel subsidy reform (Merrill & Funke, 2019).

**Figure 2. Countries implementing FFSR between 2015 and 2018**



5. G20 countries that have completed peer review of fossil fuel subsidies include: China, the United States, Mexico, Germany, Indonesia, and Italy. Argentina and Canada announced their peer review in 2018, and France and India in 2019.

**Source:** GSI, 2019.

Fossil fuel subsidies have a number of negative attributes. They are persistent and difficult to reform once in place. Introduced for various reasons (such as gaining political support, industry lobbying, cushioning the effects of oil price increases, or as a form of compensation for lower-income groups) these subsidies create a form of social and political lock-in that makes it particularly challenging to reform them in the long run (Van Asselt, 2018). The OECD (2018) found more than 1,000 policies across 44 members and partner economies that support the use or production of fossil fuels, often policies that were introduced decades ago.

Fossil fuel subsidies are often regressive. Globally, 45% of subsidies benefit the top income quintile and only 7% benefit the bottom quintile (Coady et al., 2015b). At the same time, reform must be undertaken with care because the poorer members of society spend a greater proportion of their income on energy costs, so increases in energy prices need to be accompanied by an increase in social security measures (see Box 4).

These subsidies also underprice the negative health and environmental externalities linked to fossil fuel production and use. Thus, fossil fuel subsidies are dangerous for public health since they promote the use of fuels associated with toxic air pollution to the disadvantage of clean energy. In China, India, Indonesia, and many other countries, air pollution from coal and fossil fuels is a major cause of respiratory, cardiovascular, and other non-communicable diseases such as diabetes (Pompeu, 2019; Sanchez & Luan, 2018). These diseases, in their turn, make people more vulnerable to COVID-19 and other afflictions, leading to premature deaths. Further, as a consequence of being regressive and excluding negative externalities, subsidies benefit polluters, directly contradicting the polluter-pays-principle.

Fossil fuel subsidies also interfere with international climate mitigation efforts, making fossil fuels cheaper to produce and consume (see Box 1), encouraging their wasteful use and thus emissions. The oil, gas, and coal in already-producing fields and mines are more than we can afford to burn while keeping likely warming below 2 °C—however, governments continue to subsidize fossil fuel exploration and production (Muttitt, 2016). In 2017, G20 countries spent at least USD 63.9 billion per year subsidizing coal, the most polluting fossil fuel (Gençsü et al., 2019), which is the opposite of the call from the UNSG and the IPCC to ban coal-fired power stations altogether and reduce unabated coal use to near zero by 2050 (IPCC, 2018). In Indonesia, the government has set price caps for coal in order to offset coal price increases and to reduce electricity costs placing the development of renewable energy at a significant disadvantage (Bridle et al., 2019).

**Box 1. The difference between producer and consumer subsidies in terms of end-price impacts.**

Both producer and consumer subsidies artificially lower fossil fuel prices and thus lead to additional emissions. At a global level, subsidies to producers of oil, gas, coal, electricity, and heat have broadly the same consequences for prices and climate as

consumer subsidies. All subsidies reduce commodity prices and increase consumption (Merrill et al., 2019). However, the consumption doesn't necessarily take place in the jurisdiction where producer subsidies are allocated.

The effects of producer subsidies on national carbon emissions depend on whether the subsidies are lowering prices for national consumers specifically or for global consumers more generally. Commodities that are readily transportable, such as oil, are traded on global markets with low barriers to international trade. Producer subsidies from a single, relatively small, country are unlikely to have a discernable impact on global oil prices. For example, a reform to the Petroleum Revenue Tax in the United Kingdom, which represents a producer subsidy, was assessed to have no impacts on oil prices (UK Government, 2016).

By contrast, gas, coal, and fossil fuel-based electricity is more expensive to transport per unit of energy, creating more friction holding back a global market. For these fuels, subsidies to producers are likely to have a more significant effect on local or regional prices and consumption.

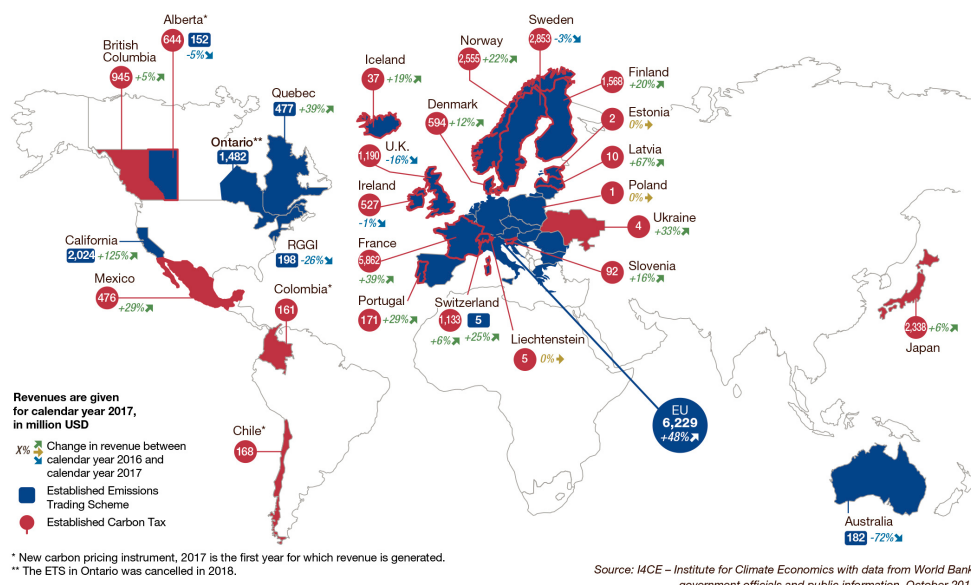
## 2.2 State of Play on Explicit and Implicit Carbon Pricing

Various policy instruments are referred to as carbon pricing initiatives. The common excise duties on fuels and electricity put a price on carbon, albeit in an implicit way, and thereby play a role in discouraging energy consumption and reducing GHG emissions. However, they are imposed irrespective of the carbon content of the energy sources, as opposed to explicit carbon pricing policies that set a unit price per tonne of CO<sub>2</sub> equivalent. In the case of a carbon tax, policy-makers set the price level, whereas under an ETS, an emissions cap is put in place for a set of regulated emitters as a group. The government then issues an equivalent amount of emissions allowances to those emitters corresponding to the cap level. In an ETS, the demand and supply of allowances in the market will determine a unit price for those allowances that corresponds to the carbon price at a given time (Partnership for Market Readiness [PMR] & International Carbon Action Partnership [ICAP], 2016). This section reviews the status of both explicit and implicit carbon pricing instruments.

Explicit carbon pricing is still limited in its application across countries, although there is growing interest in using these instruments; 96 countries—representing 55% of global GHG emissions — have stated in their Nationally Determined Contributions (NDCs) to the Paris Agreement that they are planning or considering the use of carbon pricing policies (World Bank, 2019). A summary of explicit carbon revenues in 2017 is presented in Figure 4.

**Figure 4. Map of carbon revenues around the world in 2017**

## Map of carbon revenues around the world in 2017 (in million USD)



**Source:** Reproduced with permission from Métivier & Postic (2018).

According to the World Bank's *State and Trends of Carbon Pricing 2019* report, as of mid-2019, there were 57 carbon pricing initiatives around the world (World Bank, 2019). Rising prices of existing instruments have resulted in an increase in revenues of almost 40% from 2017 to 2018 (from USD 32 to 44 billion). Existing initiatives price around 20% of global GHG emissions, but, despite recent price increases, less than 5% of those are currently priced at levels consistent with reaching the temperature goals of the Paris Agreement (World Bank, 2019 p. 3). Similarly, in an assessment of 191 countries, the IMF found there is still massive overall underpricing of carbon in countries such as China, the United States, Russia, India, and members of the EU (Coady et al., 2019). Its research found that in 2015 efficient fossil fuel pricing (i.e., reflective of negative health and environmental externalities) would have lowered global GHG emissions by 28% and fossil fuel air pollution deaths by 46% while increasing government revenue by 3.8% of GDP (Coady et al., 2019).

Among those countries that do already put an explicit price on GHG emissions, rates vary from as high as USD 127 tonne CO<sub>2</sub>e (Sweden) to less than USD 1 in Mexico, Ukraine, and Poland, while the domestic emissions covered range from less than 5% to 85% across jurisdictions (World Bank, 2019; Nachtigall, 2019). The Canadian province of British Columbia introduced a carbon tax in 2008 set at CAD 10/tonne CO<sub>2</sub>e. It reached CAD 40/tonne CO<sub>2</sub>e in 2019 and is set to reach CAD 50/tonne by 2021. The tax, designed to be revenue-neutral by reinvesting the proceeds to households, emission reduction projects, and support for affected workers, did not hamper the economy, with GDP growing by 19% and net emissions declining by 3.7% between 2007 and 2016 (Carbon Pricing Leadership Coalition [CPLC], 2019). Chile also introduced a carbon tax in 2014 (Reuters, 2014), while the Canadian province of Quebec and the state of California have been implementing linked ETSs since 2013 (International Carbon Action Partnership, 2020a).

Key recent carbon pricing developments include the introduction of a federal

Greenhouse Gas Pollution Pricing Act in Canada in 2018 (see Box 1) and the enactment of carbon taxes in Singapore, South Africa, and Colombia, respectively in 2019, 2019, and 2016. Both Colombia's and South Africa's tax obligations can be partially met by surrendering certified carbon credits from offset projects implemented within the country, thereby innovatively mixing different types of instruments.

### **Box 2. Canada's 2018 Greenhouse Gas Polluting Pricing Act**

In 2018 Canada's Parliament adopted a nation-wide carbon pricing approach that sought to increase the price of carbon to CAD 20 per tonne CO<sub>2</sub>e by 2019 and subsequently raise that price by CAD 10 each year until it reaches CAD 50 in 2022 (Government of Canada, 2018). It is being implemented as a tax covering 21 types of fuels and combustible waste, and it applies in all provinces and territories except those that develop their own carbon pricing policies meeting the federal benchmark for carbon pricing (Government of Canada, 2018). Provinces that are exempt from the federal carbon pricing approach are British Columbia, Quebec, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador (Government of Canada, 2018). Most recent developments include the adoption of an ETS in Nova Scotia, an ETS and a carbon tax in Newfoundland and Labrador, and a carbon tax in Prince Edward Island.

The carbon pricing approach includes a strong social component, by ensuring that the majority of the tax revenue is redistributed to households in the jurisdictions in which it is collected to offset higher energy prices through the Climate Action Incentive (Government of Canada, 2018). It will also ensure that lower-income households and rural communities will receive proportionally more revenues from the tax.

Much has been learned about the design of carbon pricing instruments, and policies are continually being improved. Perhaps the most significant reform was the 2018 revision of the EU Emissions Trading Scheme (EU ETS) for the period after 2020. This revision reflects the lessons learned from past experience in the scheme that was launched in 2005. For example, the revision introduces the Market Stability Reserve (MSR) to address the surplus of EU Allowances (EUAs) in the scheme, dating back to the financial crisis and causing persistently low prices (European Commission, 2019; Roig-Ramos, 2018; Twidale, 2018). The EUA price has increased from below EUR 10/t in early 2018 to over EUR 20/t in 2019 (Sandbag, 2019). China has also demonstrated significant momentum on carbon pricing as it expands on its current subnational systems to introduce a national ETS by 2020. As of April 2020, a national ETS has not yet been implemented (ICAP 2020b). China's national ETS is set to overtake the EU ETS as the world's largest emission trading scheme, covering 15% of global emissions, starting in the power sector and expanding gradually to other industries such as aviation, heating, and chemicals (Holder, 2017; ICTSD, 2018). China's ETS has the potential to level the global playing field and build momentum, inspiring other countries that have not yet implemented carbon pricing to consider doing so. The Regional Greenhouse Gas Initiative (RGGI) in the US's northeast states

addressed an oversupply of allowances in the market by gradually reducing the emissions cap, leading to fewer allowances at a higher price (IETA, 2018).

India presents an interesting case of the application of carbon tax at the point of production rather than at the point of consumption. The country applies a coal cess (tax), described in its NDC as carbon pricing (Republic of India, 2015). At the tax and exchange rates valid in early 2020, this coal tax translated into a carbon price of USD 4-5 per tonne of carbon dioxide (IISD, 2018). The cess is applied on the shipping of domestically produced and imported coal: this cost is passed on to electricity generators as coal consumers, thus sending a "mitigation signal."

Implicit carbon pricing instruments are widely used. Almost all national and subnational governments apply taxes on energy consumption (VAT, excise duty, and other levies) and production (various resource and extraction taxes, royalties, and other fees) which, along with non-tax revenues (dividends from SOEs and other production fees paid by contractors) account for the bulk of the income they generate from fossil fuels (OECD, 2019b).

Fuel excise duties are particularly significant across all countries and are the only specific energy tax in several countries (OECD, 2019b). In Europe, excise duties and other energy taxes are a more significant source of government revenue from energy than VAT (Radov et al., 2018). Fuel excise duties were not originally imposed to reduce GHG emissions, but they do increase the cost of energy and incentivize a more rational use of it, thereby helping to reduce emissions. A more nuanced treatment of electricity taxes is needed, however, as they are most often not differentiated by energy source, which means they sometimes have no effect on decarbonizing the energy system. For example, when taxes are imposed on renewable electricity sources they may increase the costs of electricity that could otherwise have contributed to lower emissions (OECD, 2019b).

Research has recently been undertaken to better understand the combined effect of explicit and implicit carbon pricing in an attempt to inform both climate and energy policy and improve the mitigation signal of both instruments used in combination. The OECD (2019b) defines an effective carbon tax as the sum of the average explicit carbon tax and the average fuel excise tax. In the 44 OECD countries, the effective carbon tax on gasoline was EUR 85.83 per tonne of CO<sub>2</sub>, of which almost all (EUR 84.34 per tonne CO<sub>2</sub>) was due to the fuel excise, and only EUR 1.5 per tonne was due to explicit carbon taxes. For non-road emissions, especially from coal and other solid fuels, the low level or absence of explicit or implicit carbon prices means that effective carbon prices are low. According to the OECD, only four countries (Denmark, the Netherlands, Norway, and Switzerland) taxed non-road energy sources at an effective carbon price of more than EUR 30 per tonne of CO<sub>2</sub> (OECD, 2018a).

The IMF proposed in a policy paper that focusing on the effective carbon price (including explicit carbon pricing and energy taxes) could provide flexibility to governments to price carbon through a variety of instruments and account for changes in energy taxes (IMF, 2019). The paper notes that global average road fuel taxes of USD 1 per litre amounted to an implicit carbon price of USD 380 per tonne of CO<sub>2</sub>. Furthermore, ad-valorem royalty rates on extraction of oil and gas are around 12% and 6% respectively, implying an implicit respective carbon price of USD 33 and USD 10 per tonne CO<sub>2</sub>. Considering the significantly high implicit carbon

prices that result from energy taxes, the IMF projects that by 2030 countries with the highest projected effective carbon rates are not countries that have explicit carbon taxes, but those with higher fuel taxes (such as in the case of certain African countries, which have some of the highest net gasoline taxes in the world) (IMF, 2019). Further, since explicit carbon pricing initiatives do not cover all energy-related emissions from fossil fuels (OECD, 2019b), it is important to take into account both implicit and explicit carbon prices to estimate the 'mitigation signal' sent to market actors.

# 3. Linkages Between Fossil Fuel Subsidies and Carbon Pricing

Explicit and implicit carbon pricing policies currently in place fail to provide a broad-based mitigation signal that is aligned with the goals of the Paris Agreement. If fossil fuel subsidies were considered in effective carbon price estimates, the picture would be even bleaker, as the effective carbon price would be lower than the figures estimated by the OECD (2018a) and IMF (2019).

To achieve the deep cuts necessary to meet the Paris Agreement goals, there is a need to take a more comprehensive look at energy pricing and the various policies that influence it, including both taxation and subsidy regimes. FFSR and carbon pricing (explicit and implicit) are both effective tools to limit climate change, mobilize public finance for fighting the COVID-19 crisis, and generate other benefits, such as reducing health damage from local pollution.

## 3.1 Comparing Fossil Fuel Subsidies and Carbon Pricing

Globally, governments' subsidies to both the production and consumption of fossil fuels amount to between USD 350 and USD 600 billion, depending on fossil fuel prices as explained above. For example, in 2018 these subsidies were at least USD 527 billion: USD 427 billion in consumer subsidies according to the IEA and roughly USD 100 billion in producer subsidies (IEA, 2019; Bast, 2015; Gerasimchuk et al., 2017; Laan, 2010).

To get a sense of scale, global FFS value can be compared to the revenues generated by carbon pricing policies. Global estimates of revenues from implicit and explicit carbon pricing policies are not available, but their size is clearly significant. For instance, a study estimated that national governments in Europe (EU28 and Norway) collected revenues of EUR 475 billion from oil, gas, and coal in 2015 (Radov et al., 2018). Most of these revenues (EUR 257 billion) were from excise duties and other energy taxes. Value added taxes accounted for a further EUR 155 billion.

Explicit carbon price policies alone were estimated to have generated around USD 44 billion in 2018, or roughly one twelfth of the value of fossil fuel subsidies globally (World Bank, 2019). Although global carbon pricing revenues increased by a third from 2017 to 2018 (World Bank, 2019), global fossil fuel consumption subsidies also increased by 34% during the same time period, largely due to rising international oil prices (IEA, 2019).<sup>6</sup>

The figures on explicit carbon pricing cannot, however, be exactly compared to FFS

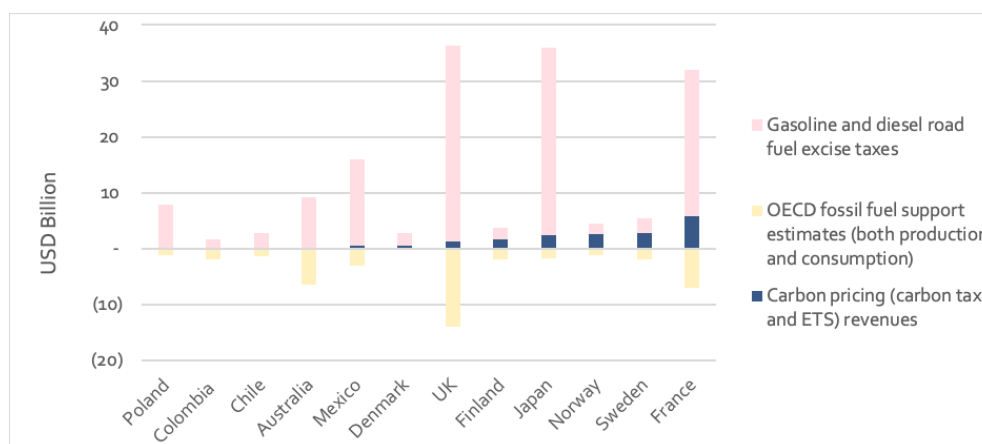
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6. Numerous studies show a high correlation between international oil prices and fossil fuel consumption subsidies, with governments increasing subsidies when oil prices are high to cushion the effects on consumers and engaging in reform when prices are low (for oil-importing countries). Removing dependence on fossil fuels would improve energy security by reducing the potential for oil price volatility to increase prices for consumers and increase pressure for subsidies.

or energy tax revenues, since governments also use ETS to price carbon. While ETSs have the potential to raise revenue through the auctioning of allowances, not all ETSs auction 100% of allowances. As such, the carbon price signal is somewhat more significant than the explicit carbon price revenue figure suggests, meaning that the revenue figures are only a partial representation of the impact of such prices on consumer behaviour. They are still a good estimate for the sake of comparing orders of magnitude, especially considering that ETSs remain fairly marginal among all carbon pricing initiatives, accounting for about 6% of carbon price signals in OECD and G-20 countries (OECD, 2018a).

To grasp the impact of fossil fuel subsidies on the overall mitigation signal and the impact on citizens' and investors' behaviour, it most useful to examine these figures at the national level. Figure 3 shows that the energy pricing landscape in many countries is dictated by overlapping and contradictory signals from each of these policy instruments. In the selection of countries presented below, fuel excise taxes generally account for the largest part of revenues. Carbon pricing (implicit and explicit) is typically greater than fossil fuel subsidies, though subsidies are significant. This is also the case in Indonesia (see Box 3) as well as in European countries. In the latter (EU28 and Norway), oil, gas, and coal are by far net contributors to government revenues. For example, across the 29 countries, governments received EUR 338 billion in revenue from oil in 2015 and paid to the oil sector in return EUR 1.6 billion (Radov et al., 2018).

**Figure 3. Carbon pricing revenues and fossil fuel subsidies in selected economies, USD billion (2017)**



**Source:** Authors' calculations based on FFS and excise taxes by the OECD (2018b, 2019b) and estimates of carbon pricing revenues by Métivier & Postic (2018) and OECD (2019b).

**n.b.** Carbon pricing revenues include only carbon taxes and emission trading schemes. Federal-level subsidy estimates are for Australia only.

What is apparent from the above analysis is that looking solely at carbon pricing

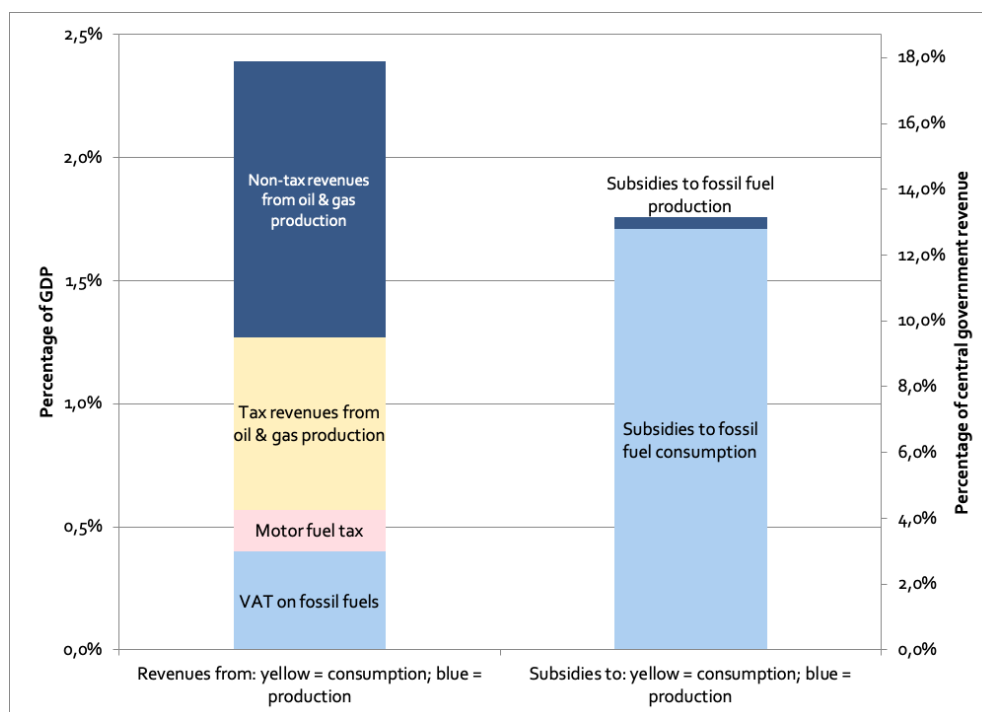
provides just a partial picture. Reforming fossil fuel subsidies and pricing carbon both contribute to the goal of sending a powerful mitigation signal. The effectiveness of carbon pricing can be severely undermined by high levels of fossil fuel subsidies. By combining FFS reform with pricing carbon, countries can reap the most benefits, keeping in mind that, depending on the context, one of these fiscal instruments might have a more or less important role to play. It is only by considering the full suite of taxes and subsidies that a complete picture of the signals being sent to the market can be understood.

### Box 3. Indonesia's Fossil Fuel Subsidies and Revenues

Understanding the relationship between fossil fuel subsidies and taxes requires attention to sectors. Figure 5 illustrates the breakdown of fossil fuel subsidies and government revenues from fossil fuels in Indonesia on average between 2014 to 2016. The government raised revenues from fossil fuel production (both tax and non-tax revenue) more than from fossil fuel consumption (motor fuel tax and VAT). Meanwhile, it subsidized fossil fuel consumption considerably more than fossil fuel production. Overall, total government revenues from fossil fuels (worth 2.4% of GDP or 17% of central government revenue) were only slightly higher than subsidies to fossil fuels (worth 1.8% of GDP or 13% of central government revenue).

Indonesia is by no means unique in both taxing and subsidizing fossil fuel production and consumption, sending a mixed mitigation signal for consumers and producers to align their decisions and investments with Indonesia's NDC target. Recognizing the opportunity cost of fossil fuel subsidies, the government of Indonesia reformed some of its fossil fuel subsidies, including major reforms to gasoline and diesel subsidies in 2014, even though in 2018–2019 the reform efforts started backsliding. In 2017, Indonesia adopted a regulation on Economic Instruments in Environmental Matters that mandates the adoption of a market-based instrument such as carbon pricing to incentivize GHG reductions by 2024 (G20 Peer Review Team, 2019; Kumara, 2017).

**Figure 5. Government revenue and subsidies related to fossil fuels in Indonesia, average for 2014–2016**



**Source:** Braithwaite & Gerasimchuk, 2019.



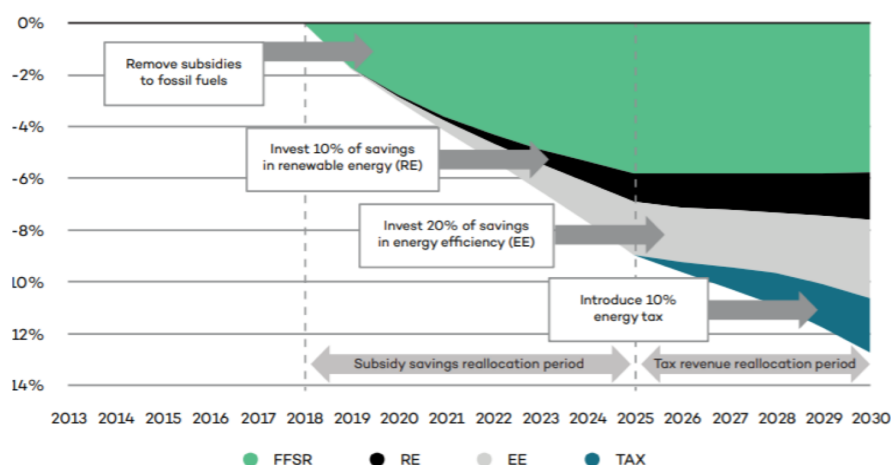
### 3.2 Emission Reduction Potential From Combined Fossil Fuel Subsidy Reform and Carbon Pricing

The potential for carbon pricing to reduce emissions is well documented. For example, Parry et al. (2018) found that a carbon price of EUR 30 (USD 35) per tonne of CO<sub>2</sub><sup>7</sup> would lead to between 6% and 30% emission reductions, and a price of EUR 60 (USD 70) per tonne of CO<sub>2</sub> would lead to between 10% and 40% emission reductions, depending on the country, by 2030. For the G20, a carbon price of USD 35 per tonne of tCO<sub>2</sub> in 2030 would be consistent with the total current emission reduction objectives of NDCs (Parry et al., 2018).

Yet current NDCs do not exhibit the level of ambition needed to limit global warming to 2 °C or less. The High-Level Commission on Carbon Prices indicates that policies need to explicitly price GHG emissions at least in the range of USD 40–80 per tonne of CO<sub>2</sub> by 2020 and USD 50–100 per tonne of CO<sub>2</sub> by 2030 to deliver on the Paris Agreement (CPLC, 2019).

The role of FFS reform in climate mitigation, however, is much less well researched. The IISD-GSI modelled 25 countries and found a simple national average of 6% GHG emission reductions when subsidies to fossil fuels are removed by 2025. This average reduction improved to 13.2% when combined with a modest increase of any energy tax (10%) and a parallel swap of 30% of the savings from FFS reform and revenues from an energy tax into renewables and energy efficiency (GSI, 2019). See Figure 6.<sup>8</sup>

**Figure 6. Average percentage of CO<sub>2</sub>e emission reductions over time from consumer FFSR and 10% extra energy taxation across 25 countries, with 10% of savings and revenues invested in renewable energy and 20% in energy efficiency.**



7. Note that these data are for CO<sub>2</sub> only: emission reductions for other GHGs are not estimated.
8. The GSI-IF (Integrated Fiscal Model) builds on system dynamics models and models GHG emission reduction gains for 26 countries. The 26 countries modelled in the research are: Algeria, Bangladesh, Brazil, China, Egypt, Germany, Ghana, India, Indonesia, Iran, Iraq, Mexico, Morocco, Myanmar, Nigeria, Pakistan, Russia, Saudi Arabia, South Africa, Sri Lanka, Tunisia, United Arab Emirates, the United States, Venezuela, Vietnam, and Zambia. These countries were chosen to provide a globally diverse range of countries with a mix of larger and smaller GDPs where fossil fuel subsidies were found to be significant and where there was interest from the governments themselves in the results.

**Source:** GSI, 2019.

Other research has also demonstrated the potential for FFS reform to contribute to emission reductions. Research by Jewell et al. (2018) uses five models to describe how FFS reform could lead to global reductions of 0.5–2 Gt CO<sub>2</sub>e<sup>9</sup>, or 1%–4%, by 2030. This reduction accounts for around a quarter of the combined effort currently proposed by countries' NDCs from the Paris Agreement of between 4 and 8 Gt. Earlier work on consumer subsidy removal alone found global emission reductions of between 6.4% and 8.2% by 2050 (Burniaux & Chateau, 2014; Schwanitz et al., 2014).

Given the opposite effects of FFS and carbon pricing, it can be useful to convert fossil fuel subsidies into a carbon pricing equivalent to allow comparison in common units. Using data from 25 countries, based on available IEA and IMF consumption subsidy data available for coal, oil, gas, and electricity,<sup>10</sup> IISD/GSI finds that fossil fuel subsidies in 2016 averaged USD 27 per tonne CO<sub>2</sub>e (See Figure 7 and Annex 1). Some countries exhibit a particularly high level of subsidization per tonne CO<sub>2</sub>e (over USD 60 per tonne CO<sub>2</sub>e) such as Venezuela, Iraq, Algeria, and Saudi Arabia, with most countries modelled at over USD 20 in subsidies per tonne CO<sub>2</sub>e.

These figures demonstrate the key role of FFS as an implicit carbon price and call for the calculation of effective carbon prices. "Effective carbon price" reflects the combined effect of carbon taxes, energy taxes and subsidies, and the price of tradable emission permits.

Further research would be worth undertaking to estimate effective carbon prices, including fossil fuel subsidies, energy taxes, and explicit carbon prices at the national level. Such research could inform policy-makers on potential policy incoherencies and pave the way for better coordinating policy choices regarding national carbon pricing initiatives and FFS reform.

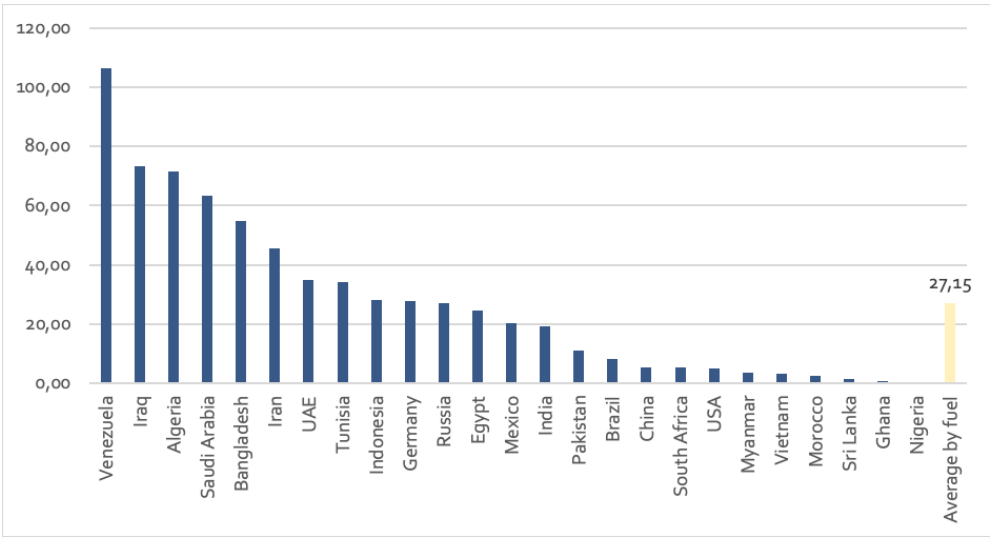
In such efforts, it is important to keep in mind cross-sectoral differences at the national level in the application of energy subsidies and carbon pricing: some sectors (e.g., fossil fuel production) can be subject to high taxes, while others (e.g., residential fossil fuel consumption) can be exempt from them and instead receive subsidies. In the United Kingdom, the average effective carbon price across all sectors and fuels was found to be GBP 80/tonne (USD 103 per tonne) CO<sub>2</sub>e (Vivid Economics & ODI, 2019). However, this average masks important differences between fuels and sectors with natural gas in the residential sector receiving a negative carbon price of GBP -32/tonne CO<sub>2</sub>e (USD 41 per tonne CO<sub>2</sub>e) due to VAT subsidies for natural gas use, while the carbon price for gasoline in transport is the highest, standing at GBP 217/tonne CO<sub>2</sub>e (USD 281 per tonne CO<sub>2</sub>e) (Vivid Economics & ODI, 2019).

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9. Presented on a CO<sub>2</sub>e (CO<sub>2</sub>-equivalent) basis: reductions of non- carbon GHGs are estimated and aggregated as CO<sub>2</sub> equivalents based on their global warming potential.

10. As for electricity taxes, electricity subsidies need to be assessed with more granularity, as they don't all differentiate between different energy sources and their respective carbon content.

**Figure 7. Consumer subsidies per tonne CO<sub>2</sub>e emitted from energy, 25 countries (USD, 2016)**



**Source:** Authors' calculations. Based on IEA and IMF subsidy data and GSI-IF modelling (GSI, 2019).

**n.b.** Further description of the model is available in Annex 1 and GSI, 2019.

## 4. The Need for Communication and Redistribution

In certain cases, attempts to implement FFS reform and carbon pricing have generated protest movements and political opposition, such as Mexico's 2017 *gasolinazos* or France's 2018 *gilets jaune* ("yellow vests") movement (Paullier, 2017; Roth & Gerasimchuk, 2018). Some Canadian provincial governments are also disputing federal legal authority to impose a carbon tax (Lambert, 2019). This resistance indicates that efforts to reduce fossil fuel subsidies and increase the price of carbon can often face considerable opposition and be forced into retreat if important sections of the population are not convinced that reform is good for them or the country.

To counteract these backlashes, governments have to design reforms that, first, have overall positive social and economic impacts, ensuring that vulnerable groups do not suffer unacceptable hardships. Second, they need to create transparency regarding the reforms' objectives and convince people that the reforms will achieve the intended results. These elements are interlinked. On the one hand, responses to specific concerns may include concerted efforts to explain the existing reform policy. On the other, the policy can be changed in response to social concerns.

Communication and complementary policies to protect vulnerable groups are key parts of the process of implementation for both carbon pricing and FFS reform.

Without complementary social policies, reforms can disproportionately impact lower-income households for whom electricity and fuel use represent a higher share of income. Policies that accurately target funds toward vulnerable households in place of blanket energy subsidies can address social concerns at a fraction of the cost (Zinecker et al., 2018).

Even when the overall social and environmental impact of reform is positive, unless people believe this to be the case, reforms may face insurmountable opposition due to misperceptions or a lack of awareness. Communicating the benefits of reform is key to building social acceptance. This means that policy-makers need to both deliver workable social compensation schemes and explain the benefits in terms of pollution reduction, health effects, fiscal stability, and decent green jobs, keeping in mind the importance of the local context. Such communication strategies are essential, and research shows that policy-makers that have engaged the public early on as part of their electoral promises (as in Indonesia or Egypt) have had more success in implementing reforms (Zinecker et al., 2018). Examples of social compensation measures from Indonesia, India, and Ghana are provided in Box 4 below.

#### Box 4. The importance of social compensation measures

In Indonesia, the Jokowi administration removed subsidies to gasoline<sup>11</sup> while a fixed subsidy of IDR 1,000 per litre was introduced for diesel. As a result, the government was able to save USD 15.6 billion (10% of state expenditures in 2015) (Pradiptyo et al, 2016). With FFS reform remaining elusive for the past 40 years, President Jokowi was able to engage in such reforms by reinvesting USD 4.5 billion into infrastructure and social development programs in local villages (airport, railways, social programs, capital injected into small and medium-sized enterprises (SMEs) and state-owned enterprises (SOEs) (Pradiptyo et al, 2016).<sup>12</sup> Another USD 10.1 billion was invested in other human development programs including for education, social security, health, and agriculture (Pradiptyo et al, 2016). The government coupled these measures with a “one fuel price policy” which served as a more targeted subsidy for lower-income households, by ensuring that fuel prices are the same in main cities and in remote areas (Indonesia Investments, 2016). As a result, FFS reform enjoyed strong support from the population and did not lead to a rise in inequality or poverty rates (Zinecker et al, 2018).<sup>13</sup> However, with a rise in oil prices and recent elections in 2018–2019, the government has not continued to adjust the prices for gasoline and diesel regularly to keep pace, thus indirectly allowing subsidies to re-emerge.

Redistribution of both government savings from subsidy reform and revenues from fossil fuel and carbon taxation—either between regions or toward poorer parts of society—is critical to the public acceptance of these measures. For instance, in India, between 2014 and 2017 the government put in place one of the world’s largest cash transfer programs (DBTL, now PAHAL) to redirect liquified petroleum gas (LPG) subsidies and reduce leakages to non-eligible consumers while considerably reducing kerosene subsidies (Adeoti, et al., 2016; IEA 2015b).

In Ghana, a consultative process with various civil society groups was key to avoid indirect price increases in other sectors, while a livelihoods program (LEAP) was also developed to support lower-income families (Lockwood, 2012; Adeoti, et al., 2016 ).

FFS reform, energy taxation, and carbon pricing can be a positive story, since they offer the prospect of generating public funds to fund policies that deliver far more positive impact than fossil fuel subsidies. For carbon pricing, many countries have used revenues from carbon taxes and emission trading auctions to finance such things as clean energy, energy efficiency, and a host of other public investments. Globally, more than 45% of revenues from explicit carbon pricing policies are reinvested in projects dedicated to the low-carbon transition (Métivier & Postic, 2018). For example, Quebec’s cap-and-trade system reinvests its revenues into a Green Fund that is earmarked specifically for environmental projects (with 90% of the proceeds geared toward mitigation measures and 8% for adaptation projects) (Santikarn et al., 2019). Within the mitigation measures that are being financed, two

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11. This was the case except for the distribution costs outside of the islands of Java, Bali, and Madura.

12. Jokowi also benefitted from declining oil prices that cushioned the effects of the reform on consumers.

13. Due to these complementary policies the Gini coefficient is reported to have decreased from 0.34 to 0.32 while poverty and unemployment were also on the decline post-reform.

thirds must be to support sustainable transportation, including public transportation and electric vehicles (Santikarn et al., 2019).

Other jurisdictions direct the carbon revenues to the general budget or to other uses. For example, Sweden uses its carbon tax revenues to lower other income and labour taxes, which reduces both the obligations of employers and the fiscal burden on lower-income households. Switzerland uses carbon tax revenues to lower health insurance premiums for its citizens (Métivier & Postic, 2018). In Sweden, public acceptance for a higher carbon tax was further bolstered by extensive citizen dialogue and others forms of public deliberation (CPLC, 2019; Klenert et al., 2019).<sup>14</sup>

Changing perceptions around FFS reform and carbon pricing through communication campaigns relies on choosing compelling messages and distributing them effectively. Emphasizing how savings and revenues will be used to meet environmental and social goals is key to communicating what can be gained from the reform rather than focusing simply on higher energy costs. Experience shows that communications that make the case in terms of funding a positive future in which social safety nets, public transport, and public health are enhanced are particularly compelling. Communications should explain how reforms are aligned with shared values and notions of fairness. These ideas are quite different from the cost-benefit calculation that forms the basis of economic assessments (Partnership for Market Readiness (PMR), Carbon Pricing Leadership & CPLC, 2018).

The oil price plunge of 2020 presents an opportunity for countries not only to phase out fossil fuel subsidies as discussed earlier, but also to increase taxation of oil consumption. This is exactly the case in India, which in March 2020 raised its excise duty on gasoline and diesel to raise the revenue needed for the response to the COVID-19 crisis as was stressed in communications around this policy change ("Excise duty on fuels," 2020).

As countries develop a vision for exit from the COVID-19 crisis, communications around FFS reform and carbon pricing can be matched with the strong public interest in health benefits such as cleaner air, targeted social safety nets, and creation of resilient jobs in the sectors of the economy linked to renewable energy and energy efficiency. The COVID-19 crisis is a human tragedy, but recovery from it can be an opportunity when people are ready to change and departure from the high-carbon business-as-usual scenario that preceded the crisis. To foster this new shared vision, the governments should engage with stakeholders in the spirit of the Sustainable Development Goals and the Paris Agreement, which offer an agenda of long-term resilience and safe climate trajectories for a post-pandemic world.

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14. Carbon pricing in Sweden was also helped by low levels of corruption and high levels of trust in public institutions. In countries where there is a higher distrust of the government, direct redistribution of carbon pricing or FFSR revenues to citizens through lump sum payments that limit government interference might be a more promising approach to garner support for such measures.

## 5. Conclusion

Progress over FFS reform and implicit and explicit carbon pricing has been slow, but there have been improvements in transparency, reporting, and policy reform. About 50 countries implemented some level of FFS reform between 2015 and 2018.

FFSR, energy taxation and carbon pricing can help governments to cut both emissions and budget deficits precipitated by the COVID-19 crisis. The savings from FFS reform, as well as revenue generated by energy taxation and carbon pricing, can be channelled to rebuild the world after the COVID-19 crisis in a resilient way without locking in more emissions. The record low prices of fossil fuel in 2020 also open a window of opportunity for cutting fossil fuel subsidies and raising taxation of oil consumption without hurting consumers.

These reforms have considerable emissions-savings benefits. In particular, fossil fuel subsidies act as a negative carbon price, reducing the cost of carbon-intensive activities and increasing incentives to produce and consume fossil fuels. Fossil fuel subsidies send a signal to the market that pulls in the opposite direction of carbon pricing. Efforts to reform fossil fuel subsidies, expand carbon pricing mechanisms, and increase energy taxes are all complementary and should be pursued in parallel for four reasons: a) policy coherence and effectiveness; b) opportunity costs and redistribution; c) energy and revenue security and d) policy parity and the polluter-pays principle. Table 1 unpacks out each of these reasons.

**Table 1. Four reasons for considering FFS, energy taxation, and carbon pricing together**

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**Policy coherence and effectiveness:** Governments are currently, on the one hand, incentivizing fossil fuels through subsidies, and, on the other, disincentivizing them via energy taxation and carbon pricing. This creates incoherent and contradictory mitigation signals to producers and consumers. Government policies need consistency in providing rewards, incentives, and disincentives to help change collective behaviour and drive innovation toward a low-carbon economy. Removing government subsidies to fossil fuels and putting an implicit and explicit price on carbon incentivizes consumers and businesses to make choices that mitigate GHG emissions.

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**Opportunity costs and redistribution:** The money governments spend on fossil fuel subsidies can be put to different uses. These savings, as well as revenues from energy taxation and carbon pricing, can be used, in particular, to fund the COVID-19 response and support green economic recovery while accelerating the shift to clean energy. In line with this thinking, in March 2020, some countries (e.g., Nigeria) started discussions about FFS reform, while India raised fuel excise duty with the

same objective of mobilizing revenue for its COVID-19 crisis response.

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**Energy and revenue security:** Fossil fuel subsidies tie countries closely to the fortunes of volatile fossil fuel prices and reduce energy security and stability, both for importers and exporters of fossil fuels. Fossil fuel importers lock in their dependence on foreign energy sources by subsidizing domestic consumption of imported oil, gas, and coal at volatile prices. Conversely, fossil fuel exporters may find it difficult to maintain energy subsidies during periods of low oil prices, which is the case in 2020. By permanently phasing out subsidies and implementing an adequate implicit and explicit carbon price, countries can shield their budgets from the impacts of volatile oil prices. Reinvesting savings and revenues into renewable energy and energy efficiency also boosts energy security.

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**Policy parity and the polluter-pays principle:** Implicit and explicit carbon pricing and fossil fuel subsidy reforms are fair and just because they help hold emitters directly accountable for the external costs that fossil fuel combustion imposes on society ("polluter-pays principle"). Carbon pricing ensures that the societal costs of climate change and air pollution are priced into emitting greenhouse gases in the first place. Fossil fuel subsidies run counter to the equitable logic of having the polluter pay, by financially rewarding socially harmful production and consumption instead of disincentivizing it.

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This paper shows that the price signal sent to the market from fossil fuel subsidies is significant. In absolute terms, fossil fuel subsidies amount to USD 350–USD 600 billion per year, depending on fossil fuel prices. This is an order of magnitude higher than the revenues generated from explicit carbon taxes and trading schemes. Meanwhile, the revenues collected from energy taxes, an implicit carbon pricing mechanism, are larger than either fossil fuel subsidies or explicit carbon pricing and are sending another powerful mitigation signal.

In relative terms, by value per unit of carbon emitted, fossil fuel subsidies are also significant. The modelling presented in this paper shows that fossil fuel subsidies are **equivalent to a negative carbon price of close to USD 27 per tonne** of carbon emitted.

All countries need to carefully examine their fiscal policies and energy pricing regulations with regards to fossil fuels—the subsidies, energy and carbon taxation regimes, and emissions trading schemes—to ensure that the policy choices made do not conflict. The concept of effective carbon prices, promoted by the OECD and the IMF, is a valuable tool to promote an effective carbon mitigation signal to the market and is a step in the right direction. However, without including the impact of

fossil fuel subsidies, these analyses present only a partial picture.

These findings underlie several conclusions and recommendations:

1. For governments, making finance flows consistent with the Paris Agreement targets while mobilizing budget resources for a recovery from the COVID-19 shock and other public causes involves the following progressive stages:
  - a. On the consumption side:
    - i. Phasing out consumer FFS while protecting vulnerable consumer groups and supporting them via targeted measures.
    - ii. Using the low oil price opportunity in 2020 to impose and increase taxes on fossil fuel consumption without hurting consumers. Such measures will ratchet the enabling conditions for clean energy transitions—otherwise low fossil fuel prices could jeopardize the switch to energy efficiency and renewable energy technologies.
    - iii. Further increasing fossil fuel consumption taxes to levels consistent with external social costs such as negative health impacts and climate change while adequately communicating the rationale of such measures and protecting vulnerable consumers.
  - b. On the production side:
    - i. Phasing out producer fossil fuel subsidies and resisting industry pressure to introduce new tax breaks and other subsidies during periods of low fossil fuel prices.
    - ii. Maintaining and, where appropriate, increasing taxes on fossil fuel production that can be used to fund budget deficits and other public needs, including just transition for workers and communities currently dependent on fossil fuels.
2. Governments and international institutions should consider building fossil fuel subsidies into effective carbon pricing calculation methodologies, noting that carbon taxation of certain sectors does not automatically mean that the country does not have fossil fuel subsidies in the same or other sectors, and the overall “mitigation signals” from these policies can be mixed.
3. Governments should facilitate exchange of lessons learned on FFS reform and carbon pricing. In this respect there is a particular role for Nordic countries and the Nordic Council of Ministers, which have been pioneers in the development of carbon pricing, energy taxation, and fossil fuel subsidy reform. The first carbon tax in the world was introduced by Finland in 1990, closely followed by taxes in Norway and Sweden in 1991 and Denmark in 1992 (Kagan, 2020). Nordic taxes for gasoline, diesel, heating oil, and other energy carriers are among the top half of the range within the EU, itself a leader in global terms on implementation of energy taxes (Nordic Council of Ministers, 2014). All four countries are members of the Friends of Fossil Fuel Subsidy Reform, an informal group of non-G20 countries working to build political consensus on the importance of fossil fuel subsidy reform (FFFSR, 2020).

4. The savings and funds mobilized through FFS reform and carbon pricing can serve countries' need to fight the COVID-19 crisis while bolstering public health and social safety nets. In the meantime, governments' stimulus and other measures should shift support and investments from fossil fuels to renewable energy and energy efficiency (i.e., "clean energy subsidy swaps") and ensure just transition for consumers, communities, and workers. The choices governments make in 2020 will lock in high- or low-carbon development patterns for decades to come. If tackled in the spirit of the Sustainable Development Goals and the Paris Agreement, policies and investments put in place today can send long-term signals to investors and other market participants that will secure long-term resilience and safe climate trajectories for a post-pandemic world.

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# Annex

## Annex 1. Subsidies per Tonne of Carbon Emitted From Across 25 Countries (2016)

| Country                | Subsidy per tonne, USD |              |              |              | Average per country |
|------------------------|------------------------|--------------|--------------|--------------|---------------------|
|                        | Coal                   | Electricity  | Gas          | Oil          |                     |
| Venezuela*             | 0.00                   | 133.35       | 123.28       | 169.72       | 106.59              |
| Iraq*                  | 0.00                   | 118.96       | 103.49       | 70.99        | 73.36               |
| Algeria*               | 0.00                   | 85.51        | 61.05        | 139.89       | 71.61               |
| Saudi Arabia*          | 0.00                   | 50.11        | 97.41        | 105.65       | 63.29               |
| Bangladesh*            | 0.00                   | 17.46        | 201.45       | 0.18         | 54.77               |
| Iran*                  | 0.00                   | 39.02        | 66.06        | 77.31        | 45.60               |
| UAE*                   | 0.00                   | 31.54        | 98.25        | 9.87         | 34.92               |
| Tunisia^               | 0.00                   | 137.29       | 0.00         | 0.00         | 34.32               |
| Indonesia*             | 0.00                   | 76.85        | 0.00         | 35.66        | 28.13               |
| Germany                | 108.13                 | 0.00         | 0.40         | 2.07         | 27.65               |
| Russia*                | 0.00                   | 66.60        | 41.58        | 0.00         | 27.05               |
| Egypt*                 | 0.00                   | 41.24        | 7.03         | 49.64        | 24.48               |
| Mexico*                | 0.00                   | 77.73        | 0.00         | 3.63         | 20.34               |
| India*                 | 0.00                   | 4.19         | 45.71        | 27.42        | 19.33               |
| Pakistan*              | 0.00                   | 6.68         | 37.77        | 0.00         | 11.11               |
| Brazil^                | 0.00                   | 32.31        | 0.00         | 0.00         | 8.08                |
| China*                 | 0.00                   | 8.50         | 0.00         | 13.63        | 5.53                |
| South Africa*          | 0.00                   | 21.54        | 0.00         | 0.00         | 5.39                |
| United States^         | 10.69                  | 0.00         | 4.31         | 5.32         | 5.08                |
| Myanmar^               | 0.00                   | 0.00         | 0.00         | 14.97        | 3.74                |
| Vietnam*               | 1.91                   | 0.00         | 11.26        | 0.06         | 3.31                |
| Morocco^               | 0.00                   | 0.00         | 0.00         | 10.51        | 2.63                |
| Sri Lanka*             | 0.00                   | 0.00         | 0.00         | 6.05         | 1.51                |
| Ghana*                 | 0.00                   | 0.00         | 0.00         | 2.92         | 0.73                |
| Nigeria*               | 0.00                   | 0.00         | 0.00         | 0.83         | 0.21                |
| <b>Average by fuel</b> | <b>4.83</b>            | <b>37.95</b> | <b>35.96</b> | <b>29.85</b> | <b>27.15</b>        |

**Note:** \* Indicates subsidy data taken from IEA, 2018b. Subsidy data used from IEA excludes support to renewables and nuclear power. ^ Indicates subsidy data taken from IMF pre-tax subsidy estimates, 2017 (raw data from IMF shared with GSI). Source: GSI, 2019.

**n.b.** "0" indicates no data was available.

The emission factors for all energy sources are obtained from the IPCC (tonnes of CO<sub>2</sub>e, or GHG per terajoule [TJ] of energy consumption). In the case of electricity, emission factors are used for coal, natural gas, and fuel oil. These emission factors are average, and not for a specific technology (e.g., subcritical vs. supercritical coal plant). The total GHG emissions for electricity are estimated using (i) total electricity consumption, (ii) the national energy mix for power generation, and (iii) the emission factor for coal, natural gas, fuel oil (the emission factor for nuclear and renewable energy is assumed to be zero).

As a result, the amount of subsidies per tonne of GHG emissions (USD/tonne GHG) is estimated using (a) model-generated electricity consumption estimates (TJ/year), (b) model-generated emission estimates for power generation (ton GHG/year) and (c) subsidies for power generation (USD/TJ/year).

For the estimation of subsidies per tonne of CO<sub>2</sub> or GHG generated from electricity production, there are a few complications, or caveats to consider: If the subsidy is implemented to reduce the cost of electricity (consumer side) regardless of the energy source used, the estimation of the subsidy per tonne of emissions from electricity generation is misleading. This is because a country may have 80% renewable energy use for power generation, and a high subsidy. The result would be that the subsidy per tonne of CO<sub>2</sub> or GHG emissions is very high. At the same time, subsidy data from the IEA excludes support to renewables and nuclear power. If the subsidy is implemented to favour the use of fossil fuels, it would be required to obtain both the amount of subsidies that target power generation from fossil fuels and the amount of electricity generated from fossil fuels. With this information we can correctly estimate the subsidy per tonne of emissions for electricity generation.

## Annex 2. Fossil Fuel Subsidy Estimate Methodologies

| Method                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEA price gap approach                    | This method consists in identifying the gap between domestic energy prices and an agreed reference international benchmark price (set at import or export parity prices, depending on whether the country is a net fossil fuel importer or exporter). This gap is then multiplied by the amount of energy consumed for each fuel type. Although this approach is useful for cross-country comparisons, it has several caveats such as the non-inclusion of fossil fuel production subsidies and other forms of support to consumers such as direct transfers. The IEA estimates cover developing countries only.                                                                                                                                                                          |
| OECD inventory approach                   | The OECD approach is more encompassing than the IEA approach by including producer support estimates and other non-price support measures. It follows the producer support estimate-consumer support estimate (PSE-CSE) framework that was initially developed for the agricultural sector. The OECD has published these inventories annually since 2011, and FFS estimates are classified based on whether they represent tax revenue that is foregone or direct transfers. The OECD estimates cover the OECD member states and some large non-member emerging economies.                                                                                                                                                                                                                |
| IMF post-tax approach                     | The IMF's post-tax approach is the most encompassing. It has a global scope, but is not updated on annual basis. It includes pre-tax subsidies (combining both the OECD inventory and the IEA's price gap approach) and post-tax subsidies. Post-tax subsidies include negative externalities linked to the consumption of fossil fuels such as air pollution, global warming, or traffic congestion.                                                                                                                                                                                                                                                                                                                                                                                     |
| Sustainable Development Goal (SDG) 12.c.1 | The SDGs include FFSR under Goal 12, ensuring sustainable consumption and production patterns. The goal encourages countries to: "Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist." To this end indicator 12.c.1 accompanies this goal, i.e., for countries to measure the amount of fossil fuel subsidies per unit of GDP (production and consumption)." Guidance to countries as to how to measure subsidies is available from UN Environment (UNE, IISD and OECD, 2019). The approach encourages reporting subsidies via an inventory, bottom-up approach across all fossil |

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fuels including subsidies for both production and consumption. The approach for measuring subsidies to fossil fuels is rooted within the Agreement on Subsidies and Countervailing Measures (ASCM) under the World Trade Organization (WTO), where different "types of subsidies can be identified, ranging from direct transfers of funds and induced transfers to government revenue foregone and transfer of risk."

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