CEP council on economic policies

CHALLENGES AND OPPORTUNITIES FOR THE REFORM OF FOSSIL FUEL TAX EXPENDITURES IN DEVELOPING AND EMERGING ECONOMIES

Tara Laan
Ronald Steenblik

CEP DISCUSSION NOTE
July 2023

AUTHORS

Tara Laan is an energy policy analyst specializing in fossil fuel subsidy reform and taxation. She is a Senior Associate with the International Institute for Sustainable Development (IISD), where she leads their energy taxation program. For over 15 years Tara has led and contributed to projects on energy pricing and reform in Africa, the Americas, Asia, the Pacific, and Europe. Tara was formerly a senior adviser in the Australian Prime Minister's department, leading its international trade policy team. She has also advised Australian federal and state governments on the environment, forestry, and education.

Ronald Steenblik is a Senior Technical Advisor to the Quaker United Nations Office (QUNO) and a Senior Fellow with the International Institute for Sustainable Development (IISD). Until he retired from the Organisation for Economic Co-operation and Development (OECD) in November 2018, Steenblik was the Special Counsellor for Fossil Fuel Subsidy Reform in the OECD's Trade and Agriculture Directorate. In that capacity, he led the OECD's fossil fuel subsidies reform effort, guiding staff working at the nexus of trade and the environment. He also served as Chair of the G20's voluntary peer reviews of inefficient fossil fuel subsidies. In 2006-07, Steenblik served as the first Director of Research for the Global Subsidies Initiative (GSI), a programme developed by the IISD to improve transparency on the size and effects of subsidies, especially those harming developing countries or the environment.

ACKNOWLEDGMENTS

We appreciate the extensive and helpful feedback from Agustin Redonda, Christian von Haldenwang and Flurim Aliu on the paper itself, but also thank Masami Kojima and Doug Koplow for their responses to specific questions. This discussion note was funded by the Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

BACKGROUND

Fossil fuels provide the vast majority of the world's primary energy supply, as well as being the main feedstock for plastics. Most governments subsidize some fossil fuels, whether to increase domestic energy supply, support declining mining regions, or make fuels more affordable for industry, motor vehicles, or households. These subsidies can be problematic because, additional to their intended benefits, they impose large costs on society: directly through impacts on government budgets and indirectly by exacerbating the negative impacts of fossil fuels such as climate change and air pollution.

Estimates of the magnitude of fossil fuel subsidies range from USD 500 billion to USD 700 billion a year, depending on the prevailing price of crude oil. The largest category of subsidies is below-market pricing of fossil fuels, or "consumer price support". The second-largest category is tax subsidies, or "tax expenditures" (TEs) — revenue forgone by governments arising from reductions in, exemptions from, or other deviations from a tax levied on fossil fuels producers or products.

In 2021, global fossil fuel TEs totalled at least USD 150 billion (estimate from 51 economies), targeting all points of the value chain: research, exploration, production, and consumption. Tax expenditures are thought to be more extensively used by OECD countries, which typically have complex tax systems, but they are also employed by many developing and emerging economies. Around one-third (USD 50 billion) of the total USD 150 billion fossil fuel TEs in 2021 was in developing and emerging economies (estimate from 12 large economies). These are likely to be significant underestimates given data are not available for most countries and many TEs remain unquantified, particularly in developing and emerging economies that often have less comprehensive TE reporting. Poor transparency makes it hard to assess the impact of fossil fuel TEs on government budgets, emissions, the energy market, poverty, and inequality.

Commitments to reducing fossil fuel subsidies have been made by numerous international bodies over the past 15 or so years, including the United Nations. Progress on these commitments is hard to assess given low transparency. However, we know that TEs increased dramatically in 2022 in response to the energy crisis. Governments were quick to cut taxes on fossil fuels as a seemingly easy-to-apply crisis response, often without sufficient consideration of the impacts on revenues, emissions, or challenges of returning tax rates to pre-tax levels. At least four developing and emerging economies reduced consumer fuel taxes in 2021 and 2022. Going back to before the energy crisis, we identified five developing and emerging economies that successfully reformed fossil fuel TEs or significantly increased fossil fuel taxes.

Developing and emerging countries stand to gain significantly from the reform of fossil fuel TEs. Reducing or eliminating subsidies can mobilize revenue that can be redirected to boost GDP growth while reducing poverty, inequality, and pollution. Eliminating incentives for fossil fuel production and consumption can also improve energy security by directing investors and consumers away from price-volatile and geopolitically risky fossil fuels and towards renewable energy and electric vehicles.

Support needs to be shifted from fuels to people. The challenge is to find effective ways to deliver social support that does not involve polluting fossil fuels. Developing countries frequently have inadequate welfare and tax systems to deliver alternative forms of support. These governments need to build the required infrastructure — subsidy savings can provide

the necessary funds. Many developing countries also need to improve the social contract between citizens and government, so that citizens — the most vulnerable sectors in particular — can feel confident that they will be supported as energy prices increase and that subsidy savings will be used wisely.

However, the existence of strong social welfare systems is clearly not sufficient. During the 2022 energy crisis, many developed countries with highly functional social welfare infrastructure, developed tax systems, and strong commitments to climate action still reduced taxes on fossil fuels, particularly for transport and home-heating. The reality is that citizens in many countries expect their governments to insulate them from large price shocks.

Breaking the link between social assistance and polluting fossil fuels requires developing the political will to resist calls for energy subsidies, assistance schemes based on targeted cash grants, and a transition to alternative energy sources that are not price volatile and polluting. History has shown that political leaders find it very difficult to resist calls for energy subsidies. Subsidizing the supply of non-fossil energy has therefore been a preferred strategy for many governments. Reform of fossil fuel TEs is difficult but remains critical for the energy transition to remove distortions that favour fossil energy.

On the production side, support needs to be moved from fossil fuels to clean energy. Such reforms face powerful opposition from entrenched fossil fuel interests. Governments need to build understanding in the broader public about the urgent need to stop new fossil fuel investments and the economic benefits of diversification into renewable energy, as well as supporting economic diversification in fossil fuel dependent regions. This will not be easy. But lessons can be drawn from past reform efforts.

Tax cuts for fossil fuels are no longer a reasonable coping mechanism for high energy prices or energy security. Developed countries need to support developing and emerging economies in their efforts to build alternative energy and welfare systems to deliver on climate and development goals.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Fossil fuels[1] have been the driving force of industrialization and unprecedented economic growth since coal started to be mined and used on a large scale in Europe in the late 18th century, and petroleum began to be pumped out of the ground in the late 19th century. In 2021, fossil fuels accounted for 82% of primary energy consumption globally (BP, 2022). Yet the combustion of fossil fuels generates carbon dioxide (CO_2), and its production and distribution both release CO_2 and methane (CH_4), the two leading greenhouse gases in the atmosphere responsible for climate change. Fossil fuel combustion also results in toxic air pollution that affects human and environmental health, with major costs to society and government budgets.

Subsidies, including those provided in the form of tax expenditures (TEs), stimulate production and combustion, thus working against the direction in which most of the world agrees it should be moving: phasing out fossil fuels and adopting clean energy — what is often abbreviated to "the energy transition". Fossil fuel subsidies also distort energy markets, erode government budgets, and are an inefficient means of assisting the poor (OECD & IEA, 2021; Parry et al., 2021).

The 2021-22 energy crisis has caused an uptick in fossil fuel subsidies as governments attempt to secure energy supplies, provide cost-of-living relief for energy consumers, and dampen inflationary pressures. But it has also caused many governments to accelerate their transition away from the price-volatile and geopolitically unstable trade in fossil fuels.

The aim of this report is to assess opportunities and challenges for the reform of fossil fuel subsidies, with a particular focus on TEs supporting the production or consumption of fossil fuels in emerging and developing economies. The analysis was constrained by poor transparency regarding these policies in developing countries. While information is widely available on fossil fuel subsidies and on TEs in general, relatively little data are available on fossil fuel TEs in developing countries and even less on their reform. As a result, this report draws on literature on the reform of fossil fuel subsidies more broadly where there is little information on fossil fuel TEs specifically.

1.1 How fossil fuel subsidies are provided

Fossil fuel subsidies can be provided to producers, consumers, or general services (OECD, n.d.-b). Producer subsidies lower the cost of extracting coal, gas, oil, and peat or increase returns for producers of those commodities. Consumer subsidies lower prices for end users. Publicly funded support for some general services, such as research, geophysical surveys, or infrastructure, creates enabling conditions for the fossil fuel industry.

The World Trade Organization (WTO) Agreement on Subsidies and Countervailing Methods (ASCM) provides a widely recognized definition that is legally binding for all 164 WTO members. It recognizes six means by which subsidies are provided by governments:

(i) by directly transferring funds (e.g., via grants, loans, or equity infusions)
(ii) by accepting liabilities, including those that potentially could lead to the direct transfers of funds (e.g., loan guarantees)

[1] The International Energy Agency (IEA) defines fossil fuels as "Fossil fuels are taken from natural resources which were formed from biomass in the geological past. By extension, the term fossil is also applied to any secondary fuel manufactured from a fossil fuel." (IEA, 2004)

(iii) by foregoing or not collecting revenue that would otherwise be due (e.g., by providing fiscal incentives such as tax credits)
(iv) by providing goods or services other than general infrastructure
(v) by purchasing goods (from a producer)
(vi) by providing income or price support (in the sense of Article XVI of GATT 1994).

The additional qualifier is that "a benefit is thereby conferred." Thus a loan or a loan guarantee does not automatically qualify as a subsidy if it is no more advantageous to the beneficiary than what that beneficiary could obtain in the private credit market. Similarly, it is only a government purchasing goods at an above-market price from a producer that qualifies as a subsidy.

The WTO ASCM definition has been used as the basis for defining fossil fuel subsidies by, among others:

- the OECD (OECD, n.d.-b)
- in reporting on United Nations Sustainable Development Goal Indicator 12.c.1, "Amount of fossil-fuel subsidies (production and consumption) per unit of GDP" (Steenblik et al., 2019) and
- countries producing self-assessments of their fossil fuel subsidies in the G20 (China and the United States, Germany and Mexico; and Indonesia and Italy).

The OECD uses a broader category of "support", which encompasses policies that can induce changes in the relative prices of fossil fuels (OECD, n.d.-b), including import or export duties or quantitative restrictions. Whether the term "subsidy" or "support" is used, the common factor is that the fossil fuel industry or consumers of its products benefit from the action.

1.2 Global estimates of fossil fuel subsidies

In 2021, fossil fuel subsidies totalled an estimated USD 732 billion, up from USD 362 billion in 2020 (OECD & IEA, 2022).[2] Of what is known of government policies relating to fossil fuels, the form of support accounting for the largest subsidies by value stem from government interventions that keep the prices of fossil fuels, and electricity generated by fossil fuels, at below international price parity ("consumer price support"). In the case of petroleum fuel, this price support varies with the international oil price (Figure 1). The second largest category of fossil fuel subsidies globally is TEs and other revenue forgone.

In addition to the WTO subsidy categories, fossil fuel production is also supported through capital investments by state-owned energy companies and investments in mines, wells or refineries by public financial institutions. While the subsidy element of these can be difficult to ascertain, we know that the sums are large. Around USD 257 billion was invested by SOEs in fossil fuel capital in 2019 (Sanchez et al., 2021). A further USD 77 billion on average (from 2016 to 2018) was provided annually in grants, guarantees, and below market rate (i.e., concessional) debt in the G20 countries and the major multilateral development banks they control (Tucker et al., 2020).

[2] The joint OECD and IEA estimate covers only 82 countries (and not all of the countries that may be providing producer support), but it covers most of the largest fossil fuel producers and consumers and is the closest to a global estimate that currently exists.

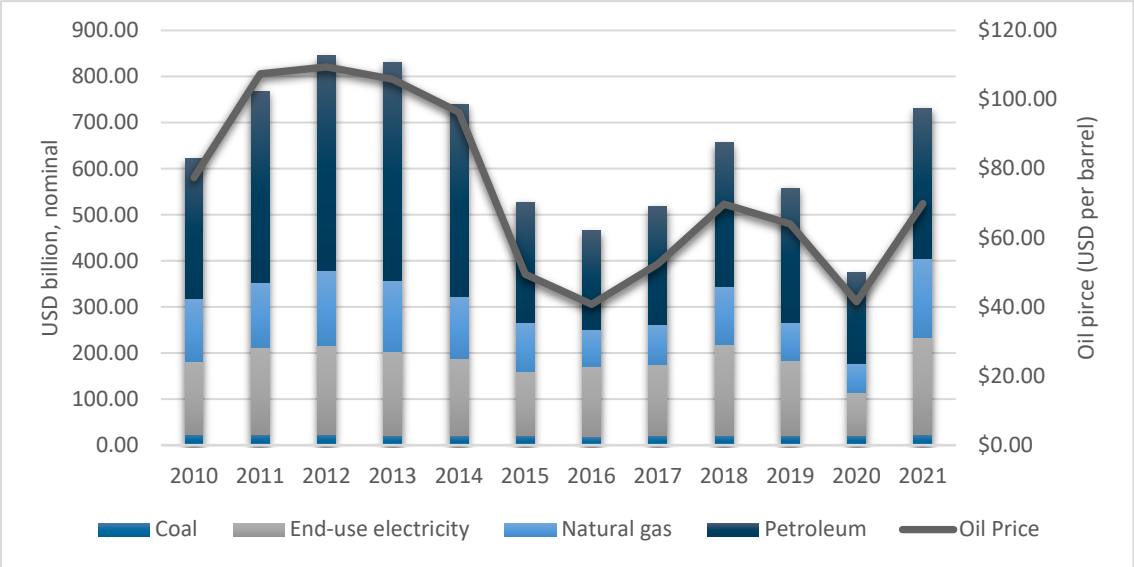

FIGURE 1: GLOBAL FOSSIL FUEL SUBSIDIES

Note: Global estimate for 192 economies available till 2020 with partial coverage of 82 major economies till 2021. Sources: Fossil Fuel Subsidies Tracker, 2022; OPEC, 2022

2 WHAT WE KNOW ABOUT FOSSIL FUEL TAX EXPENDITURES

Tax expenditures are losses in revenue incurred by governments resulting from provisions in the tax code that allow for "a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability" (US Department of Treasury, n.d.).

Tax expenditures are estimated with reference to a benchmark tax level or system. Various approaches of varying levels of difficulty are used to derive estimates of the cost of TEs. The revenue-forgone approach is the most straightforward and the most commonly used in OECD countries (OECD, n.d.-b). Revenue forgone is the difference between the tax revenue raised with and without the tax expenditure, all else being equal.

The revenue-forgone approach is a static measure — i.e., it does not account for behavioural responses related to the removal of the tax expenditure. For example, removing a 10% corporate income tax credit for investment in a particular type of capital equipment leads to an increase in revenue by the amount of the forgone taxes. But if the change results in a reduction in corporate profits, then tax revenues will be lower than that amount. If the lower investment in equipment causes lower production levels, other revenue streams such as royalties might also be affected. Modelling is required to assess influence on investor decisions and supply. However, the revenue-forgone method provides a reasonable and transparent estimate of likely revenues.

Quantified fossil fuel-TEs totalled around USD 153 billion in 2021 in the 51 OECD, G20 and EU Eastern Partnership economies countries covered by the OECD Inventory of Support for Fossil Fuels ("the OECD Inventory") (OECD, 2021). For that year, TEs made up 67% (USD 153 billion) of the USD 226 billion in subsidies reported (OECD, 2021). This was above the average for the previous ten years of USD 136 billion a year. Compared with the global total of estimated fossil fuel subsidies for the 82 countries covered by the OECD-IEA database (which includes large consumer price gap subsidies), TEs make up around 22% of total global subsidies.

Global fossil fuel TEs also roughly follow crude oil prices because many of the measures provide consumer tax reductions during times of high oil prices (Figure 2). In 2020, COVID-19 related lockdowns led to low oil prices and therefore low global subsidy levels. However, this aggregate trend belies the significant level of support that was provided to the energy sector as part of COVID-19 response and recovery plans, with G20 countries allocating at least USD 277 billion in public money to fossil fuel-intensive activities (EPT, 2022). [3] Many of these involved tax reductions for consumers and producers of coal, natural gas and oil (examples from large economies are provided at OECD & IEA, 2021). At least six countries increased excise taxes on fuel and six countries increased carbon taxation to generate revenue during low oil prices. India (Ahmed & Varadhan, 2020) and South Africa (Government of South Africa, 2020) were the only non-OECD countries in this group. Several OECD countries reduced some of their fuel excise duties[4] while two countries (Denmark and Finland) reduced their taxes on electricity to encourage electrification (OECD, 2021).

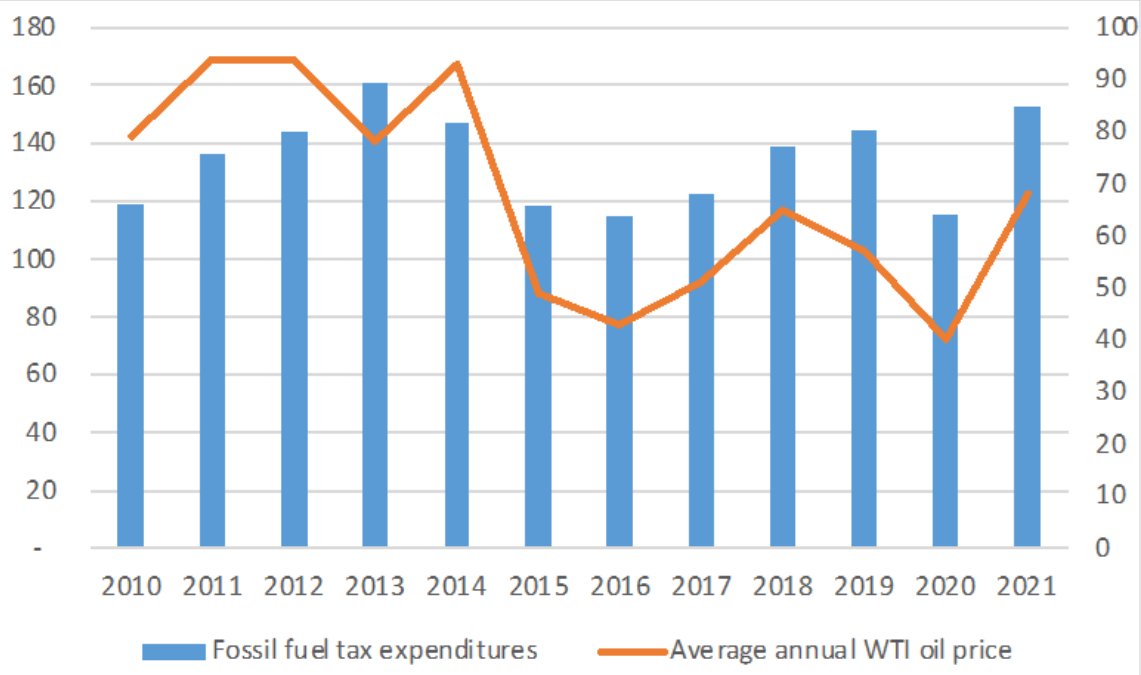

FIGURE 2. QUANTIFIED FOSSIL FUEL TAX EXPENDITURES IN COUNTRIES INCLUDED IN THE OECD INVENTORY OF SUPPORT FOR FOSSIL FUELS

[3] Fossil-fuel intensive sectors is broader than fossil fuel subsidies or even "support", as it includes bailouts to airlines, airports and other industries that depend heavily on fossil fuels.

[4] The Czech Republic, Estonia, Latvia, Sweden, and the United Kingdom.

Source: OECD, 2022

2.1 Fossil fuel tax expenditures in developing and emerging economies

While TEs are thought to be more extensively used by OECD countries, which typically have complex tax systems that have been built upon and modified repeatedly over decades, they are also employed by many developing and emerging economies. The OECD Inventory includes data for 12 non-OECD partner economies (notably members of the Group of 20 countries).[5] Fossil fuel subsidies channelled through TEs for these countries totalled USD 53 billion in 2021 (OECD, 2022). Examining fossil fuel TE data for these countries, we observe that consumer TEs declined from 2015 to 2021, partially following the falling oil price, while producer TEs increased over this period (except for a dip in 2020 presumably due to COVID-19 economic and fiscal impacts) (Figure 2). The increase in producer TEs can largely be explained by Russia, where fossil fuel TEs rose from USD 5 billion in 2010 to USD 29 billion in 2021 (OECD, 2022).

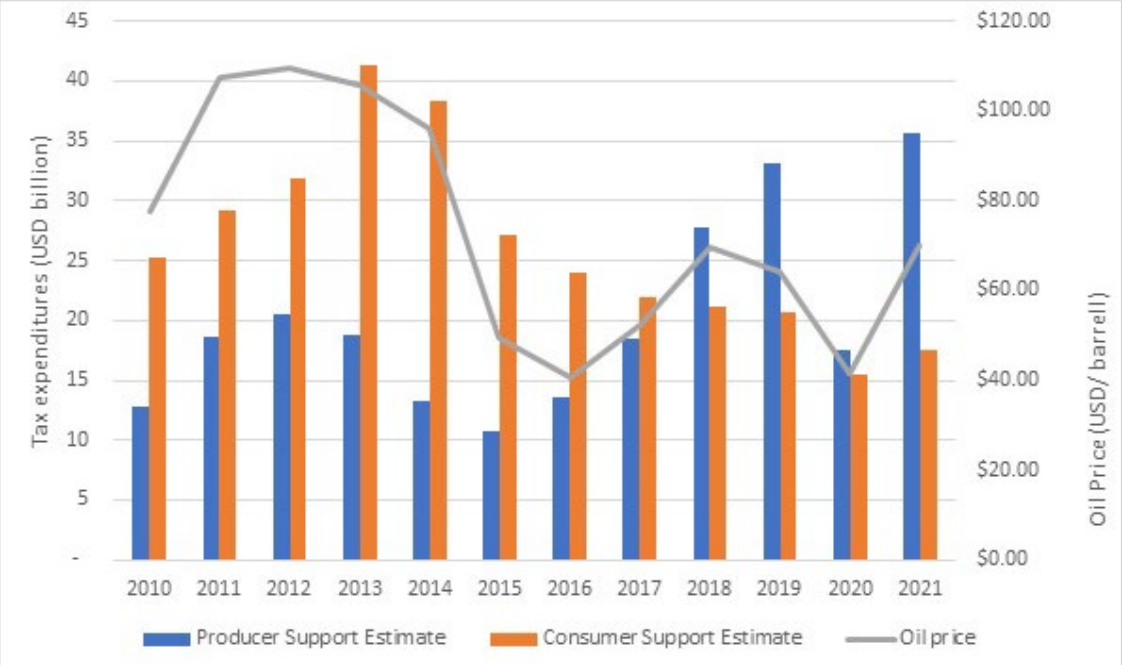

FIGURE 3. FOSSIL FUEL TAX EXPENDITURES FOR 12 NON-OECD COUNTRIES COVERED BY THE OECD INVENTORY OF SUPPORT FOR FOSSIL FUELS

Sources: OECD, 2022, OPEC, 2022

Data are also available from the Global Tax Expenditure Database (GTED).[6] An extract of the database from 39 countries not covered by the OECD identified more than 200 fossil-fuel related TE provisions in these economies, totalling more than USD 6 billion between 2015 and 2020, cumulatively. The measures averaged 0.3% of GDP in each country and as high as 4.9% of GDP in Niger in 2019 (Aliu & Redonda, 2022). See Box 1 for an illustration of data

[5] Non-OECD countries covered by the OECD Inventory, as of December 2022, were Argentina, Armenia, Azerbaijan, Belarus, Brazil, China, Georgia, India, Indonesia, Moldova, Russia, and South Africa.

[6] GTED collates official and publicly available data on TEs; it is led by the Council on Economic Policies (CEP) and the German Institute of Development and Sustainability (IDOS). See Redonda et al., 2022.

availability on fossil fuel TEs in GTED for a selected group of countries (Ethiopia, Côte d'Ivoire, Ghana, Morocco, Senegal, Tunisia, and Togo).

BOX 1: DATA AVAILABILITY AND QUALITY IN SELECTED EMERGING AND DEVELOPING COUNTRIES

This box describes the state of data in the GTED on fossil fuel TEs for a selected group of African countries: Côte d'Ivoire, Ethiopia, Ghana, Morocco, Senegal, Togo and Tunisia.

Reporting on TEs: Within this group, the only country that has not publicly reported on TEs at all (at least since 1990) is Tunisia. The rest have all published some TE information, but with varying levels of cross-year coverage and scope. Morocco has been comprehensively reporting on TEs since 2003. Togo published its first TE report in 2021. Ghana has reported on TEs since 2005 but it only publishes overall estimates of the total revenue forgone from import exemptions and VAT tax refunds. The other countries fall somewhere in-between and report only for a handful of years and mostly provide data that is not as comprehensive as the information published by Morocco but that covers a broader share of TEs than the information provided by Ghana.

Reporting on fossil fuel TEs: Data availability issues become clearer after searching for information on fossil fuel TEs within the TE data published by these countries. Only the Ethiopian, Moroccan, and Senegalese TE reports provide sufficient details that allow us to disentangle the information on fossil fuel TEs from the overall information on TEs. The TE reports from Morocco and earlier TE reports from Senegal provide revenue forgone estimates at the provision-level, while the TE report from Ethiopia only provides aggregated data but includes information on import duty and import VAT exemptions for mineral fuels. Changing reporting structures and methodologies also present a major data availability challenge. Earlier Senegalese TE reports (between 2008-2014), for example, offered provision-level TE data and provided information on specific fossil-fuel TEs. More recent TE reports from Senegal, however, only provide aggregated TE information and do not present any information on fossil fuel TEs. Similarly, the Moroccan TE report, while being the most comprehensive of the group and one of the most comprehensive reports in the developing world, had a major methodological shift in 2019. The new methodology broadened the Moroccan definition of a benchmark TE system and caused a large drop on the total revenue forgone from TEs reported by the country. This makes comparing the data from 2019 and onwards with previous data difficult and makes tracking the cost of Moroccan fossil fuel TEs over time hardly possible.

Cost of fossil fuel TEs: Given the scarcity and non-continuity of the TE information, confidently estimating the cost of fossil fuel TEs in the developing world is a daunting task. Even for the countries with provision-level data (Morocco and Senegal), revenue forgone estimates for many of the reported provisions are missing. Yet, with the available information some lower-bound estimates for the countries with available data can be computed.

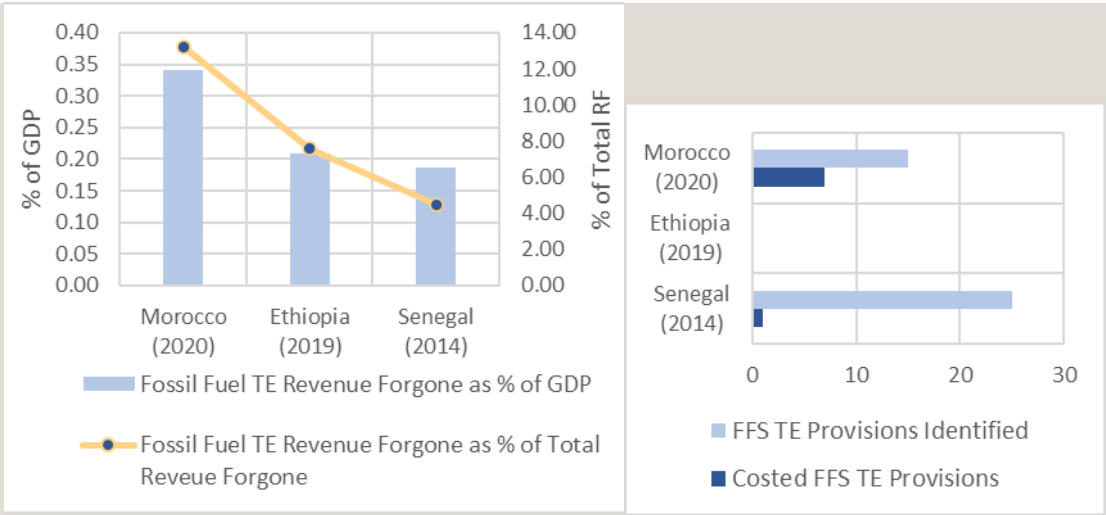

FIGURE 4: NUMBER OF PROVISIONS AND REVENUE FORGONE ON FOSSIL FUEL TES IN LATEST AVAILABLE YEAR

Source: GTED

2.2 International efforts to improve transparency

The reported numbers in the OECD Inventory and the GTED are likely to be significant underestimates. The largest economies are included, but the country coverage is incomplete, and many subsidies remain unquantified. Of the 947 fossil fuel TEs identified in the latest version of the OECD Inventory, 80% were quantifiable (OECD, 2022). Around 70% of the fossil fuel TEs provisions in the GTED had been quantified. Both databases are biased towards countries with relatively good reporting of TEs.

In addition to the OECD Inventory and the GTED, several other initiatives and processes are in place to improve the reporting of TEs. The OECD & IEA together report on recent developments in fossil fuel subsidy reforms in the G20, including the G20 fossil fuel subsidy peer review processes, as well as recent reforms of support measures globally (OECD & IEA, 2021).

The UN Sustainable Development Goals (SDGs) include a target to "Rationalize inefficient fossil-fuel subsidies …" and an associated indicator to measure progress against the target, SDG 12.c.1: "Amount of fossil fuel subsidies per unit of GDP (production and consumption)."[7] The first deadline to report under this indicator was 31 March 2022. Twenty-two countries (plus the UK territory of Guernsey) had responded as of early November 2022. Actual data were only reported by five countries, while others said that they do not have the capacity to report or want to first observe other countries' submissions before they submit. Sources of data on TEs at the national level are outlined in Table 1.

[7] UN General Assembly Resolution A/RES/71/313.

TABLE 1. SOURCES OF DATA ON FOSSIL FUEL TAX EXPENDITURES AT THE NATIONAL LEVEL

Source of information	Details
Annual fiscal budgets: national and sub-national	Forgone revenue from large TEs are sometimes included in budget reporting, even in the absence of a TE report. Where such data is published at the national level, it is incorporated in the Global Tax Expenditures Database (Redonda, von Haldenwang, & Aliu, 2022).
Tax expenditure statements: national and sub-national	These are the mostly likely source of data but are rarely comprehensive, sometimes only covering expenditures above a threshold amount.
State-owned enterprises	Annual reports may contain data on taxation paid and tax reductions claimed. Several TE subsidies in India have been quantified using SOE data, for example (Aggarwal et al., 2022).
G20 self-assessments	Countries are encouraged to produce self-assessments of their fossil fuel subsidies in the G20 (OECD & IEA, 2021).
G20 voluntary, reciprocal peer reviews	G20 countries have developed and implemented a framework for voluntary, reciprocal peer reviews of inefficient fossil-fuel support "as a valuable means of enhanced transparency and accountability" (G20, 2013). As of 2021, peer review panels had evaluated over 140 government support measures across six OECD and emerging economies, allowing assessment of challenges and good practice in reform (OECD & IEA, 2021). Additional countries have undertaken similar peer reviews through the Asia-Pacific Economic Cooperation (APEC) forum: Chinese Taipei (2017), Peru (2015), the Philippines (2016) and New Zealand (2015) (OECD & IEA, 2021).
Multilateral organisations and development banks	Detailed data is available at the national level from the OECD, IMF (including Article IV country reports) and The World Bank Energy Subsidy Reform Assessment Framework.
NGOs	Many national and international NGOs report on fossil fuel TEs in their focus countries including the Australia Institute (Armistead et al., 2022), Earth Track (Earth Track, 2022), Investigate Europe (Investigate Europe, 2022), The Global Subsidies Initiative (*Global Subsidies Initiative*, 2022), Oil Change International (Oil Change International, 2021), Greenpeace (Greenpeace, n.d.), Climate Action Tracker (Climate Action Tracker, n.d.), the Overseas Development Institute (ODI, n.d.) and Stockholm Environment Institute (Erickson & Lazarus, 2015).

3 FOSSIL FUEL-RELATED TAX EXPENDITURES AND THEIR BENEFICIARIES

As noted in Section 1.1, fossil fuel TEs can be categorised depending on which part of the value chain they affect: production of fossil fuels; consumption of fossil fuels (as inputs to production or final consumption) or support for general services.

3.1 Production

Fossil fuel producer TEs confer a benefit by reducing the costs of supply or increasing the rates of return. In theory, TEs are considered when a producer bids on the profits they will share with the government, or pay to it, or the rate of royalty they will be willing to pay. If this were the case, then forgone revenue from TEs would be compensated for—to some extent—by higher rents to government (G20, 2017; Government of Mexico, 2016). However, bidders rarely have perfect information about how the tax regime will affect their investments and returns in fossil-fuel exploration, development, and exploitation at the time that they bid. In addition, the number of bidders may not be sufficiently numerous to ensure competition or there may be collusion between bidders that affect bids.

In practice, information on the value of resources and the effects of TEs is unlikely to be sufficiently symmetrical to allow producers to accurately account of the value of TEs in their bids. Moreover, some hydrocarbon tax regimes are explicitly designed to encourage new exploration and development by tying tax breaks to such investments, thereby deliberately lowering capital costs in the investment phase of the project. As a result, tax breaks to producers have the effect of lowering end-user prices (by reducing production costs) or lead to increased investment in fossil fuels due to higher profitability (Achakulwisut et al., 2021; Erickson et al., 2017; Erickson & Lazarus, 2015) (also see Section 4.1.3).

Common forms of fossil fuel production tax incentives include (OECD, n.d.-a):

- Corporate income tax deductions for exploration and development expenses, including carry forward of expenses or losses, with the objective of allowing companies to recoup up-front investments before paying tax.
- Investment tax credits (deductions of a certain percentage of investment costs from gross revenue or income).
- Tax deductions on capital equipment, such as accelerated tax depreciation allowances, and exemptions or reductions on import duties or sales taxes.
- Preferential treatment of capital-gains in corporate income tax.
- Credits for exploration or R&D.

Less visible forms of TEs include special treatment of income from state-owned enterprises, tax exemptions for bonds, tax relief for industry sinking funds (money set aside for future large outlays such as remediation), and generous provisions around the use of foreign tax credits *(OECD, n.d.-b).*

Tax expenditure features may be found in other specialised fiscal instruments that apply to the fossil fuel sector such as royalties and resource-rent taxes. For example, royalty exemptions can act in a similar way to tax breaks, allowing companies to recoup investments in exploration and capital expenditures before they pay full royalties. The deductions can be generous. In four Canadian provinces, for example, royalty exemptions amounted to CAD 768 million (around USD 600 million) in FY 2021-22 (McKenzie et al., 2022).

3.2 Consumption

3.2.1 Inputs to production

Fossil fuels are commonly used as inputs to primary industries, manufacturing, services, or other forms of energy (e.g., electricity generation). Governments often provide tax reductions for these inputs as means to lower costs for producers. Common TEs on fossil inputs to production include:

- Excise-tax exemptions for fossil fuels for own use — e.g., fuels used in coal mining, oil extraction, or refining petroleum or natural gas.
- Low tax rates for diesel for specific sectors, especially farming, fishing, mining, the military, and public transport.
- Low tax rates for diesel across the economy on the assumption it is primarily used as an input for primary production and freight.

Tax reductions applying to inputs are sometimes provided to improve the efficiency of the tax system. Sales taxes are designed to tax the end unit of production. Exempting such taxes on inputs is therefore a feature of the tax system, not necessarily an exemption. Excise taxes, on the other hand, intentionally raise the price of an item either because it is harmful to society or because revenues can be raised easily and relatively efficiently on its consumption (OECD, 2013). Therefore, exempting excise taxes on inputs makes less sense from a double-taxation perspective: emissions are caused by the combustion of the fuel, regardless of the stage of production (OECD, 2013). In addition, excise-tax exemptions or reductions on fossil inputs are often applied selectively, with specific sectors benefiting while the same fuels are often taxed when used by other industry sectors for their production process (OECD, 2013).

3.2.2 Final consumption

Consumer TEs lower the end-user prices of fossil fuels either through general exemptions or reduced rates across the economy or targeting specific groups. Targeted subsidies might single out specific groups of consumers, tax bases, fuels or uses of fuels (OECD, 2013). Similar to tax exemptions as an input to production, many take the form of reductions in or exemptions from excise or sales taxes on transport fuels or coal. Common tax breaks for fossil fuels include (OECD, 2013):

- the exemption of aviation fuel from excise taxes (particularly fuel used in international flights);
- lower excise tax rates for “clean” fuels such as compressed natural gas (CNG) or liquefied petroleum gas (LPG) or biofuel blends;
- automatic or ad hoc tax cuts when fuel prices rise;
- tax exemptions for fuel used by the public sector and affiliated bodies.

3.3 General services

Tax expenditures for general services includes deductions for activities that benefit the fossil fuel sector, or a specific fuel type, as a whole and does not increase current production or consumption of fossil fuels. For example, Turkey allows 100% of expenses realized under R&D projects to be deducted from the taxable income, a provision that benefits the coal sector (OECD, 2022). Mexico has two TEs for general services in the fossil fuel sector, which provide tax incentives for:

- investments in treatment, refineries, commercialization, transport and storage of oil, gas and petrochemicals;
- scientific and technological research for the exploration, exploitation and refining of hydrocarbons, as well as the production of basic petrochemicals (OECD, 2022).

4 WHY GOVERNMENTS PROVIDE FOSSIL FUEL TAX EXPENDITURES AND WHY IT MATTERS

On the production side, governments provide TEs to stimulate hydrocarbon development. There are five main reasons they may seek to promote domestic oil, natural gas, and coal production (the first is specific to energy while the remaining four apply to most investment incentives):

- increase energy supply, energy security, and potentially reduce energy prices;
- stimulate employment and regional economic development;
- increase exports;
- promote innovation in the extractive industries;
- help establish a domestic industry that, as a second-order effect, can generate national income and government revenue (fossil fuels—particularly oil and gas—as high-rent products are capable of generating significant revenue).

Historically, there has been considerable risk involved in fossil fuel production due to uncertainty about the extent and quality of the fossil fuel resources, as well as prices (OECD, 2013). Exacerbating this risk is the need for significant up-front investment in exploration, mining or drilling rig equipment, transport infrastructure, refineries, liquification facilities for liquified natural gas, and export infrastructure such as ports. Governments have sought to reduce these risks and capital intensity partly through the tax system. Tax exemptions and deductions aim to reduce up-front costs and allow companies to recoup investments over time *(OECD, n.d.-b)*.

However, advances in technology and high commodity prices have significantly changed the risk–reward balance for many hydrocarbon investments. And costs of production can be significantly lower than market returns when the discovered resources are abundant and of high quality, and prices are high. Production has the potential to generate super-normal profits. Tax incentives and insufficient resource rent taxation can result in the public receiving low returns (in the form of government revenue) from exploitation of public resources, particularly in light of the negative environmental impacts of fossil fuels.

On the consumer side, the rationale for TEs is generally to lower energy costs for consumers, such as when taxes on fuel are lowered during times of high energy prices or to reduce input costs to specific sectors, or targeting vulnerable groups of citizens. Exemptions from excise taxes are an administratively simple means of providing industrial support for traditionally subsidized sectors, such as agriculture and marine capture fishing. Another reason cited for excise exemptions for specific sectors is that off-road diesel users should not have to pay excise tax, which in some countries is hypothecated to fund highway infrastructure. However, in most countries excise is simply a means to raise general revenue, with no link or hypothecation from fuel taxes to road building or repair. In addition, the complete

exemption from excise taxes in many countries results in tax cuts over and above a reasonable road user charge (OECD, n.d.-a).

4.1 Why does it matter?

Fossil fuel TEs are problematic for at least four reasons. They can:

1. erode government revenues
2. exacerbate the negative impacts of fossil fuels
3. distort energy markets
4. are not an effective way to help the poor

These effects are briefly discussed below.

4.1.1 Erode revenue

All TEs erode government revenue, but the full extent of revenue loss is frequently not known. This is because most governments do not quantify all their TEs or publish sufficient information to allow independent researchers to do so, even in countries with relatively transparent budget processes. These reports typically cover corporate and personal income taxes. Fewer cover sales taxes (VAT) and very few estimate excise tax exemptions (OECD, 2013). Reporting at the sub-national level is similarly variable. Analysis of the GTED reveals that only 47% of all countries have TE reports, which drops to 36% for non-OECD countries.

Few countries include detailed figures in their published tax expenditure estimates relating specifically to the production or consumption of fossil fuels. They are rarely included in country budgetary frameworks, which means they are less subject to oversight, and not reviewed annually in budget processes. In addition, there are rarely limits on TEs (e.g., if fishers receive a diesel fuel rebate, they can claim it on any diesel consumed, without a cap).

Even where there is explicit government reporting of fossil fuel subsidies and estimates by independent organisations, not all expenditures are estimated. For example, in Canada, the federal government reports on fossil fuel subsidies as part of its budget process and produces a TE report, of which only around 50% of the 128 active TE and revenue subsidy programs identified are quantified (Laan & Corkal, 2020).

Developing economies are particularly vulnerable to revenue loss because they often do not have a strong income tax base and rely heavily on consumer transport fuel taxes and resource rents, if available (Bacon, 2001; Elgouacem et al., 2020; IMF et al., 2011). For example, at 13% of GDP, Cote d'Ivoire's tax revenue is below average levels in sub-Saharan, low income developing countries in Africa, and emerging markets (IMF, 2022). The low tax revenue is due to extensive tax exemptions for key industries, low levels of indirect taxation, and non-compliance (IMF, 2022). Against this backdrop, Cote d'Ivoire applies a reduced VAT rate for petroleum products: 9% compared to a standard rate of 18% (IMF, 2022). This represents a lost opportunity to generate revenue from fuels and is inconsistent with the economic rationale of levying taxes on products that have high social costs and strong revenue-raising potential.

4.1.2 Exacerbate negative impacts of fossil fuels

Tax expenditures encourage greater production and consumption of fossil fuels than would otherwise be the case, worsening negative effects of their extraction and combustion. Two of the leading impacts are on climate change and air pollution.

Fossil fuels are the largest contributor to climate change, accounting for over 75% of global greenhouse gas emissions and nearly 90% of all CO_2 emissions (United Nations, n.d.). Anthropogenic air pollution overwhelmingly derives from energy production and use, mainly the combustion of fossil fuels and biomass.

The 2015 Paris Agreement undertakes to hold "the increase in the global average temperature to well below 2°C … and to pursue efforts to limit the temperature increase to 1.5°C" (UNFCCC, 2015). A 50% chance of meeting the 1.5°C target requires all countries to cease coal production by 2040 (Calverley & Anderson, 2022) and that no new oil and gas fields are developed (Kursk et al., 2022). Tax incentives that encourage investment in or consumption of fossil fuels are therefore inconsistent with achieving the Paris targets.

Toxic air pollutants from fossil fuel production and combustion include sulphur oxides (SO_X), nitrogen oxides (NO_X), particulate matter (PM), carbon monoxide (CO), volatile organic compounds (VOCs), ground-level ozone, and heavy metals (IEA, 2016). In 2018, particulate matter alone from fossil fuels combustion was responsible for an estimated 10 million premature deaths worldwide (about 1 in 5) (Vohra et al., 2021).

Developing and emerging economies are at the greatest risk from air pollution and climate change. The greatest mortality impact from air pollution is estimated in regions with substantial fossil fuel related concentrations of PM2.5 in the atmosphere, notably China (with 3.9 million premature deaths: 21.5% of total deaths in 2012) and India (2.5 million premature deaths in total, and 30% of deaths in India among people over age 14) (Vohra et al., 2021).

Countries with lower GDP per capita are at greater risk of suffering losses and damage as a result of climate change, based on a study of 173 countries (Bharadwaj et al., 2020) [8] The 46 least developed countries had the highest risk of damage, with Burundi, Somalia and Mozambique at greatest risk (Bharadwaj et al., 2020). Low-income countries are the least responsible for causing climate change, increasing the responsibility of wealthy countries and large emerging economies to reduce their emissions, including by reforming TEs for fossil fuels. In November 2022, the 27th Conference of the Parties (COP27) of the United Nations Framework Convention on Climate Change (UNFCCC) agreed to establish new funding arrangements for assisting developing countries that are particularly vulnerable to the adverse effects of climate change, in responding to loss and damage. Funding for such a mechanism could be raised through eliminating domestic TEs and increasing fossil fuel taxation.

Fossil fuel production can also cause land and water degradation, such as from opencast coal mining, oil spills, and fugitive methane emissions. Under-pricing transport fuels (e.g. through tax reductions) has been demonstrated to increase the amount people drive, with measurable impacts on congestion and traffic accidents (Burke & Nishitateno, 2015; T. Zhang & Burke, 2020).

4.1.3 Distort energy markets

Producer TEs can increase the amount of fossil fuels produced or, for firms with marginally profitable production, be instrumental in determining whether a firm continues producing at all (Achakulwisut et al., 2021; Erickson et al., 2017). Producer subsidies often target new

[8] The study considered a range of vulnerability factors including their institutions, levels of poverty, prevalence of disease, gender equality, natural hazards and the state of infrastructure.

capital investment rather than ongoing production. Lowering up-front cash flow requirements makes investment more appealing, inducing fossil fuel producers to spend more on new production capital than would otherwise be the case, locking in future production. By making fossil fuel investments more attractive, funds are also diverted away from alternatives including renewable energy.

On the consumption side, TEs distort markets by lowering prices for consumers. Lower prices reduce incentives for energy efficiency or switching to alternative energy sources. When tax reductions favour a specific fuel, it causes distortions within the domestic economy but also often trade. The policy of applying lower taxes on diesel than on gasoline has the distortionary effect — sometimes unintended, but sometimes intended — of encouraging private vehicle owners to buy diesel vehicles, resulting in more pollution given that diesel contains approximately 18% more carbon per litre than petrol and generates higher levels of particulate emissions than gasoline (OECD, 2014).

Several tools are available for assessing the distorting impact of TEs on fossil fuel production and consumption, such as effective marginal tax rates, effective average tax rates, optimal extraction models, and modelling behavioural responses of end-user industries and the public to government support measures — see Box 1 and (Elgouacem, 2020).

4.1.4 Not an effective way to help the poor

Many studies have demonstrated that the wealthy use more energy than the poor, and universal consumer fuel subsidies are mostly captured by the rich (ADB, 2015; Coady, 2015; del Granado et al., 2012; Jain et al., 2014). The incidence of subsidies varies among fuels, with gasoline and diesel subsidies for private vehicles the most regressive in lower income countries because the poor rarely own private vehicles (although impacts of removing them on public transport and inflation can be deleterious for the poor). Kerosene and LPG are more frequently used by the poor but their subsidies can still be captured more by the wealthy. This can result either because subsidized prices are still too high for the very poor or because rural households cannot afford the cost or time required to travel to access subsidized fuels and instead use biomass.

The incidence of fuel subsidies is demonstrated well by a study in Ghana that found that almost 78% of fuel subsidies benefited the wealthiest group, with less than 3% of subsidy benefits reaching the poorest quintile (Cooke et al., 2016). The results for individual fuels showed that the poorest quintile received only 0.1% of gasoline subsidies, while the richest quintile received 96%. The poor received 11% of the benefits of the kerosene subsidy, but the richest quintile still received more than three times that (Cooke et al., 2016).

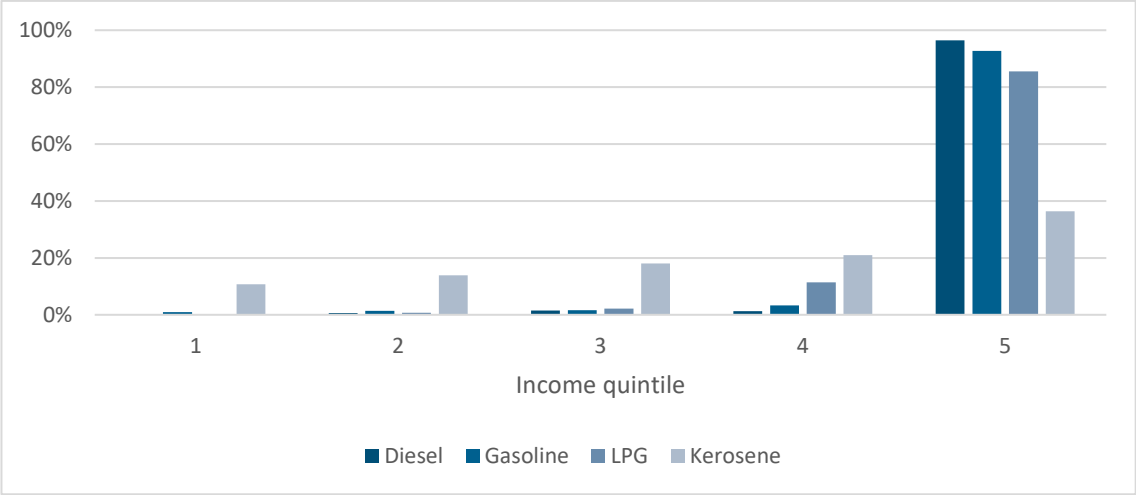

FIGURE 5. BENEFIT INCIDENCE OF FUEL SUBSIDIES ACCRUING TO EACH INCOME QUINTILE IN GHANA, 2008 (IN %)

Source: Authors' chart using results from (Cooke et al., 2016), which was based on 2008 data from the Ghana Living Standards Survey.

Similar results have been observed in other developing countries. For example:

- In Indonesia, the richest 10% were found to have consumed 40% of subsidized gasoline, whereas the poorest 10% consumed less than 1% (World Bank, 2011).
- A study of the Indian state of Jharkhand found that the top 40% of households received 54% of LPG subsidy benefits, and the bottom 20% received 27%, with some poor households receiving less than half the subsidy benefits as better-off consumers (Sharma et al., 2021).
- In Ethiopia, fuel taxes were found to be progressive if imposed on fuels used mostly by the relatively wealthy, such as fuel for private and public transport, rather than those used more by the poor, such as kerosene and butane in urban areas (Mekonnen et al., 2013).

In general, however, the poor spend a higher proportion of their income on energy, so they will often be affected more by subsidy reform (Coady, 2015; del Granado et al., 2012). An IMF study from 2012 found that a USD 0.25 per liter increase in gasoline resulted in in a 5.9% decline in household real incomes in twenty developing countries with indirect impacts (e.g., inflationary impacts on food, and public transport) accounted for over half of the total impact on incomes (del Granado et al., 2012). Reform strategies can reduce these effects by re-directing funds from fuel subsidies directly to the poor, such as through cash transfers. If transfers are not administratively feasible, targeting the energy subsidy to the poor (rather than providing universal subsidies) can result in substantial savings (Sharma et al., 2021).

5 STATUS OF REFORM EFFORTS FOR FOSSIL-FUEL RELATED TAX EXPENDITURES

Most of the world's major economies, as members of the G20 or APEC, have agreed to phase out inefficient fossil fuel subsidies.[9] G7 members have set a deadline for such phase-out by the end of 2025. At the UNFCCC's COP26[10] in 2021, and again at COP27 in 2022, almost 200 countries agreed to accelerate efforts to phase out inefficient fossil fuel subsidies (United Nations, 2021 and 2022). And at the WTO's 12th Ministerial Conference, in June 2022, 47 Members of the World Trade Organization pledged to begin discussing options for supporting fossil fuel subsidy reform efforts within that body.

Some progress has been made. Between 2015 and 2020, at least 53 countries implemented fossil fuel consumer subsidy reform: 34 removed price support subsidies, 14 reformed TEs or increased fossil fuel taxes, and 7 removed price supports and increased taxes (Sanchez et al., 2020). The majority of these (33) were developing or emerging economies.

However, overall progress on reform has been slow. Reforms often occur during times of low oil prices, with subsidies returning when prices rise. Also, frequent reform events do not necessarily translate to drops in total subsidy numbers. For example, from 2003 to 2015, gasoline taxes rose in 83 economies but fell in 46 economies. During the same period, the global mean gasoline tax fell by 13% due to faster consumption growth in countries with lower taxes (Ross et al., 2017). Hence reforms that affect small total amounts of subsidies will be outstripped by ongoing or new subsidies in rich and populous countries.

The year 2022 has witnessed a major backsliding on fossil fuel TEs. Against a backdrop of rising energy demand and tightening supply in the post-COVID-19 economic recovery, Russia's invasion of Ukraine triggered a global energy crisis (OECD & IEA, 2022). Sanctions, supply disruptions and uncertainty led to record-high international prices for coal (Robertson, 2022) and liquefied natural gas (Rashad, 2022) and near-record oil prices (Egan, 2022).

Many governments cut excise taxes on transport fuels, or lowered VAT rates and import duties on transport fuels, coal, natural gas, or electricity to shield consumers and dampen inflation (Table 2). Governments were quick to use TEs on fossil fuels as a seemingly easy-to-apply crisis response, often without sufficient consideration of the impacts on revenues, emissions, or challenges of returning tax rates to pre-tax levels. Governments also put in place policies to address the causes of the energy crisis in the longer-term, including diversifying fossil fuel supplies and adopting policies to improve energy efficiency and accelerate the uptake of renewable energy (IEA, 2022).

[9] United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP)

[10] "Inefficiency" has not been defined.

TABLE 2. COUNTRIES USING TAX REDUCTIONS TO CONTROL ENERGY PRICES DURING THE 2021 TO 2022 ENERGY CRISIS

Tax expenditure policy	Country
Reduced energy taxes (excise, VAT, carbon taxes) on gasoline, LPG, natural gas, electricity	Austria[1], Australia[2], Belgium[1], Bulgaria[1], Croatia[1], Cyprus[1], Czech Republic[1], Denmark[1], Estonia[1], Finland[1], France[1], Germany[1], Greece[1], Guyana[3], Hungary[1], India[4], Ireland[1], Italy[1], Japan[8], Korea[8], Latvia[1], Luxembourg[1], Netherlands[1], New Zealand[8], Norway[1], North Macedonia[5], Poland[1], Portugal[1], Romania[1], Serbia[6], Slovakia[1], Slovenia[1], South Africa[7], Spain[1], Sweden[1], UK[1], US (individual states[8]), Vietnam[9]
Import tariffs removal	China[10]
Deferral of producer coal taxes	China[11]

Sources: [1]. (Sgaravatti et al., 2021), [2]. (Australian Government, 2022), [3]. (Loop News, 2022), [4]. (Vengattil, 2022). [5]. (Trkanjec, 2022), [6]. (Urosevic, 2022), [7]. (Naidoo, 2022), [8]. (Climate Action Tracker, 2022), [9]. (Bloomberg Tax, 2022), [10]. (Pande & Raj, 2022), [11]. (Z. Zhang, 2021)

We found no evidence of new fossil fuel producer tax incentives being introduced in 2022, presumably because the industry was reaping windfall profits and did not need incentives to invest in new production. On the contrary, many governments increased taxation on production — not necessarily through TE reform — in order to capture more of the windfall profits being generated by fossil fuel producers.

TABLE 3. COUNTRIES USING TAX INCREASES ON PRODUCERS DURING THE 2021 TO 2022 ENERGY CRISIS

Measure	Country
Surcharge on corporate incomes tax for the extractive sector	Colombia[1]
Windfall profits taxes	Belgium[3], Bulgaria[3], Czech Republic[3], Germany[3], Hungary[3], Greece[3], India[2], Italy[3], Netherlands[3], Poland[3], Portugal[3], Romania[3], Spain[3], UK[3]
Export tax	India[2]

Sources: [1]. (Reuters, 2022a), [2]. (Reuters, 2022b).

5.1 Recent reforms of fossil fuel tax expenditures

There are some positive examples of TEs for fossil fuels being reformed in the recent past and from before the COVID-19 and energy crises.

Fuel tax cuts put in place early in 2022 are starting to be removed. In Australia, fuel excise was halved in April 2022 for a period of six months, with an estimated reduction in receipts of AUD 5.6 billion (Australian Government, 2022). Despite oil prices remaining at an average of USD 88 per barrel (bbl)[11], the excise was returned to its previous level on 28 September 2022. However, in many other economies, the tax cuts persist (Sgaravatti et al., 2021).

[11] Average for September crude oil, average spot price of Brent, Dubai and West Texas Intermediate, equally weighted

Canada is making progress in its G7, G20 and APEC commitments to phase out fossil fuel subsidies. The federal government has eliminated or is in the process of phasing out eight tax measures (OECD & IEA, 2021). The Government of Canada claims that there is only one remaining TE at the federal level that provides a preference to the fossil fuel sector without an end date in view. However, analysis by non-government organisations suggest that there remain a number of measures that have not yet been phased out (Corkal, 2021).

There are several examples of the reform of fossil fuel TEs from before the COVID-19 and 2021-2022 energy crisis, two of which were emerging economies.

- In 2020, Indonesia removed coal from the list of goods exempted from VAT and therefore 10% VAT will be payable on domestic coal sales (Prawira & Richardson, 2020). The new tax imposition will not affect coal export activities, as export sales are subject to 0% VAT. Indonesia has also announced a carbon tax on coal, which was planned to be implemented in mid-2022 but is on hold due to the energy crisis.
- Austria, Greece, Mexico, the Netherlands, and Spain had or introduced fuel tax concessions for diesel fuel for use in agricultural machinery in the mid to late 2000s, but were no longer offering them in 2018. The Slovak Republic had also stopped, but in 2019 reintroduced agricultural fuel tax concessions (OECD, 2020). The Netherlands maintains a reduced energy tax rate for natural gas used for heating greenhouses.
- From 1 January 2022, South Africa increased its carbon tax rate by ZAR 144 (about USD 9) per tonne of CO_2, with annual increases thereafter to reach at least USD 30 by 2030 (Steenkamp, 2022). However, the first phase of the tax, which provides exemptions of up to 100% for many key sectors, was extended from end-2022 to end-2025.

Some countries also increased fossil fuel taxes, not necessarily reducing TEs. It is beyond the scope of this report to cover all tax increases in recent years but three examples from developing and emerging economies show important trends in fiscal strategies.

- Over the period 2010-14, India reduced its price subsidies on gasoline and diesel (which had been funded through budgetary transfers to cover losses by state-owned oil companies), and then gradually increased excise taxes and VAT on fuel, delivering significant revenue for the state (Aggarwal et al., 2022). From 1 April 2020 to 31 March 2021, excise taxes and VAT on gasoline and diesel generated revenue of USD 60 billion — 15% of all state and central government revenue (Aggarwal et al., 2022). In recent years, India has used a flexible approach to setting excise tax rates and VAT, increasing rates in response to low international prices and reducing them when prices are high (Ahmed & Varadhan, 2020; Vengattil, 2022).
- From 2018 to 2020, the Philippines increased fossil fuel taxes accompanied by cash transfers assessments (Government of the Philippines, 2022). A study of the distributional impacts found that the cash transfers (assuming 100% coverage for those targeted by the subsidies) offset the increase in poverty incidence caused by higher energy prices for some but not all sectors (Castillo et al, 2018).
- Saudi Arabia, which has some of the cheapest transport fuels in the world (GlobalPetrolPrices.com, 2022) introduced a 5% VAT on all goods including transport fuels in 2018, which was increased to 15% in 2020 (Kingdom of Saudi Arabia, 2020).

6 POTENTIAL IMPACTS OF REFORMS

Fossil fuels production and consumption is deeply integrated in all economies. Any change in support that substantially affects their price or supply can have far-reaching effects, ranging from gender impacts at the household level—in the case of LPG for cooking (Chowdhury et al., 2020)—to inflation, international competitiveness of carbon-intensive companies, or efforts to address climate change (Beaton et al., 2013). Not all subsidy reforms will have significant impacts, however. A review of subsidy reforms carried out by the IMF a decade ago, for example, found that significant economic or social disruption occurred in only 10 of 22 cases (Clements et al., 2013).

In this section, we focus on five major impacts of the reform of fossil fuel TEs:

1. government revenue;
2. GDP growth;
3. GHG emissions;
4. poverty and inequality;
5. energy security.

We prioritise the impacts of reform of consumer tax cuts, given the surge in this kind of TE during the energy crisis. But we also examine the reform of tax incentives to producers in relation to emissions and energy security.

6.1 Revenue

Removing TEs boosts government revenues. Kuehl et al. (2021) estimate that the elimination of consumer fossil fuel subsidies, including TEs, in 32 countries (including 22 developing and emerging economies)[12] would result in cumulative fiscal savings of USD 2.99 trillion by 2030 compared with a business-as-usual scenario.[13] The actual amount of revenue that can be generated from subsidy elimination will depend on behavioural changes and interactions that can occur during reform.

How revenues are reallocated is critical to the impacts of reform. Modelling has consistently demonstrated that when subsidy savings are reallocated to productive uses in the economy or as cash transfers to citizens, the negative impacts of higher energy prices are usually offset or reversed. The following sections explore these effects.

Tax expenditure reforms can cause impacts that cross national boundaries. Gars et al. (2022) found that the EU cuts to fuel VAT[14] increased Russia's oil profits by around EUR 3.1 billion a year, equivalent to 0.2% of Russia's GDP. This is because consumer tax reductions increase

[12] The 32 countries accounted for 77% of global CO2 emissions, and 72% of both global GDP and population. They were Algeria, Argentina, Australia, Bangladesh, Brazil, Canada, China, Egypt, Ethiopia, Germany, Ghana, India, Indonesia, Iran, Iraq, Japan, Mexico, Morocco, Myanmar, Nigeria, Pakistan, Russia, Saudi Arabia, South Africa, Sri Lanka, Tunisia, United Arab Emirates (UAE), the United States, Venezuela, Vietnam, the Netherlands, and Zambia.

[13] The estimate is based on total subsidies in 2018 of USD 321 billion for the 32 countries analysed, forecasted energy consumption, and the assumption that subsidy provided per unit of energy consumed remained constant in the future.

[14] The tax cut was modelled as an EU-wide tax cut of EUR 0.20 l, which was based on a weighted average of announced tax cuts in EU countries (equivalent to roughly 10% of the price) and the assumption that all countries cut the taxes to the EU's minimum level.

demand, which results in an increase in the underlying oil price, which in turn results in increased profits for oil producers. They found that a cash transfer to households, with the same fiscal cost as the tax cut, would reduce these side effects to a fraction (Gars et al., 2022). Tax increases in one country can also negatively impact producers in a second country. For example, removing a tax exemption on coal imports might reduce volumes imported, reducing incomes in the exporting country (depending on access to international markets). Such impacts need to be considered, particularly if low-income exporters could suffer large losses in export revenue that could affect development outcomes.

Subsidy reform and carbon pricing can work together to generate significant revenue while ensuring that final prices better reflect social costs. The OECD estimated the revenue benefits of fossil fuel subsidy reform and increasing taxation to a benchmark level equivalent to a modest carbon price (EUR 30/tCO2 for all fossil fuels) for 15 developing economies in 2018. They found that:

- in Côte d'Ivoire, fuel taxation generated the equivalent of 1.2% of GDP in 2018, which could be increased by 0.4% of GDP if taxes were raised to the benchmark level (no fuel or electricity subsidies were identified);
- in Ghana, removing subsidies (equivalent to 0.1% GDP) and lifting taxes to the benchmark rate was estimated to raise an additional 0.3% of GDP in revenue;
- in Morocco, reforming fuel and electricity subsidies (1.1% of GDP) and raising taxes to the benchmark could increase revenue by a total of 1.7% of GDP.

6.2 GDP

Several studies have examined the effect of eliminating fossil fuel subsidies on global GDP (Table 4). We are aware of no studies that specifically examine the effect of fossil fuel TE reform on global or national GDP.

Table 4. Summary of modelling results for the impact of fossil fuel subsidy reform on global GDP growth.

Study	Impact on GDP Growth
Delpiazzo et al., 2015	0.2% higher in 2030
Bosello and Standardi, 2013	0.13% lower in 2050
Burniaux 2011, 2014	0.3% higher in 2050
Burniaux, 2009	0.1% higher in 2050
OECD 2000	0.1% higher in 2010

At the national level, impacts on GDP will depend on country circumstances. Most studies report that subsidy reform has small negative, neutral, or positive impacts on national economic growth. As discussed in the section on revenue, redistribution schemes appear to play a role in determining the macroeconomic impact of a rise in energy prices. Two developing country examples are discussed below.

- In Indonesia, a simulated phase out of all fossil fuel subsidies between 2012-2020 indicated that Indonesia stood to experience GDP gains of between 0.4% and 0.7% of GDP in 2020. The results depended on how revenues were recycled, with direct payments on a per household basis resulting in the largest gains (Durand-Lasserve et al., 2015).

- A study of fossil fuel subsidies reform in India, Indonesia and Thailand using a long-term model, yielded small impacts on GDP, which were positive when governments reinvested subsidy savings back into their economies (Asian Development Bank, 2016).

Local and regional economic impacts on fossil fuel dependent regions could be more severe. Vulnerability will be determined by the level of economic diversification, human capital, institutions, and governance (Peszko et al., 2020). Such factors influence an economy's capacity to commence alternative economic activities and attract investment (Peszko et al., 2020). Just transitions strategies — potentially drawing on subsidy savings — can address local employment, retraining, and economic diversification associated with concentrated local impacts of fossil fuel phase-out (Gass & Echeverría, 2017).

6.3 GHG emissions

Reform of fossil fuel TEs would reduce GHG emissions in two ways. First, removal of consumer subsidies would increase prices, reducing demand and therefore emissions. Second, removal of producer subsidies would reduce supply, pushing up prices but also reducing investment in new fossil fuel production infrastructure.

Kuehl et al. (2021) found that removing fossil fuel consumer subsidies, including TEs, in 32 countries[15] would result in cumulative GHG emissions reductions of 5.46 gigatonnes (Gt) of CO2 equivalent by 2030, equivalent to around 10% of projected global emissions at the time.

Jewell et al. (2018) estimated that the removal of all global fossil fuel subsidies would result in a reduction of 0.5-2.2 Gt CO2 a year by 2030, compared with a business-as-usual scenario, equivalent to a 1-5% reduction. While this might seem slight, it is roughly equivalent to one quarter of the energy-related emission reductions pledged by all countries under the Paris Agreement (4-8 Gt CO2). A subsequent study (Erickson et al., 2020) found that these estimates did not sufficiently account for the impact of removing producer subsidies. As an illustration of this effect, they modelled the reduction of one common producer tax subsidy in large economies, accelerated depreciation allowances, and found that its elimination could result in a reduction of 0.2 to 0.3 Gt CO2 in 2030. This is a 0.5% reduction in 2030 emissions, which is large for a reform of a single subsidy policy.[16]

6.4 Poverty and inequality

As noted in Section 4.1.4, many studies have demonstrated that untargeted consumer fuel subsidies mostly benefit the rich. Removing such subsidies and redistributing the savings can therefore have positive impacts on poverty and inequality (ADB, 2015; Chateau et al., 2018; Durand-Lasserve et al., 2015; Mackie & Haščič, 2019; Pradiptyo et al., 2016; Rentschler & Bazilian, 2017).

A study of energy-policy interventions enacted in response to the COVID-19 economic crisis found that contextual factors, policy design, household income status, and complementary policies were critical in determining the impact of energy policies on poverty and inequality (Dufour et al., 2022). For example, in low-income countries, transport fuels are sparingly used directly by the poor but higher fuel prices can have significant indirect inflationary effects on public transport prices or food (energy is an important input throughout the food supply chain). Reforms that take this into account and provide cash transfers to the poor will have

[15] The 32 countries accounted for 77% of global CO2 emissions, and 72% of both global GDP and population.

[16] Compared with expected emissions of ~58 GT CO2e in 2030 (UNEP, 2022).

very different impacts to reforms that do not. Two developing country examples are discussed below.

- In Ghana, one study projected that the removal of fuel subsidies without compensation would increase national poverty by 1.5 percentage points, with 395,180 people pushed into poverty (Cooke et al., 2016). However, expanding Ghana's cash transfer programme, Livelihood Empowerment Against Poverty (LEAP), to the 500,000 poorest households was projected to reverse this impact and result in a net reduction in national poverty of 2.3%. The cost of the projected cash transfers was 0.13% of GDP, only a small fraction of the saved fuel subsidy costs of 3.2% GDP. The expansion of LEAP also reduced national inequality levels (Cooke et al., 2016).
- An evaluation of Morocco's 2014 fuel subsidy reforms found that impacts on the poor were minimised by prioritising the reform of subsidies that mostly benefit the wealthy (Verme & El-Massnaoui, 2015). Subsidies were eliminated for gasoline, reduced gradually for diesel, and reduced for large consumers of electricity, while subsidies were maintained for LPG, small-scale consumers of electricity, and some food items. The reforms saved the government around MAD 5.5 billion (USD 0.5 billion), with the richest quintile contributing the most (52.6%) and the poorest quintile contributing only 3.7% (Verme & El-Massnaoui, 2015). Compensatory cash transfers were not provided despite important indirect impacts from diesel price reform on the poor, partly because the government lacked capacity at the time to deliver targeted transfers.

Many countries lack adequate welfare systems to reach all affected individuals (Perry, 2020), with errors of inclusion and exclusion common. Also, alternative energy sources might not be available to allow consumers to maintain essential energy use without paying the higher fossil fuel prices or switching to biomass, with associated health impacts. Sudden fuel price increases without adequate compensation can cause great hardship but the impacts depend on domestic patterns of use.

A succession of fuel price rises over the past two decades reveal that very few countries resist subsidizing consumer fuels when prices rise steeply. Fuel subsidies have generally been highest in low- or mid-income hydrocarbon producer countries that use cheap fuel as a way to deliver social assistance in the absence of welfare restructure. But even countries with good social infrastructure subsidized consumer fuels in 2022 (Table 2). This reflects a common societal view that energy is a fundamental need that needs to be kept affordable, through government intervention if necessary. Intervention to ease cost-of-living pressures is understandable but would ideally be provided in ways that do not promote polluting fossil fuels or distort energy markets.

6.5 Energy security

The 2021-22 energy crisis has resulted in a major shift in motivation for the energy transition. Previously emissions reductions were the main driver. Now, energy security has become the motivator for the energy transition, such that the energy crisis could mark a turning point in the transition towards a cleaner, more affordable and secure energy system (IEA, 2022).

Fossil fuel TEs work against energy security objectives by deepening dependence on volatile and geopolitically risky fossil fuels rather than enabling the transition to relatively stable-priced renewable energy coupled with electric vehicles or other clean transport options and high standards of building insulation. Removing fossil fuel TEs on production and

consumption will decrease supply and increase prices, encouraging consumers and investors to use more clean energy (renewables, electric vehicles and other low-emission technologies). It also levels the playing field so that renewables can better compete. Renewable energy tends to be more price stable and provides a long-term alternative to price-volatile and geopolitically risky fossil fuels.

As stated by IEA Executive Director Fatih Birol (OECD & IEA, 2022):

> "Fossil fuel subsidies are a roadblock to a more sustainable future, but the difficulty that governments face in removing them is underscored at times of high and volatile fuel prices. A surge in investment in clean energy technologies and infrastructure is the only lasting solution to today's global energy crisis and the best way to reduce the exposure of consumers to high fuel costs."

For countries that have not yet developed their renewable energy potential, fossil fuel proponents might argue that reducing TEs for production could result in lower domestic fossil fuel production, potentially reducing energy security. However, not all reforms will have this effect. In the United States, one analysis suggests that 12 tax subsidies worth USD 41 billion a year to fossil fuel producers would have a very small impact on production, and therefore their removal will not materially increase retail fuel prices, reduce employment, or weaken U.S. energy security (Aldy, 2013). Extending such assessments to other countries would be helpful. Also, energy security is not just about supplies, but ability to pay for fuel. If TEs reduce government revenue, that effect can also make a country more vulnerable.

7 POLITICAL ECONOMY

Fossil fuel subsidy reforms often do not succeed because of a failure to understand and overcome political barriers (Victor, 2009). Tax breaks can be deeply entrenched, and their persistence have little relationship with the logic of their original objective or whether those objectives are being met. Vested interests and investments can solidify around the policy, with recipients working to maintain their financial benefits regardless of the impact on general welfare (Inchauste & Victor, 2017). Government leaders willingly oblige, as the tax breaks help them stay in power by channelling resources to the groups that support them, such as by voting or by donating to their political campaigns (Urpelainen & Yang, 2019; Victor, 2009). Unlike budgetary transfers, TEs are often less visible and their full cost is hidden from public scrutiny, making the relationship between public funds and political patronage more difficult to detect. Even where governments do not face elections, they fear instability and believe that providing highly visible resources at low prices can reduce the likelihood of unrest (Victor, 2009). Once such policies are in place they can be hard to remove. Reforming tax policy, like subsidies more generally, therefore requires a political economy perspective to overcome the resistance from these rent-dependent actors (Corral-Montoya et al., 2022).

7.1 Diffuse and concentrated benefits

Understanding the political economy of a specific tax expenditure reform requires analysis of the size and allocation of costs and benefits of the existing system, which can be concentrated or diffuse (Inchauste & Victor, 2017).

Concentrated benefits arise from tax cuts for specific industries or parts of the fossil fuel production chain. Fossil fuel producers, as recipients of concentrated benefits, use their close links to governments, political donations, and lobbying to retain concentrated benefits (Victor, 2009). Fossil fuel industries can play a large role in some economies and be significant employers, with labour unions and dependent regional communities being concentrated recipients of subsidies and powerful political forces against reform (Urpelainen & Yang, 2019).

Diffuse benefits arise from lower fuel taxes available to all citizens. Citizens benefiting from low taxes on fuels, particularly in non-democratic settings, are generally not organised into formal groups and therefore often resort to protests to maintain low fuel prices. Between 2005 and 2018, 41 countries had at least one riot directly associated with fuel pricing or availability, including changes in tax rates (McCulloch et al., 2022). The externalised costs of under-priced fossil fuels — such as poor air quality and climate change — are also typically diffuse.

Reform strategies need to be tailored to how concentrated (or diffused) costs and benefits are. As Inchauste & Victor (2017) state:

1. When benefits are concentrated, satisfying or isolating interest groups with alternative policies is an important condition for effective reform.
2. When benefits are diffuse, it can be much harder to identify and manage the political coalition needed for reform.

Mitigating resistance from special interest groups requires that the group reduces its opposition or that they become a lower political threat. A sustainable reform would ideally address both conditions by:

- A government providing special interest groups with alternative benefits that meet their interests, such as through just transitions strategies and economic diversification, thereby undermining the advocacy coalitions opposing phase-out (McDowall, 2022).
- Dispersed interests that benefit from reform developing the desire and capacity to mobilize in their own collective interests and become a louder voice for change.
- Special interests having reduced influence, such as through a change of government to one that is less reliant on the given interest group for political support.
- A governments facing fiscal stringency or another crisis pursuing rapid reform despite opposition (Inchauste et al., 2016).

7.2 Providing a credible alternative

Reforming universal consumer tax subsidies risks incurring widespread opposition unless the recipients — and policymakers with the power to change them — can see and appreciate the longer-term benefits. Numerous studies have shown that the so-called "political discount rate" is typically shorter than that for society as a whole because most politicians are primarily concerned that the perceived benefits for the majority of their voting constituents exceed their costs of a policy change, within the relatively short timeframe of the next election cycle (Seelkopf and Hakelberg, 2021).

Inchauste & Victor (2017) state that "… the central task for reformers is to make a credible offer to the public that the removal of visible benefits will deliver new yet currently invisible gains". Targeting these new programmes only to the poor would have the biggest impact in

reducing poverty and inequality but is unlikely to work politically. Middle and upper classes benefit the most in absolute terms from universal fuel subsidies, therefore these groups might also need to be compensated to some extent to gain their support, particularly given that these income groups are more politically connected and vocal. Fairness in the distributional effects of the policy has been called the most important determinant of the success of energy taxation reforms (Malerba et al., 2022). Reformers need to ensure the promise is credible and communicate the benefits to the public to build support (Inchauste & Victor, 2017).

The significant revenue that can be generated from TE reform can be enlisted to deliver benefits to affected parties and build coalitions willing to support reform (or at least not oppose it) (Inchauste & Victor, 2017). This can ease concerns of political leaders fearing a backlash. Governments vary in their administrative and political capacity to deliver alternative benefits. Cheap fuel is relatively more simple to provide than a social protection system that provides targeted direct transfers (Victor, 2009). Countries with poor social welfare infrastructure are doubly disadvantaged in their efforts to remove consumer subsidies: 1) they need to develop new systems to deliver benefits to affected individuals and 2) the government is likely to lack credibility in its intention or capacity to provide an alternative to the fuel subsidy because it has not done so before. Improvements in social protection systems are often critical to the success of reforms to facilitate targeting assistance to those most in need or most likely to oppose reforms (Inchauste & Victor, 2017).

7.3 Leadership

Political leadership is crucial for the successful reforms of subsidies. Politicians find it harder to undertake reform if their leadership position is weak (McCulloch, 2017). Successful reforms, therefore, tend to take place (Inchauste & Victor, 2017):

- During times of crisis: a crisis can radically increase the credibility of reformers: there are no other options and the leader seems like a problem solver rather than an incumbent clinging to power.
- When political capital is high,[17] such as newly elected governments or those with a mandate for economic reform.
- When the government has a reform strategy that minimizes the political resources needed while maximizing the degree of reform (see following section).
- Power imbalances also occur between national governments and multilateral bodies. Fossil fuel subsidy reform is sometimes a condition in IMF and World Bank structural adjustment programs (Jakob, 2019). For the citizens receiving the subsidies and the government benefiting from the associated political patronage, the reforms can be seen as economically, politically and socially dangerous austerity measures imposed by wealthy countries (Perry, 2020).

[17] For example, powerful leaders in Indonesia have been able to make politically unpopular subsidy reforms, but when their position is insecure, the country's leaders are less willing to make changes to fuel subsidies that are politically popular but fiscally expensive (McCulloch, 2017).

8 PRINCIPLES FOR REFORM OF FOSSIL FUEL TAX EXPENDITURES

There is a growing body of literature on principles for the reform of fossil fuel subsidies that is applicable to the reform of TEs related to fossil fuel production or consumption. The key lessons from this literature are synthesized briefly below.

8.1 Increase transparency

Regardless of any decision to reform, fossil fuel TEs should be reported on systematically and comprehensively including their fiscal impacts and policy objectives (Redonda et al., 2019; Redonda, von Haldenwang, & Steenblik, 2022). Transparency is an important element of good governance for measures involving public money. Quantification is not a prerequisite to reform but can provide critical information regarding the costs, benefits and impacts of policies (Steenblik et al., 2019).

Reporting can be done through annual budget TE reports or in regular spending reviews. For example, several OECD governments have used reviews to enhance budget efficiency and ensure expenditures effectively align with government policy and fiscal objectives (OECD & IEA, 2021). The EU annual reports since 2020 have monitored Member States' progress towards phasing out fossil fuel subsidies, including those provided via TEs (Ferdinandusse et al., 2022).

8.2 Develop a comprehensive reform strategy

A comprehensive reform plan will increase the likelihood of lasting change (Beaton et al., 2013; Clements et al., 2013). Not all elements of the reform strategy outlined below will be needed for the reform of all subsidies — some governments have successfully eliminated fossil fuel TEs without a comprehensive plan. But a carefully developed and well-informed plan with clear long-term objectives will increase the chances of success and reduce the chances of unintended or unwanted consequences. For example, EU Member States are required to produce plans for national policies, timelines and measures to phase out their fossil fuel subsidies, including many that take the form of TEs (European Commission, 2021).

Indonesia successfully employed reform strategies when reducing fuel subsidies in 2005, 2008 and 2015 (Beaton et al., 2013). The strategies included a communication campaign, consultation with parliament, cash transfers for the poor and near-poor, increased funding for infrastructure, and low-interest loans for small businesses (ADB, 2015). Together these policies reduced political opposition and protests. Fuel subsidies decreased but only temporarily because retail prices did not remain linked to world market prices.

8.2.1 Assess the impacts of the policy and its reform

A careful assessment is needed of the impacts of each TE and its reform on consumers, poverty and inequality, industry, exports, government revenue, and jobs. Household surveys can be useful to assess energy use, expenditure, and attitudes. Modelling might be necessary to assess potentially complex interactions, particularly for TEs benefitting producers. A decision can then be taken about reforming the policy.

8.2.2 Consultation

Effective reform plans and lasting policy change requires an understanding of stakeholder perceptions of the subsidy policy and how they might be affected by its removal (Beaton et al., 2013). Engagement can be resource intensive but reforms that do not take into account stakeholder views may lack legitimacy and risk backsliding as well as causing preventable economic and social hardship. The concept of just transitions is founded in consultation and co-development of reform strategies (ILO, 2016). Given the potential sensitivity and complexity of the political economy issues around fossil fuel subsidy reform, interviews may be a necessary part of the consultation process (Inchauste et al., 2016).

8.2.3 Compensation

Compensation refers to the judicious use of revenues to ameliorate impacts and increase political support. Rather than using ad hoc cuts to excise and VAT on polluting fossil fuels, governments need to develop and implement better ways to support households and businesses during times of high energy prices. These include temporary cash transfers, improved public transport, clean transport alternatives such as electric bicycles and automobiles, and diversification into renewable energy. Maintaining tax rates can generate the revenue required to fund such alternatives. Where social welfare and other infrastructure is undeveloped, subsidies should be targeted to those who need them most (Coady et al., 2004; Sharma et al., 2019).

8.2.4 Timing

High energy prices are a good time to undertake or prepare for tax reform. A time of high fossil fuel profits are an opportunity to reduce producer incentives and increase taxes, including royalties and windfall profits taxes (Vernon & Baunsgaard, 2022). Periods of high prices should also be when preparations are being undertaken to raise taxes when international prices start to fall. However, governments can be complacent about reforms when prices are low, and price reforms are often reversed when prices rise later (Kojima, 2013).

Gradually phasing in consumer price changes can help recipients come to terms with the loss of the tax benefit (Beaton et al., 2013; Clements et al., 2013). Phasing can give consumers and investors time to adjust to new prices or conditions, and potentially adjust behavior or budgets. Sudden changes can cause hardship and backlash.

However, there are many types of support policies, especially those related to new investments, that should never be gradually phased out but eliminated suddenly and completely. A phased approach can result in a rush by companies to take advantage of the incentive, which could cause a surge in production — the opposite of what one wants.

Timing should also be considered when imposing subsidies. Making support time-limited and temporary provides an opportunity to end the support mechanism or at least review it before renewing it.

8.2.5 Communication

Communication is critical to build an understanding about the rationale for fossil fuel subsidy reform, particularly any compensation that will be provided to reduce impacts.

Messaging can focus on the negative impacts of the current policy and the gains from reform (Table 5).

TABLE 5. NEGATIVE AND POSITIVE COMMUNICATIONS MESSAGES ABOUT FOSSIL-FUEL SUBSIDY REFORM

Objective of communications	Focus of messaging
Raise awareness of subsidy problems	• Fiscal costs of subsidies • Inefficiency in helping the poor • Contribution to climate change and air pollution
Neutralize opposition	• Identify any illegal profiteering from the subsidy such as smuggling or corruption • Counter misconceptions about subsidy benefits or costs
Raise awareness of gains from reform	• Estimate and publicise subsidy savings • Describe how savings will be used to deliver targeted welfare assistance, increase government spending on social services or infrastructure • Note positive effects on clean energy industries
Raise awareness of reform plans	• Explain reform objectives, consultation processes, timing, and expected effects

Source: Adapted from (Beaton et al., 2013).

9 DISCUSSION: CHALLENGES AND OPPORTUNITIES FOR DEVELOPING AND EMERGING ECONOMIES

9.1 Challenges

To limit global warming to 1.5ºC and avoid the worst impacts of climate change, the world needs to rapidly phase down fossil fuel consumption and production. Tax incentives for investment in new fossil fuel developments are incompatible with a 1.5ºC temperature ceiling. At the same time, tax cuts for consumers undermine price signals to consumers and investors in fossil-fuel-using capital to reduce fossil fuel consumption. The economy-wide fossil fuel TEs put in place during the 2022 energy crisis are an understandable response to the cost-of-living crisis but neglect to take into account the negative impacts of fossil fuels and their costs to society.

Support needs to be shifted from fuels to people. The challenge is to find effective ways to deliver social support that does not involve polluting fossil fuels. In developing and emerging economies (where alternative energy sources and welfare infrastructure is sometimes non-existent) the challenge is twofold. These governments need to develop effective new welfare and tax infrastructure for delivering support. Indonesia and Iran developed new cash transfer payment systems to accompany fossil fuel subsidy reforms (ADB, 2015; Guillaume et al., 2011). But many developing countries also need to improve the social contract between citizens and government, so that citizens feel confident that they will be supported as energy prices increase and that subsidy savings will be used wisely. In Nigeria, surveys

revealed that citizens were more likely to be strongly opposed to fuel subsidy reform if they believe the government to be corrupt or lacking capacity to implement effective compensation, while delivery of national and local services improved the acceptance of reform (McCulloch et al., 2021). Building a social contract appears to be critical to reform success.

Improved governance and transparency on taxation — which tends to be lower in developing and emerging economies than in OECD countries (IMF et al., 2011) — is an important first step in building community understanding about fossil fuel subsidies, developing credible reforms plans and compensation packages. Consultation and communication with the public and stakeholders can also build trust. Where existing social welfare infrastructure and personal income tax systems are adequate, governments need to resist the temptation to provide seemingly easy-to-impose tax cuts on fossil fuels and instead deliver cost-of-living support through cash transfers.

The energy transition is likely to be accompanied by higher fossil fuel prices in response to carbon pricing, investments to support higher penetration of renewables, and increased instability in fossil fuel markets (Schnabel, 2022). Therefore, the need to support poorer segments of societies during periods of high energy prices will not disappear at the end of the current energy crisis.

However, the existence of strong social welfare systems is clearly not sufficient. During the 2022 energy crisis, many developed countries with highly functional social welfare systems and strong commitments to climate action (such as Sweden) reduced taxes on fossil fuels. Clearly citizens have an expectation that governments should ensure energy is available and affordable.

The challenge is therefore to break the link between social assistance and polluting fossil fuels. This requires both developing the political will to resist calls for energy subsidies, and facilitating the transition to alternative energy sources that are not price volatile and polluting. History has shown that the first part of the equation can be very difficult. Accordingly, many governments pursue only the second.

On the producer side, the challenge is to identify and wind back subsidies in the context of powerful opposition. Deep structural reforms might be needed to assist indebted state-owned companies, commonly found in developing economies that subsidize fuels, adapt to reforms. Governments need to build understanding in the broader public about the need for governments to stop supporting new fossil fuel investments and of the economic benefits of diversification into renewable energy, as well as supporting economic diversification in fossil fuel dependent regions. This will not be easy. But lessons can be drawn from past reform efforts.

9.2 Opportunities

The reform of TEs can help deliver revenue that can support the energy transition if it also includes measures to reduce the economic shock to the poorest consumers; just transitions for fossil fuel businesses, communities, and workers; incentives for clean energy and associated infrastructure. Additional funds can be raised by removing other types of fossil fuel subsidies and increasing taxes, including carbon taxes.

The opportune time to raise revenues is while fossil fuels are still in wide use. Under scenarios consistent with 1.5°C to 2°C temperature ceilings, fossil fuel revenues are likely to

be currently peaking in large emerging economies (Laan & Maino, 2022).[18] Fossil fuel revenues will decline as the energy transition gathers pace, therefore governments need to increase revenue raising now through subsidy and tax reform. High energy prices are an opportune time to reform producer tax incentives and put in place plans to reduce consumer tax incentives and increase tax rates when global prices start to decline.

The energy crisis of 2021 and 2022 has demonstrated that the world needs to hasten the adoption of clean energy. An energy system dominated by clean energy offers a lasting solution to energy price volatility, energy inflation (by creating alternatives to fossil fuels), and energy security (by providing domestic supplies of safe, distributed energy) (International Energy Agency, 2022). Tax cuts for fossil fuels are no longer a reasonable coping mechanism for high energy prices. Developed countries need to support developing and emerging economies in their efforts to build alternative energy and welfare systems.

[18] Brazil, China, India, Indonesia, Russia, and South Africa.

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