FOSSIL FUEL SUBSIDY REFORM: WHAT ROLE FOR THE WORLD TRADE ORGANIZATION?

Working Paper No. 3 in Trade and Environmental Sustainability Series

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This working paper has benefited from comments shared on a previous draft by a group of various stakeholders to whom we are grateful. These insights were shared at a meeting at Quaker House in Geneva on 27 September 2021. This is a work in progress and we welcome further comments. This is the third paper in the series on Trade and Environmental Sustainability, which also includes papers on the topics of circular economy, environmental goods and services reform, and greening Aid for Trade.

Contents

Introduction

The removal of fossil fuel subsidies (FFS) would bring about many important and positive effects, among them helping to reduce air pollution and emissions of greenhouse gases that cause climate change and improving government's finances. It could also reduce distortions affecting trade in not only the subsidized products, such as coal, fuel oil and natural gas, but also in goods that compete with fossil fuels, such as wind turbines and solar photovoltaic panels. This paper focusses on the role that mechanisms at the WTO could play within the context of a more integrative approach that also involves other global institutions.

Reductions in greenhouse gas emissions from the global elimination of FFS alone would be modest but important. Researchers for the International Institute for Sustainable Development (IISD), for example, recently modelled what would happen if the world's 32 leading subsidizing countries completely removed their FFS by the year 2025 (Kuehl et al., 2021). They found that carbon-dioxide (CO2) emissions would be 6% less in 2025 and in 2030. They point out that an additional 3% cut in CO2 emissions could be achieved by earmarking 30% of the subsidy savings from the reforms for investment in energy efficiency and renewable energy — what the IISD calls a "subsidy swap". If, in addition to FFS reform and a subsidy swap, the same countries also imposed an ad valorem tax of 10% on all fossil energy and earmarked 30% of the extra tax revenues to supporting energy efficiency and renewable energy, CO2 emissions could be cut by almost 12% by 2030 (Annex Figures A1 and A2). In addition, a significant dent would be made in air pollution from fossil fuel combustion, which has been estimated to cost the world almost US$3 trillion a year (Myllyvirta, 2020).

Reforming FFS is ultimately the responsibility of sovereign governments, but coordination at the international level can underpin domestic action and reduce free-riding. International political appeals to phase out FFS date back at least to the early 1990s when, for example, signatories of the 1992 Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) included hortatory language calling on Annex 1 parties to phase out those "market imperfections, fiscal incentives, tax and duty exemptions and subsidies" that run counter to the objective of the UNFCCC "in all greenhouse gas emitting sectors". It wasn't until late in 2009, however, when leaders of the Group of Twenty (G20) and of the Asia-Pacific Economic Cooperation (APEC) forum separately announced that they would commit to "phase out and rationalize over the medium term inefficient FFS", that the issue gained momentum and began to be seen as a central plank of a suite of measures necessary to address climate change.

More recently, the reform of FFS has begun to be seen as a trade-policy issue as well. At the 11th WTO Ministerial Conference (MC11), held in Buenos Aires in December 2017, Ministers from 12 WTO members signed a statement calling on the WTO to "to advance discussion in the World Trade Organization aimed at achieving ambitious and effective disciplines on inefficient FFS that encourage wasteful consumption".[1] A document supporting a similar initiative is likely to be submitted formally to MC12 when it meets in Geneva in December 2021 or soon thereafter. Meanwhile, FFS have been discussed in both the WTO Committee on Trade and Environment (CTE) and the Trade and Environmental Sustainability Structured Discussions (TESSD).

The purpose of this briefing paper is to provide information on FFS and their relationship with trade and trade rules that can help inform their discussions on possible action at the WTO, in particular in the TESSD.

Section 1 of this paper first gives an overview by exploring the definition and magnitude of FFS, and how they are provided. Section 2 then looks into the linkages between FFS and the multilateral trading system, including options for governance to achieve FFS reform. Section 3 explores ways for making FFS reform sustainable, just and equitable, especially in developing countries. Section 4 raises topics and questions for further discussion.

[1] WT/MIN(17)/54, p. 2.

1.1 DEFINITION OF FOSSIL FUEL SUBSIDIES

The definition of a subsidy that has been accepted by more countries than any other is that in Article 1 of the WTO's Agreement on Subsidies and Countervailing Measures (ASCM). By this definition, a subsidy must satisfy three criteria: (i) it must involve a financial contribution (ii) by a government or any public body within the territory of a Member (iii) that confers a benefit.[2]

A more specific definition of a FFS, one that is consistent with the OECD concept of "support"[3], has been provided by the International Energy Agency (IEA). It defines an energy subsidy as "any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lowers the price paid by energy consumers." The benchmark against which consumer price support should be measured is disputed. The IEA and the International Monetary Fund (IMF) consider a reduction in the domestic price of a fuel below export or import price parity as consumer price support, while some oil- and gas-exporting countries argue that no subsidy is being provided if the domestic price of a fuel covers the cost of producing and transporting it to domestic consumers.

1.2 MAGNITUDE OF FOSSIL FUEL SUBSIDIES

Currently, data on the world's FFS are incomplete. The IEA has for the past 15 years or so produced annual estimates of consumer price support (what it calls "fossil fuel consumption subsidies") for the leading, mainly non-OECD countries providing such support, for oil products, natural gas, coal, and fossil-based electricity. The OECD has complemented those estimates with estimates of other support, particularly that provided through government grants and tax breaks, to both producers and consumers. The OECD's coverage has expanded over time, and now includes 50 countries, accounting for a large share of the world's fossil-fuel consumption. The OECD and International Energy Agency (IEA) conservatively estimate total support at about USD 320 billion in 2019.[4] Based on these

[2] Also see https://www.wto.org/english/tratop_e/scm_e/subs_e.htm Note that the WTO definition thus makes no distinction between whether the beneficiary is a producer of consumer, but rather is concerned about whether government money is involved, and whether a benefit is conferred to one or more recipients.

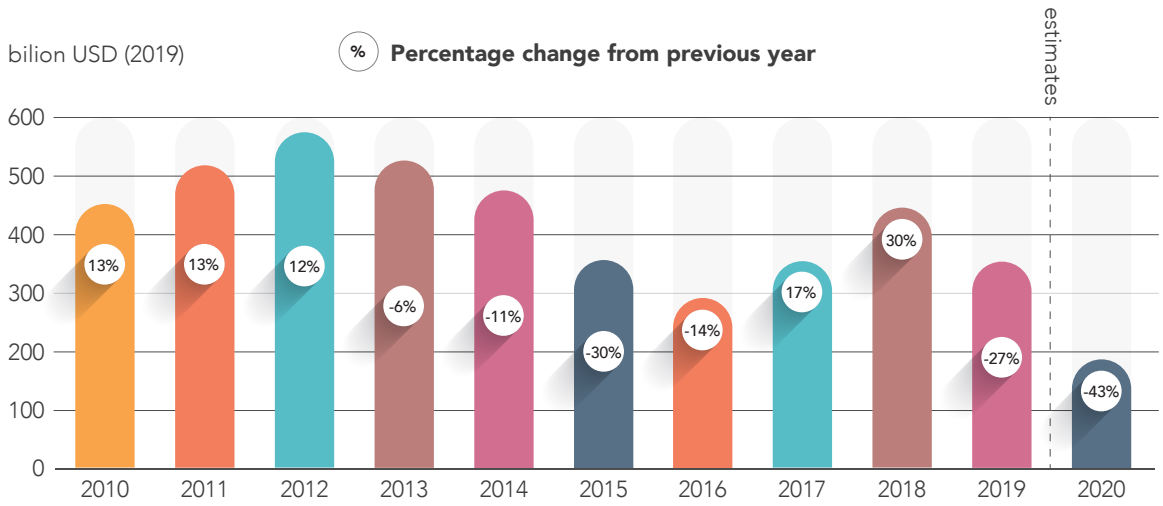
[3] What the WTO does not include in the definition is what the OECD refers to as "induced transfers" — i.e., those created through some government intervention, such as an import tariff or export tax, that increase or reduce the price paid for a good by domestic consumers. The OECD (and many other analysts) include such market price support (to producers) and consumer price support in their estimates of support to various sectors, along with the subsidies included in the WTO definition.

[4] https://www.iea.org/topics/energy-subsidies

incomplete estimates, just over half of FFS are for oil products, with the rest split almost equally between natural gas and electricity.[5]

The drop in fossil fuel prices and consumption caused by the Covid-19 pandemic brought down global fossil fuel consumption subsidies to USD 180 billion in 2020.[6] This is the lowest annual figure reported since the IEA started tracking the data in 2007 (IEA 2020; see also Figure 1).[7] Since the beginning of 2021 fossil fuel prices have returned to pre-pandemic levels, and so likely have fossil fuel consumption subsidies.

Figure 1. Annual value of fossil fuel consumption subsidies, 2010-2020.



Source: IEA (2020).

[5] The International Monetary Fund (IMF) also publishes estimates of consumer price support (which it calls "pre-tax subsidies to fossil fuels", for most countries of the world; these estimates cover more countries than does the IEA, and also includes in the pre-tax subsidies a small amount of the producer support estimated by the OECD. The totals tend to be of the same magnitude as the IEA's estimates. In addition, the IMF publishes what it calls "post-tax subsidies to fossil fuels", which are dominated by the IMF's estimates of consumption externalities (the socialized costs of greenhouse gas emissions and emissions of local pollutants), but also include its estimates of the socialized costs associated with driving (even though these are independent of the form of energy used), plus under-collected consumption subsidies, plus the aforementioned pre-tax subsidies. Their resulting global estimate of "post-tax subsidies to fossil fuels" for 2017 was US$5.2 trillion (Coady et al., 2019). This use of the term "subsidy" is, however, non-standard and not further referred to in this paper.

[6] The notion that periods of low international petroleum prices provide the most opportune times for domestic pricing reforms is popular, but as the World Bank's Masami Kojima has pointed out, it is a double-edged sword. During such periods, governments often announce an end to their price subsidies, but with varying degrees of formality. Rather than definitively end administered pricing, many instead promise regular price reviews and adherence to the principle of market-based pricing. Yet, when international oil prices begin to rise again, the previous policies are often reversed. In short, the negligible political cost of "ending" subsidies can beget a correspondingly weak commitment to serious and durable reform.

[7] https://www.iea.org/articles/low-fuel-prices-provide-a-historic-opportunity-to-phase-out-fossil-fuel-consumption-subsidies

1.3 POLICIES SUPPORTING FOSSIL FUEL PRODUCTION AND USE

1.3.1 FFS POLICIES IN OECD COUNTRIES

All OECD countries consume fossil fuels, and most tax gasoline and diesel fuel consumed for road transport quite heavily. These taxes range widely, from USD 0.20 to USD 1.70 per litre. Government support for the consumption of those fuels mainly takes the form of targeted reductions in or exemptions from fuel-specific excise taxes—mainly fuels consumed by farming, mining and forestry machinery, and fishing vessels—or lower value-added taxes on fuels or electricity than that charged on other goods. A few also provide targeted subsidies to low-income households to help them pay for heating fuels or electricity in the winter months, and air conditioning in the summer. In total, the OECD estimates these tax exemptions and targeted payments have varied between around USD 15 billion and USD 30 billion a year in OECD countries.

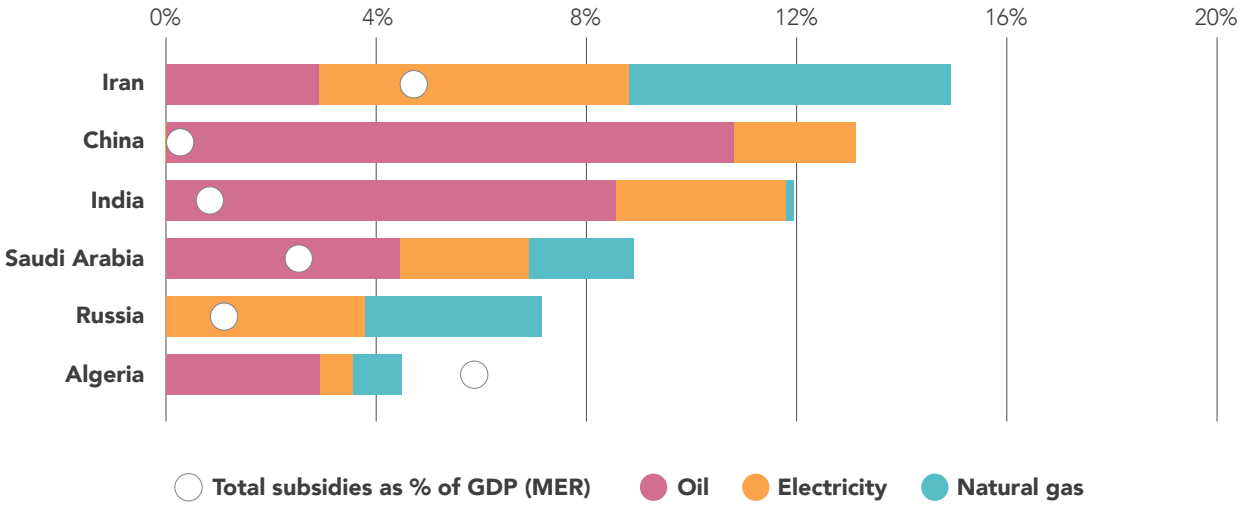
Oil and natural gas production are the two segments of the fossil-fuel industry that benefit most from special tax regimes intended to encourage continued exploration and development. In OECD countries with federal structures, such as Australia, Canada, and the United States, the value of support provided by sub-national governments collectively often exceeds that of the central government. The subsidized production of hard coal largely came to an end in the EU at the close of 2018. Some subsidies are still provided, but they are used mainly to help close down existing mines and provide redundant workers with training or early-retirement benefits in order to have a "just transition". Thus, the main remaining coal producers in the OECD are Australia, Canada, Germany (lignite), Mexico, Poland, Turkey, and the United States. Direct government support to coal mainly takes the form of funding of research and development, the retraining of workers, and payments to cover the costs of damage (e.g., land subsidence) caused by past mining. In a few countries exploration or production-related subsidies still exist.

1.3.2 FFS POLICIES IN DEVELOPING COUNTRIES

Numerous studies, from the 1980s until the present (e.g., UNDP and World Bank, 1984; Kosmo, 1987; Ross et al., 2015; Kojima, 2016;), have documented how a significant number of developing countries, especially those that are net exporters of crude oil, have subsidized the consumption by their citizens of fossil fuels and electricity generated by fossil fuels; the IEA's most recent estimates of the subsidy value of those policies cover the leading 25 subsidizing

countries, by fuel, for 2020 (Figure 2). In the recent past, average subsidization rates have exceeded 70% in some oil-exporting countries (Sovacool, 2017). Since the mid-2010s, however, several members of the Cooperation Council for the Arab States of the Gulf have raised their domestic prices for oil, natural gas, and electricity. One study of Saudi Arabia's 2018 price reforms (Aldubyan and Gasim, 2021) found that the country's gasoline and electricity price reforms delivered annual welfare gains[8] of, respectively, USD 2.3 billion and USD 1.0 billion.

Figure 2. Value of fossil-fuel consumption subsidies by fuel in the top 6 countries, 2020.



Source: IEA, 2021.

[8] https://onlinelibrary.wiley.com/doi/full/10.1111/rode.12619

2.1 WHY ADDRESS FFS REFORM AT THE WTO?

It should not come as a surprise that several members of the WTO wish to make fossil fuel subsidies reform — and the contribution that the trade regime can make to achieving such reform — one of the topics of focus of the Trade and Environmental Sustainability Structured Discussions (TESSD). Although, at root, the over-riding international interest in achieving such reforms may be environmental in nature, there are both trade-related interests for making progress in this area, and institutional reasons for involving the WTO.

Given the effects of FFS on direct competition among sellers of fossil fuels has not been strong enough to lead to any FFS cases being brought to the WTO, nor even the application of countervailing duties to alleged subsidized imports of fossil fuels (Steenblik et al., 2018), it would appear that nowadays the main trade interest relates to the ways that FFS can reduce the cost of inputs to energy-intensive industries, such as fertilizer manufacturing, steelmaking, and plastic resin production, and that they can lower the relative cost of fossil fuels and electricity generated from fossil fuels relative to cleaner-energy alternatives.

The institutional motivations for bringing FFS to the WTO relate to two concerns. The first are the formal (binding) obligations that the WTO can bring to bear on FFS. One of those obligations is that WTO members should periodically provide a full notification of all subsidies, including FFS, with the potential to distort trade. Compliance with this requirement has been patchy at best but could be strengthened. Second, and more importantly, the WTO's Agreement on Subsidies and Countervailing Measures (ASCM) provides binding rules and remedies for addressing harm caused by the use of subsidies[9] — remedies that are only otherwise accessible via a few bilateral or regional trade agreements.

Besides the uncomfortable fact that the ASCM has to date been toothless in disciplining FFS, even those subsidies that clearly support otherwise uncompetitive domestic coal producers, many of the subsidies of greatest concern slip through the net because they are non-specific — i.e., they are generally available to all consumers of the subsidized fuel, such as gasoline or diesel. Moreover, by stimulating consumption more than would occur in the absence of the subsidies, they potentially increase imports of fossil fuels, to the benefit of potential fuel exporters to the subsidizing countries. Subsidized fuel or electricity prices may make it more difficult for exporters of solar panels or wind turbines to sell their products. But those products are not sufficiently "like" any of the subsidized fossil fuels — a requirement to apply a countervailing duty or to mount a challenge to the subsidy under current WTO jurisprudence.

[9]There are three types of adverse effects. First, there is injury to a domestic industry caused by subsidized imports in the territory of the complaining Member. This is the sole basis for countervailing action. Second, there is serious prejudice. Serious prejudice usually arises as a result of adverse effects (e.g., export displacement) in the market of the subsidizing Member or in a third country market. Thus, unlike injury, it can serve as the basis for a complaint related to harm to a Member's export interests. Finally, there is nullification or impairment of benefits accruing under the GATT 1994. Nullification or impairment arises most typically where the improved market access presumed to flow from a bound tariff reduction is undercut by subsidization.

The WTO, and the system of trade arrangements more generally, is not powerless to support efforts to reform FFS. Suggestions on how the WTO in particular could do that generally fall into two categories: (1) make greater use of existing processes and tools, particularly those relating to transparency on government support policies; and (2) seek either a new interpretation of the WTO's subsidy rules or develop a specific agreement that more effectively disciplines them. However, as is becoming more widely understood and accepted, the WTO exists within a broad network of international institutions that are already working to improve transparency on FFS and are providing advice to governments on how they can durably phase out those subsidies (van Asselt and Verkuijl, 2021). Cognizant of this increasingly fragmented governance structure, the following section explores various ways in which the WTO could contribute to FFS reform.

2.2 OPPORTUNITIES AT THE WTO'S FOR ADVANCING FFS REFORM

Over the last 12 years, numerous groups and individuals have offered ideas on what role the WTO could play in supporting international efforts to reform fossil fuel subsidies.[10] These ideas range from conducting more dialogue on FFS to crafting binding subsidy disciplines, and everything in-between. Among others, addressing FFS at the WTO would offer the following opportunities, which are not mutually exclusive:

1. Discuss the issue

One, "placing FFS on the agenda of the WTO Committee on Trade and Environment (CTE)", has already taken place, on numerous occasions, going back at least to 2001.[11] Members of the Friends of Fossil Fuel Subsidy Reform ensure that the topic appears frequently on the CTE meetings' agendas. Such dialogue serves a useful purpose, by informing delegates of new developments and understanding individual country's positions. But, to date, these discussions have not led to widespread calls within the WTO for ambitious actions by the organization.

Discussing FFS in other WTO bodies can also serve to keep the topic of FFS reform alive and provide a means for members to probe more deeply into the reviewed countries' fossil-fuel policies. For example, questions can, and have been, asked about FFS in the WTO Committee on Subsidies and Countervailing Measures. However, one study reviewed the minutes of the SCM Committee between 2008 and 2013 and found that only 14 questions had been asked about FFS over that period, mainly by G20 member countries of other G20 countries and were mainly designed to elicit more information on the few FFS that had been formally notified to the WTO (Casier et al., 2013: 10).

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[10] See, for example, Steenblik (2010), Das et al. (2018) and ICTSD (2018).

[11] See the WTO press release of 16 October 2001 (PRESS/TE/037), page 4 of which mentions "the representative of the OECD presented a recent OECD study on the 'Environmental Effects of Liberalizing Fossil Fuels Trade: Results from the OECD Green Model'." Available from https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/PRESS/TE037.pdf&Open=True

2. Make FFS the focus of in-depth policy reviews

Some have suggested making greater use of the WTO's Trade Policy Reviews (TPRs), which are conducted by the Trade Policy Review Body (TPRB) based on a written statement by the WTO member under review and a report prepared by the Secretariat.[12] These reports are not restricted to using information notified officially to the WTO but can draw on outside information as well. During the TPRB meetings at which the reports are discussed, other members can submit questions to the reviewed countries. Countries belonging to the Friends of Fossil Fuel Subsidy Reform[13] have frequently availed themselves of this procedure. But the level of questioning has been inconsistent from one TPR to the next.[14]

Meanwhile, peer reviews focussed on FFS specifically have been carried out by G20 and APEC economies, and by IEA members in context of their IEA-led triennial in-depth reviews of their members energy policies (see, e.g., OECD and IEA, 2020). An extension of the idea of making greater use of the TPRB, as proposed by Das et al. (2018: 43), thus envisages WTO members that are not members of the G20 or APEC voluntarily committing themselves to a similar non-binding pledge to phase out fossil-fuel subsidies and using the review processes of the WTO to report progress and discuss how to address remaining barriers to reform.
It is likely that WTO members will continue to use the occasion of the TPRs to pose such questions much as they have for fishing subsidies. However, the frequency of TPRs — every three years for China, the EU, and the United States; every five years for the next 16 leading trading nations; and every seven years for most other WTO members — does not recommend it as a core institution for advancing the FFS reform agenda.

3. Improve the notification of FFS more systematically

If substantially increasing transparency on FFS is the objective, improving the notification of FFS to the WTO would seem to be a promising path to pursue. But the record of such notifications, indeed the notification of subsidies to the WTO more generally, has so far been poor. Although Article 25.1 of the Agreement on Subsidies and Countervailing Measures (ASCM) requires that all Members submit a new and full notification of all specific subsidies every three years, with updating notifications due in the intervening years, successive chairs of the SCM Committee have complained of chronic low compliance.[15] Moreover, the ASCM's Article 25 does not specify which types of subsidies should be notified beyond those meeting the definition of Articles 1 and 2 of the ASCM and does not specify any consequences for incomplete notifications (ICTSD, 2018).WTO members could agree to amendment Article 25 to correct these lacunae, or provide the WTO secretariat with sufficient resources to carry out

[12] "Overseeing national trade policies: the TPRM" at https://www.wto.org/english/tratop_e/tpr_e/tp_int_e.htm.
[13]The Friends are an informal group comprising nine countries – Costa Rica, Denmark, Ethiopia, Finland, New Zealand, Norway, Sweden, Switzerland, and Uruguay – that seek to promote fossil fuel subsidy reform.
[14]In the meeting at which its 2016 TPR was reviewed, for example, Russia was asked two non-trade-specific questions about their fossil fuel subsidy policies and plans and responded with brief but non-evasive answers (WTO, 2016: 38-39). More recently, delegates asked probing questions of India about its internal pricing policies for LPG and natural gas, eliciting detailed information (WTO, 2021a: 37, 122, and 156). On the other hand, only one question relating to FFS was asked of Saudi Arabia during its recent review, and the Kingdom's answer was of a general nature (WTO, 2021b: 124)
[15]"Chair cites 'chronic' low compliance with subsidy notification requirements", at https://www.wto.org/english/news_e/news20_e/scm_27oct20_e.htm.

some of the data-gathering itself. But a better use of its resources, arguably, would be to draw on data from other organizations — notably the OECD, IEA, World Bank and various research institutes and NGOs — that already fill that gap.[16] Finding some way for the WTO to more formally recognize these estimates would be helpful.[17]

4. Enforce existing trade rules through litigation and trade remedies

Meanwhile, the individual members of the WTO could, in theory, try to apply existing subsidy disciplines to discourage other countries' FFS. The obvious advantage of such action is that it would require no change to the WTO's rules. However, those rules can be used only against subsidies that cause adverse trade effects. Moreover, because of the dominance of multinational enterprises — both investor-owned and state-owned — in international energy trade, the likelihood of such trade remedies being used in the future appears low: multinationals are likely to benefit from foreign subsidies (especially tax breaks) and so would have a disincentive to endorse any action by their home country to challenge them. To date, no disputes related to fossil-fuel subsidies have been brought to the WTO, nor have there been any countervailing duties applied to imports of a fossil fuel (Steenblik et al., 2018).

5. Seek a mandate to provide a supplementary interpretation of WTO rules

The aforementioned actions could largely be pursued simultaneously and without any changes to the WTO's rules.

The next higher level of ambition would be for WTO members to agree on an interpretive understanding of how existing WTO rules and mechanisms apply to FFS. Such interpretations do not modify the content of existing obligations but clarify how the rules should apply in the context of WTO dispute settlement (ICTSD, 2018). The Dispute Settlement Understanding itself, an outcome of the Uruguay Round of multilateral trade negotiations, is an example of such an interpretive understanding.

One important issue that could usefully be clarified is which product markets could be considered to have suffered adverse trade effects. Current GATT and ASCM rules limit cases and unilateral remedies to "like" products. Yet it is often products competing in the same market, such as power generation, that are affected by FFS. An interpretive understanding could, for example, allow a short list of technologies that generate electricity from renewable energy (identified by their HS sub-headings) to be considered sufficiently "like" for the purpose of existing subsidy disciplines. Another important issue that requires a clearer definition is the specificity of fossil fuel subsidies.

A decision to commence negotiations on developing such an understanding could in theory be taken by the WTO's General Council. Much more likely, it would have to be provided by Ministers and would be led by the WTO's Negotiating Group on Rules.

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[16] See also the database that has been assembled from the OECD, IEA and some of the IMF estimates of FFS as a central point of info relevant to the SDG 12.c.1 indicator.

[17] Also see Steenblik, R. (2020) and van Asselt and Verkuijl (2021).

6. Seek a mandate to negotiate a stand-still agreement on fossil fuels subsidies

Using the enforcement mechanisms of the WTO itself to limit members' FFS via rules set out in a multilateral agreement would be a much more significant step than relying on existing rules and would require a mandate from a Ministerial Conference before formal negotiations could begin. A standstill agreement would freeze all or a subset of subsidies and prohibit new ones from being created. A subsidy-reduction agreement would aim to not just stop the growth and proliferation of subsidies but also phase them out. These are not mutually exclusive approaches, as a standstill agreement could presumably be negotiated more quickly than a subsidy phase-out agreement and serve as its prelude.

The idea of a standstill agreement on FFS has already been mooted in APEC. At their recent virtual meeting on 4-5 June 2021, APEC Ministers Responsible for Trade issued a joint statement that tasked their officials "to explore options, for those members that are in a position to do so, to undertake a potential voluntary standstill on inefficient FFS for progress to be reported to ministers in November."[18] The details of such a standstill agreement have yet to be worked out, but one can assume that at a minimum it would implore ("for those members that are in a position to do so") that each APEC economy provide a descriptive list of all of their existing support policies and programmes.

The role of the CTE or TESSD would presumably then be to make the case for including a mandate to begin negotiations in a future Ministerial Conference communiqué.

7. Seek a mandate to negotiate specific disciplines on fossil fuels subsidies

The most ambitious action that the WTO could take on FFS would be to agree to commence negotiations on a stand-alone agreement, analogous to the WTO Agreement on Agriculture and the expected future agreement on fisheries subsidies.

Many academics and NGO specialists have set out ideas on what kinds of support an agreement should or could cover, on its modalities (e.g., what if any types of subsidies should be prohibited) and transparency requirements, and in what form the principle of special and differential treatment (S&D) should be reflected in the agreement.[19] It is beyond the scope of this paper to describe, and much less evaluate, these ideas. But the following issues give a flavour of the challenging nature of crafting an agreement that would be both achievable and effective:

- A large share of government support is provided broadly to final consumers and does not meet the specificity test set out in ASCM Article 2. Would an Agreement on Fossil Fuels cover such support?
- Are there particular types of subsidies that should be prohibited, or subsidies to

[18]https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Trade/2021_MRT.

[19]See Das et al. (2018) and reports cited by that paper.

particular fossil fuels? Should the additional carbon emissions expected to be caused by a particular fossil fuel support policy guide decisions of which types of subsidies should be subject to the most stringent disciplines?

- Similarly, are there other types of subsidies, such as ones to help facilitate the closing of existing coal-mines, that should be exempt from phase-out requirements?
- Should all or some of the phase-out commitments be expressed with reference to some historical period? Should that same period be used for calculating consumer price support? And for how long should the phase-out occur?
- How should special and differential treatment (S&D) be reflected? Should developing countries, for example, be given more time to phase out their FFS?

Ideally, any new WTO Agreement on Fossil Fuel Subsidies would involve all members. But, if the multilateral negotiations on fisheries subsidies — which, if successfully concluded by the end of 2021, will have taken almost 20 years to complete — are reflective of the length of time such negotiations require, it is legitimate to ask what a WTO Agreement on Fossil Fuel Subsidies would accomplish if it were to take as long to conclude. Expected technological developments and changing energy markets mean that the world may look very different two decades hence.

For that reason, initiating talks on a plurilateral Agreement on Fossil Fuel Subsidies that is open to all members ready to negotiate in good faith might offer the chance of a speedier deal. After all, the bulk of FFS is provided by only a small subset of the WTO membership. In the short term, WTO Members, or a subset thereof (such as the members of the TESSD) could sign onto a political declaration on FFS at MC12 in Geneva at the end of 2021. Members could agree to discuss fossil fuel or wider energy subsidies within the CTE or the TESSD context and provide a mandate for reforming FFS within the WTO. The six-nation negotiations to forge an Agreement on Climate Change, Trade and Sustainability (ACCTS)[20], which include a component on FFS, are another opportunity to make progress on FFS reform in the context of trade policy. Confounding prior speculation that an agreement on FFS would need to involve a critical mass of countries[21], the ACCTS shows that critical mass is not an essential condition for those countries for whom the environmental benefits of FFS reform are what matter most.[22] Conveniently, the text that emerges from the ACCTS could also serve as a model for a WTO agreement (or an expanded ACCTS) that includes a broader number of parties.

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[20] These talks were launched in September 2019 by five WTO members: Costa Rica, Fiji, Iceland, New Zealand, Norway. Switzerland became a party to the negotiations in 2020.

[21] See, for example, Das et al. (2018: 46).

[22] Critical mass is also clearly not a concern for countries who include language limiting FFS in their bilateral free trade agreements. Article 13.11.3 of the EU–Singapore Free Trade Agreement, for example, specifically addresses fossil fuel subsidies, albeit in an aspirational rather than a binding fashion:

The Parties recognise the need to ensure that, when developing public support systems for fossils fuels, proper account is taken of the need to reduce greenhouse gas emissions and to limit distortions of trade as much as possible. While subparagraph (2)(b) of Article 12.7 (Prohibited Subsidies) does not apply to subsidies to the coal industry, the Parties share the goal of progressively reducing subsidies for fossil fuels. Such a reduction may be accompanied by measures to alleviate the social consequences associated with the transition to low carbon fuels. In addition, both Parties will actively promote the development of a sustainable and safe low-carbon economy, such as investment in renewable energies and energy efficient solutions.

Irrespective of what ultimately gets done by the WTO to support FFS reform, there is a lot that members need to do within their own countries to both understand the extent to which their policies support fossil fuel production and consumption, and what would be the impacts of phasing out such policies on specific industries, regions, and populations (Annex 1). Ideally, any evaluation of these impacts would take place against a larger evaluation of a broader energy transition. Developing such an understanding would help members both with their domestic policymaking and their negotiating position at the WTO.

The organs of the WTO could play a useful role here. Some developing countries lack the technical expertise and institutional frameworks necessary to carry out effective reforms of their FFS in ways that protect the most vulnerable and do not incite a popular backlash (Asmelash, 2017). The WTO has long-standing experience of building capacity and providing technical assistance to developing countries (particularly least-developed countries) on trade-related matters, mainly through its Institute for Training and Technical Cooperation or "ITTC".[23]

Again, however, this is already a crowded space. Various agencies of the United Nations, such as the UN Development Program, have worked for many years with developing countries on how to reform their FFS, particularly those to consumers. The Partnership for Action on Green Economy (PAGE)[24], which involves five UN agencies, is building capacity in socially just fossil fuel reform within its mandate of supporting nations and regions in reframing economic policies and practices around sustainability. The World Bank, through its Energy Subsidy Reform Facility, has embedded experts in individual country governments to help them design new policies. The focus of these institutions is, of course, on more than just the trade implications of FFS.

As Das et al. (2018: 40) observe, "Coordination would be needed to avoid a duplication of efforts, otherwise the added value of the WTO's involvement would be questionable." Where the WTO Secretariat or the ITTC — if adequately resourced — could add value is in helping its members identify and measure their FFS. To some extent, the Secretariat performs that service already, through its various in-person and increasingly on-line training courses on various trade topics, including subsidies.[25] A course specifically on FFS could be developed jointly between the WTO and another organization with more specialized knowledge in the area.

[23]https://www.wto.org/english/tratop_e/devel_e/teccop_e/ittc_e.htm

[24]PAGE brings together five UN agencies – UN Environment (UNEP), International Labour Organization (ILO), UN Development Programme (UNDP), UN Industrial Development Organization (UNIDO), and UN Institute for Training and Research (UNITAR) – whose mandates, expertise and networks can offer integrated and holistic support to countries on inclusive green economy, ensuring coherence and avoiding duplication. Also see https://www.un-page.org/

[25]https://www.wto.org/english/tratop_e/devel_e/train_e/gbc_factsheet_e.htm.

3.1 A JUST TRANSITION APPROACH TO FFS REFORM

The need for the world to transition from fossil fuels to non-carbon energy sources has in recent years focused the minds of policy makers on the need to plan for and manage the inevitable economic consequences of that transition in a just way. The 2015 Paris Climate Agreement acknowledges "the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities" and highlights the importance of workers in responding to climate change.

The reform of FFS can be seen as consistent with just transition principles (Gass and Echeverria 2017). With FFS costing governments on average in the neighborhood of USD 500 billion a year[26] in outlays or foregone revenues, depending on the year, removing them could go a long way to financing such a transition. Stakeholder engagement and transparent public communication as a part of rights-based approaches are key to successful FFS reform. In Indonesia, President Joko Widodo for example made it a priority to communicate the necessity for and benefits of reforms. (ibid.)

The European Commission's "Just Transition Mechanism", which forms an integral part of its European Green Deal, is perhaps the best-known plan. But many others are in various stages of development and implementation. The Netherlands, for example, is currently helping its Groningen Province adjust to the closing down of its massive natural gas field. Common to many of the transition plans are the following elements:

- Consultation with labour unions, consumers and various other stakeholders.
- Technical assistance to help advise and support firms and local governments in both designing policies and adapting physical infrastructure.
- Active labour market policies, such as facilitating employment opportunities in new sectors and offering re-skilling opportunities to displaced workers;
- Financial support to affected firms during the decommissioning and retooling process, and to displaced workers as part of a general strengthening of social protection floors.
- Funding (ideally paid by the industry while still engaged in extractive activities) to address legacy environmental effects from past drilling and mining.

One idea that is sometimes espoused is to train workers displaced from extractive industries specifically for jobs in the renewable-energy industry, or similar industries, or even to give preference to those workers as new jobs in those industries open up.[27] While the idea appears sensible, such targeted re-employment policies are likely to be counter-productive and lead to unwanted mismatches of skills and temperament. Better would be to facilitate employment opportunities in sectors with growth potential and offer re-skilling opportunities and relocation assistance to the workers. That said, in some countries and for some industries there may be good opportunities for moving workers from fossil-fuel related industries to those connected with renewable energy or improving energy efficiency.[28]

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[26]These numbers change year by year, mainly owing to fluctuating oil prices. The year 2020 was exceptional because of Covid-19: lower fuel demand and lower prices. The latest combined OECD and IEA numbers are for just 52 G20 and emerging countries (i.e., not for the whole world) and come up to $350 billion in 2020. In 2019, however, they were ~$385 billion, and in 2018 over $600 billion. Also see https://www.oecd.org/fossil-fuels/

[27]Also see https://www.ilo.org/weso-greening/documents/WESO_Greening_EN_chap2_web.pdf and https://ec.europa.eu/energy/sites/ener/files/documents/8_ilo_skills_for_the_green_transition_tahmina.pdf

[28]See, for example, Tomer et al. (2021).

3.2 FOSSIL FUEL REFORMS, RIGHTS-BASED APPROACHES, AND POVERTY ALLEVIATION

Human rights-based approaches[29] to climate action place emphasis on how "incorporating human rights into national plans for climate action can promote fairer, more ambitious and effective outcomes to address root causes of climate change, enhance biodiversity, and transform power structures that maintain avoidable and extreme poverty."[30] These involve rights and protections, to which States are already committed under international law. These rights cover both individual and collective rights (e.g., cultural, social, and economic rights).

A particular concern with subsidy reforms is their potential adverse welfare impact on poverty. Some kinds of subsidy reforms lead to an increase in the price of fuels and other goods consumed by poor households. Transitional policies, such as conditional cash transfers, may therefore be needed to mitigate the negative impacts of subsidy reforms on lower-income households. Which policies will work best in any given country will depend on the institutional capacities of governments to design and implement the relevant policies and the ability of poor households to fully benefit from such policies.

[29]According to the United Nations Sustainable Development Group in its publication "Universal Values", a human rights-based approach (HRBA) is "a conceptual framework normatively based on international human rights standards and operationally directed to promoting and protecting human rights. It seeks to analyse inequalities which lie at the heart of development problems and redress discriminatory practices and unjust distributions of power that impede development progress and often result in groups of people being left behind. Under a human rights-based approach, plans, policies and programmes are anchored in a system of rights and corresponding obligations established by international law, including all civil, cultural, economic, political and social rights, and the right to development. HRBA requires human rights principles (universality, indivisibility, equality and non-discrimination, participation, accountability) to guide United Nations development cooperation, and focus on developing the capacities of both 'duty-bearers' to meet their obligations, and 'rights-holders' to claim their rights."

[30]QUNO (2020), Submission to HRC Special Rapporteur on Extreme Poverty and Human Rights' Report to the UN General Assembly on the "just transition": people in poverty and sustainable development.

Reforming and eventually eliminating fossil fuel subsidies holds enormous potential for welfare gains, reducing inequities, and reducing GHG emissions and other pollution. The TESSD launched this year in Geneva provides an excellent platform to shape a meaningful work programme on FFS.

FFS reform has begun to be seen as a trade-policy issue over the past few years. At MC12, there would be space for submitting a formal proposal on FFS reform. Over the long run, the benefit of involving the WTO in the reform process would be that it can make binding rules that can be enforced through its dispute settlement system. Meanwhile, over the short to medium-term, the WTO could: 1) make better use of existing processes and tools for FFS reform; and 2) provide a new interpretation of its subsidies rules or develop a dedicated agreement on FFS reform.

Based on the issues, opportunities and challenges highlighted earlier in this paper the following could be questions for stimulating discussions on "how to" address FFS in the WTO:

1. How can the WTO make FFS the focus of in-depth policy reviews?
3. How can the notification of FFS in the WTO be improved more systematically?
4. How can existing trade rules be enforced through litigation and trade remedies?
5. How to provide a supplementary interpretation of WTO rules (e.g., clarify how the rules should apply in the context of WTO dispute settlement)?
6. How to negotiate a stand-still agreement on fossil fuels subsidies (i.e., agree to freeze all or a subset of subsidies, and prohibit the creation of new ones)?
7. How to negotiate specific disciplines on fossil fuels subsidies (e.g., in a stand-alone agreement)
8. Overall, how can the WTO best contribute to international FFS reform efforts as part of a wider set of international actors and processes?

To counter the extant fragmented governance structure for FFS, it would be important that the WTO develops a coherent approach to FFS reform in concert with other intergovernmental organisations.

No matter what the WTO decides to do in this area, governments need to better understand the ways in which their own and other countries' policies support fossil fuel consumption and production and what the impacts would be of phasing out such support policies in the context of the wider transition to a low carbon economy. The WTO could support such efforts in developing countries through capacity building and technical assistance.

Removing FFS could go a long way to financing a "just transition" to a low-carbon economy. Ensuring that FFS reform conforms to the principles of such a transition would require anticipating its impacts on consumers and workers and developing appropriate flanking measures. WTO members, if they haven't already, should begin consulting with workers, firms and local governments, and explore what financial support and other policies may be needed to effect FFS reform. Institutional capacities of governments will be critical in ensuring that FFS benefits the most vulnerable and marginalized segments of society (e.g., through enlarged social protection floors. The WTO has a potentially valuable role to play in sharing ideas and experiences in these areas.

Reducing or eliminating remaining subsidies to fossil fuels will affect a significant segment of the world population. To the extent that fossil fuel combustion is reduced as a result, and government revenues are able to be redeployed for other purposes, the benefits will be widespread but diffuse. Other impacts will be more concentrated.

Impacts of reforming fossil-fuel production subsidies

Among the industries that will benefit from FFS reform are providers of goods and services that supply or use alternative energy sources. Power plants that generate electricity from renewable energy sources will become more competitive in those markets where fossil fuels purchased by electric companies were previously subsidized. Vendors of home appliances and industrial machines that use electricity rather than fossil fuels will find it easier to compete against those requiring natural gas or petroleum products.

Fossil-fuel producers in subsidized industries will see their profits decline, however, and employment will drop not only in oil and gas extraction and coal mining, but also the companies that supply them with machinery and other inputs. These effects will often be regionally acute.[31]

Such effects have been observed, certainly, following past reforms. Over the last 60 or so years, for example, the countries of the European Union (EU) have withdrawn subsidies to their hard coal industry, an industry that at its height employed several million miners (mostly men), plus at least as many people in supporting industries.[32] The experience of that period is salutary.[33]

The Government of The Netherlands, for example, after it had discovered enormous deposits of natural gas under its territory, closed down its coal mines over the course of a decade; its last mine was shuttered in 1974. France, which in the 1970s embarked on a major program to develop nuclear power, let its coal industry decline more gradually, but in 1994 decided to close down all of its remaining coal and lignite mines, a feat that was concluded ten years later. Germany, by contrast, kept recruiting new workers into its heavily subsidized hard coal mines and only closed its last underground pit in 2018.

In an attempt to reduce local unemployment, national European governments typically provided a combination of passive and active policies. Older miners were offered early-retirement packages. Younger workers were offered extended periods of unemployment insurance and job training. Financial incentives were often provided to relocate firms into the affected areas. But these measures only eased somewhat the inevitable decline in local economic activity.

[31]In the United States, for example, Tomer et al. (2021) found that the share of jobs that are in fossil fuel industries in the 10 counties with the highest share of fossil fuel employment range from 35% to 50% of all jobs in those counties, versus just 1.1% for the nation as a whole.

[32]Data on indirect jobs related to coal mining are approximate. Alves Dias et al. (2018: 29) report the ratio of indirect to direct jobs of anywhere from 0.2 to 3.9, with 1.6 for underground hard-coal mining in Germany.

[33]By no means was the decline in mining jobs due to the withdrawal of subsidies, however. The mechanization of mining was responsible for a large part of the decline in the underground workforce.

More recent evidence from India (Pai, 2021) shows that main direct effect of transitioning away from subsidizing domestic coal mining will be felt in the mining industry itself. In that country, coal mining is concentrated in 51 districts and provides 80% of all coal jobs. The power plants that consume the coal are spread across 140 districts and represent only 20% of jobs. Moreover, some of those jobs in the power sector can be readily transferred to plants that use other sources of energy to generate electricity. Overall, Pai estimates, some 3.6 million jobs in India are directly or indirectly linked to domestic coal mining.

Impacts of reforming fossil-fuel consumption subsidies

Given that most of the FFS identified to date in non-OECD countries result from administered pricing policies that keep retail prices for petroleum products, natural gas, or electricity below world reference prices, reform of those policies implies increased costs to consumers. High-income countries, such as countries that are low-cost producers of fossil fuels, should be able to use the increased revenues from selling those fuels at a higher price to help compensate their poorest citizens. The impacts of FFS reform in low- and middle-income countries are more varied and complex, however. In those countries, the distributional effects of an increase in prices for fossil fuels or electricity largely depends on country- specific income and the distribution of energy expenditure across households, and the forms of energy used.

In 2010, the World Bank (Bacon et al., 2010) published a detailed analysis of household expenditure on energy, food, and transport in seven south or southeast Asian countries (Bangladesh, Cambodia, India, Indonesia, Pakistan, Thailand, and Viet Nam), and two African countries (Kenya and Uganda). What it found was that at the time (2003 to 2006, depending on the country), expenditure on all forms of energy ranged from 7% to 12% of total household expenditure (Appendix tables A.1 and A2.)

Natural gas was not a significant source of energy in any of the surveyed countries. Petroleum products accounted for the bulk of the modern energy purchases, except in Pakistan, where a greater share was spent on electricity. In all countries, the share of household expenditure going towards the purchase of transport fuels (gasoline and diesel) was higher among the top two income quintiles than the bottom two — often substantially higher.

This pattern differs from that seen in a country like the United States, where the situation is reversed: there the households in the poorest septile[34] spent 6.5% of their income on transport fuels in 2018, versus 2.2% by the richest septile (Zhou et al., 2020: 28). The explanation, of course, is that private vehicle ownership is much less common outside of high-income countries. The implication is that raising the prices of transport fuels in developing countries will affect mainly those with enough income to afford vehicles, especially cars or trucks.

Kerosene was the petroleum product consumed slightly more by urban households than by rural households in most of the surveyed countries, and in all countries more by poorer households than by richer households. In Cambodia, for example, the poorest urban households spent 1.9% of their income on kerosene alone, versus just 0.1% in rural areas. In

[34]A septile is a quartile in which the statistical population is divided into seven subsets of (nearly) equal sizes.

Indonesia and Kenya, households spent between roughly 2% and 3.5% of their income on kerosene. Generally, the larger the share spent on electricity (suggesting more widespread electrification), the smaller the share on kerosene or liquified propane gas, as can be seen most starkly in the numbers for Indonesia, Pakistan, and Thailand, especially among the rural population.

Some countries depended on biomass much more than others, particularly for cooking. In Bangladesh and Cambodia, biomass accounted for a higher share of rural household expenditure than expenditure on modern forms of energy in across all income quintiles, and in India, all but the top quintile of rural households. Among urban households, biomass dominated only in the expenditure of the poorest two to four quintiles in these three countries. FFS reform would not directly affect the price of biomass — which is responsible for increased morbidity and premature mortality through air pollution — but it could indirectly affect its price or at least its consumption.

What these various studies underscore is the diversity of starting conditions confronting countries as they contemplate the phasing out of their FFS — which provides all the more reason for developing transition plans that are tailored to each country's circumstances.

What leads to successful subsidy reforms?

Several analyses show that subsidy reforms that are efficient in economic terms may be considered not politically viable, leading to less-than-optimal policies. The design of successful FFS reform depends not only on the timing, speed and sequencing of the reforms; it also works best if at the same time the government commits to improve and enlarge social protection floors or to guarantee sufficiently high benefits in the face of inexistent social protection systems.

Experiences in some developing countries have shown that subsidy reforms can incorporate an horizontal and vertical expansion of social protection floors — as an integral element of reform adjustments. Examples are Jordan, where the budgetary savings from its reform of fuel prices in 2005 and 2008 were used to expand its social safety networks; and Mozambique, where budgetary allocations to a range of social protection programs were increased substantially when the government increased fuel prices by 38% in 2008 (Alleyne and Hussain, 2013). However, in others countries (such as Egypt), this option has revealed itself to not be appropriate, as the existing social safety nets proved inadequate to the task of protecting the poor (Fattouh and El-Katiri, 2013). Many other developing countries, in which social assistance systems do not exist or have sequenced their reforms by initially removing subsidies to fuels mainly consumed by the wealthiest segments of the population (e.g., petrol), before doing so for fuel more important for lower-income groups (e.g. diesel and kerosene), or have developed compensation schemes to mitigate the adverse effects of the reform on the most vulnerable and marginalized segments of society (Clements et al., 2013; van Beers and Strand, 2013).

Cash transfers to households are often used to sustain the extreme poor and to support needed adjustments. With this system, targeted households receive an amount of cash that at least partially offsets the direct and indirect effects of the energy price increases (Ruggeri

Laderchi, 2014: 16). However, caution needs to be exercised to avoid over-compensation, which could have adverse social consequences and foster resistance from those who receive no payments.[35] Poverty-neutral cash transfers can, moreover, lead to an unequal distribution of compensation benefits among regions. In particular, regions with higher energy consumption but lower pre-reform poverty rates will tend to receive a larger share of the overall compensation budget.

The challenge is then to ensure an adequate balance among the complementary income support for transitions and core public programs to spur long-term growth and poverty reduction. For example, in some Sub-Saharan African countries, subsidy reforms have been associated with several additional measures as the elimination of fees for state primary and secondary schools, a ceiling on public transport fares, additional funding for health care in poor areas and a rise in the minimum wage, as experienced by Ghana during its 2005 reform, or investments related to the expansion of rural health services, electrification, and drinking water supply, as in Gabon when the government increased gasoline and diesel prices by 26% in March 2007 (Alleyne and Hussain, 2013).

In sum, all available studies agree that a successful reform requires a consistent package of different measures that complement and reinforce each other such as an appropriate timing, a sound public communications strategy, and well-targeted compensating measures that facilitate public acceptance of reforms.

[35]Also see https://www.ohchr.org/documents/issues/epoverty/humanrightsapproachtosocialprotection.pdf

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Appendix Table A.1. Shares of rural household expenditure on various energy sources, food, and transport for select countries (2003-06)[a], by quintile: all households (%)

Country	Quintile	Kerosene	Liq.	Gasoline	Petroleu	Natural	Electricity	Total	Biomass	Total	Purchase	Other	All food	Transport
Bangladesh	1	1.5	ND	0.0	**1.5**	0.0	0.3	**1.8**	6.2	**8.0**	56	13	**70**	1.8
	2	1.3	ND	0.0	**1.3**	0.0	0.4	**1.8**	5.8	**7.6**	51	17	**68**	2.2
	3	1.1	ND	0.0	**1.2**	0.0	0.8	**2.0**	5.5	**7.5**	49	16	**65**	2.5
	4	0.9	ND	0.1	**1.0**	0.1	1.1	**2.2**	4.7	**6.9**	45	15	**60**	2.9
	5	0.6	ND	0.4	**1.0**	0.1	1.2	**2.4**	3.5	**5.9**	39	12	**51**	2.9
Cambodia	1	1.6	0.0	ND	**1.6**	NA	0.1	**1.7**	6.6	**8.4**	49	28	**77**	0.2
	2	1.3	0.0	ND	**1.3**	NA	0.1	**1.5**	5.8	**7.3**	51	25	**76**	0.2
	3	1.1	0.0	ND	**1.2**	NA	0.3	**1.5**	5.2	**6.8**	54	21	**75**	0.2
	4	0.9	0.1	ND	**1.0**	NA	0.6	**1.6**	4.6	**6.2**	56	16	**72**	0.2
	5	0.5	0.4	ND	**0.8**	NA	1.3	**2.1**	2.9	**5.0**	50	9.4	**59**	0.1
India	1	2.1	0.0	0.0	**2.2**	NA	1.2	**3.4**	8.8	**13**	55	8.8	**63**	1.5
	2	1.9	0.1	0.1	**2.1**	NA	1.7	**3.8**	7.9	**12**	52	10	**63**	1.9
	3	1.7	0.4	0.3	**2.4**	NA	2.1	**4.4**	6.9	**12**	49	12	**61**	2.4
	4	1.4	0.9	0.7	**3.1**	NA	2.4	**5.5**	5.6	**11**	45	12	**58**	2.9
	5	0.9	1.9	2.1	**4.9**	NA	2.8	**7.8**	3.1	**11**	41	8.9	**50**	3.8
Indonesia	1	2.1	0.0	0.2	**2.4**	0.0	2.4	**4.8**	3.7	**8.5**	55	15	**70**	1.2
	2	2.3	0.0	0.6	**3.1**	0.0	2.9	**5.9**	2.9	**8.8**	56	11	**68**	1.7
	3	2.3	0.1	0.9	**3.5**	0.0	3.4	**6.9**	2.2	**9.1**	56	11	**66**	2.2
	4	2.4	0.1	1.3	**4.1**	0.0	3.5	**7.6**	1.6	**9.2**	56	8.4	**64**	2.2
	5	1.8	0.3	1.6	**4.3**	0.0	3.0	**7.3**	1.0	**8.3**	52	8.7	**61**	2.2
Kenya[b]	1	2.1	0.0	0.0	**2.1**	NA	0.0	**2.1**	0.9	**3.0**	39	31	**70**	1.5
	2	2.1	0.0	0.0	**2.1**	NA	0.0	**2.1**	1.3	**3.4**	37	29	**66**	2.2
	3	2.0	0.0	0.0	**2.1**	NA	0.0	**2.1**	1.3	**3.4**	35	27	**61**	2.5
	4	1.8	0.0	0.2	**2.0**	NA	0.1	**2.0**	1.6	**3.7**	33	23	**56**	3.0
	5	1.5	0.3	0.5	**2.3**	NA	0.1	**2.4**	1.5	**3.9**	30	16	**46**	3.8
Pakistan	1	0.5	0.1	0.1	**0.7**	0.1	3.2	**4.0**	4.6	**8.6**	48	12	**59**	2.7
	2	0.5	0.1	0.3	**0.9**	0.1	3.2	**4.2**	4.4	**8.6**	44	14	**58**	2.9
	3	0.4	0.2	0.4	**1.0**	0.1	3.3	**4.4**	4.1	**8.6**	42	15	**57**	3.0
	4	0.4	0.3	0.9	**1.6**	0.1	3.5	**5.3**	3.5	**8.8**	39	16	**55**	3.1
	5	0.3	0.5	1.7	**2.5**	0.1	3.6	**6.3**	3.3	**9.6**	35	15	**50**	3.4

Country	Quintile	Kerosene	Liq. propane	Gasoline & diesel	Petroleum	Natural gas	Electricity	Total modern	Biomass	Total energy	Purchased food	Other food	All food	Transport
Thailand	1	0.0	0.3	4.6	**5.0**	0.0	3.2	**8.1**	1.6	**9.8**	37	17	**55**	0.8
	2	0.0	0.7	5.8	**6.4**	0.0	3.1	**9.6**	1.1	**11**	37	13	**50**	1.0
	3	0.0	0.8	6.5	**7.3**	0.0	2.9	**10**	0.7	**11**	36	10	**46**	1.4
	4	0.0	0.8	7.2	**8.0**	0.0	2.8	**11**	0.4	**11**	34	7	**41**	1.6
	5	0.0	0.5	8.3	**8.8**	0.0	2.4	**11**	0.1	**11**	27	4	**32**	1.6
Uganda	1	1.8	ND	0.0	**1.8**	NA	0.1	**1.9**	6.6	**8.4**	25	35	**61**	0.9
	2	1.7	ND	0.0	**1.7**	NA	0.1	**1.8**	5.4	**7.2**	25	35	**60**	1.4
	3	1.5	ND	0.1	**1.6**	NA	0.1	**1.8**	4.5	**6.3**	26	33	**59**	1.7
	4	1.4	ND	0.3	**1.6**	NA	0.1	**1.8**	3.9	**5.7**	27	29	**56**	2.2
	5	1.2	ND	0.6	**1.8**	NA	0.5	**2.2**	2.7	**4.9**	30	17	**47**	2.5
Viet Nam	1	0.4	0.2	1.1	**1.8**	NA	2.4	**4.2**	5.5	**9.6**	37	26	**63**	0.6
	2	0.3	0.8	2.0	**3.0**	NA	2.7	**5.7**	4.6	**10**	38	20	**58**	0.6
	3	0.3	1.8	2.8	**4.9**	NA	2.7	**7.6**	3.6	**11**	40	14	**54**	0.7
	4	0.2	3.5	3.6	**7.4**	NA	2.8	**10**	2.6	**13**	39	9.8	**49**	0.6
	5	0.2	4.3	4.4	**8.8**	NA	2.8	**12**	1.6	**13**	37	5.1	**42**	0.5

NA = fuel not available; ND = no question was asked concerning the fuel.

[a] Data are based on household expenditure surveys conducted during the following years: Bangladesh (2005), Cambodia (2003–04), India (2004–05), Indonesia (2005), Kenya (2005–06), Pakistan (2004–05), Thailand (2006), Uganda (2005–06), and Vietnam (2006). See Appendix A of Bacon et al. (2010) for further details.

[b] For Kenya, nearly 40% all rural households, and as much as 68% of the bottom quintile, were assigned a value of zero to non-purchased biomass.

Source: Table 3.5 in Bacon et al. (2010: 44-45), with some formatting changes.

Appendix Table A.2. Shares of urban household expenditure on various energy sources, food, and transport for select countries (2003-06)[a], by quintile: all households (%)

Country	Quintile	Kerosene	Liq. propane	Gasoline & diesel	Total petroleu	Natural gas	Electricity	Total modern	Biomass	Total energy	Purchased food	Other food	Total food	Transport
Bangladesh	1	1.1	ND	0.0	**1.1**	0.1	1.1	**2.3**	5.9	**8.3**	62	6.5	**68**	1.7
	2	0.9	ND	0.0	**0.9**	0.3	1.6	**2.8**	5.0	**7.7**	60	6.6	**66**	2.0
	3	0.7	ND	0.0	**0.8**	0.6	2.0	**3.4**	4.3	**7.8**	57	5.3	**62**	2.4
	4	0.6	ND	0.0	**0.6**	0.9	2.6	**4.2**	3.3	**7.5**	55	4.0	**59**	2.8
	5	0.3	ND	0.3	**0.6**	1.6	2.5	**4.8**	1.5	**6.3**	42	2.0	**44**	3.3
Cambodia	1	1.9	0.0	ND	**1.9**	NA	0.3	**2.1**	7.1	**9.2**	61	16	**77**	0.0
	2	1.3	0.0	ND	**1.4**	NA	1.1	**2.5**	5.9	**8.4**	58	17	**75**	0.0
	3	0.9	0.2	ND	**1.1**	NA	1.4	**2.5**	5.2	**7.7**	60	12	**72**	0.1
	4	0.6	0.4	ND	**1.0**	NA	2.3	**3.3**	4.2	**7.5**	60	7.7	**68**	0.2
	5	0.1	1.3	ND	**1.3**	NA	3.9	**5.2**	1.5	**6.8**	47	2.0	**49**	0.1
India	1	2.1	0.2	0.0	**2.3**	NA	2.3	**4.6**	5.7	**11**	51	0.9	**52**	1.6
	2	1.9	0.7	0.1	**2.6**	NA	2.6	**5.2**	5.3	**11**	53	1.2	**54**	1.3
	3	1.8	1.5	0.1	**3.5**	NA	3.0	**6.5**	3.9	**11**	50	1.3	**51**	1.8
	4	1.8	2.6	0.5	**4.9**	NA	3.4	**8.3**	2.2	**11**	47	1.0	**48**	2.3
	5	0.8	2.9	2.2	**6.0**	NA	3.8	**9.8**	0.5	**10**	37	0.5	**37**	2.9
Indonesia	1	3.5	0.0	0.1	**3.6**	0.0	3.5	**7.2**	2.1	**9.4**	59	5.1	**64**	1.2
	2	3.4	0.0	0.5	**4.1**	0.0	4.0	**8.1**	1.1	**9.2**	58	4.0	**62**	2.0
	3	3.1	0.1	0.8	**4.3**	0.0	3.9	**8.2**	0.7	**8.9**	56	5.0	**61**	2.8
	4	2.7	0.2	1.2	**4.5**	0.0	4.1	**8.7**	0.3	**8.9**	55	3.1	**58**	3.4
	5	1.6	0.6	1.8	**4.4**	0.0	3.9	**8.4**	0.1	**8.5**	48	2.0	**50**	3.7
Kenya[b]	1	3.1	0.0	0.0	**3.1**	NA	0.0	**3.1**	2.6	**5.8**	54	12	**66**	1.2
	2	3.4	0.0	0.0	**3.4**	NA	0.6	**4.0**	4.3	**8.3**	48	10	**58**	2.0
	3	3.7	0.0	0.0	**3.8**	NA	0.3	**4.1**	3.2	**7.3**	48	7.6	**56**	3.3
	4	3.1	0.0	0.0	**3.2**	NA	0.6	**3.8**	2.5	**6.3**	45	7.0	**52**	4.3

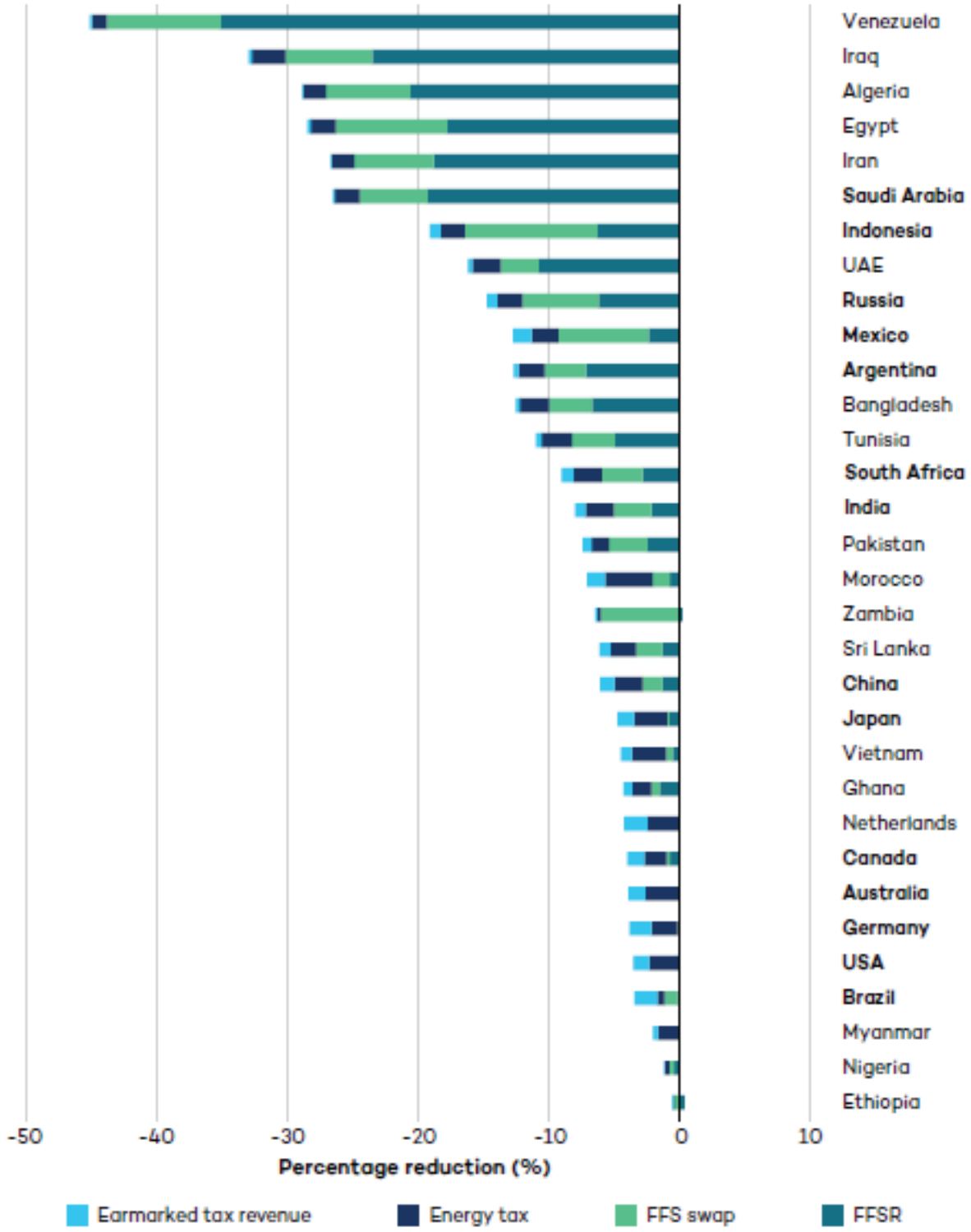
Country	Quintile	Kerosene	Liq. propane	Gasoline & diesel	Total petroleum	Natural gas	Electricity	Total modern	Biomass	Total energy	Purchased food	Other food	Total food	Transport
	5	2.2	0.6	0.8	**3.6**	NA	0.8	**4.4**	1.0	**5.4**	35	6.2	**41**	5.7
Pakistan	1	0.1	0.1	0.2	**0.4**	1.2	4.7	**6.4**	3.2	**9.6**	51	3.0	**54**	2.3
	2	0.2	0.2	0.3	**0.6**	1.4	5.0	**7.0**	2.3	**9.3**	49	2.8	**52**	2.6
	3	0.1	0.3	0.4	**0.8**	1.5	4.9	**7.2**	1.7	**8.9**	46	2.6	**49**	2.8
	4	0.1	0.3	0.8	**1.3**	1.7	5.0	**8.0**	1.1	**9.1**	44	2.1	**46**	3.4
	5	0.0	0.3	3.2	**3.5**	1.6	4.7	**9.8**	0.3	**10**	36	1.4	**38**	3.2
Thailand	1	0.0	0.5	4.7	**5.2**	0.0	3.8	**9.0**	1.3	**10**	41	12	**53**	0.8
	2	0.0	0.8	5.2	**5.9**	0.0	3.8	**9.7**	0.7	**10**	41	8.6	**49**	1.3
	3	0.0	0.8	5.1	**5.9**	0.0	3.8	**9.7**	0.3	**10**	39	6.6	**46**	1.8
	4	0.0	0.6	5.0	**5.6**	0.0	3.6	**9.2**	0.1	**9.3**	38	4.7	**43**	2.8
	5	0.0	0.3	6.2	**6.5**	0.0	3.3	**9.8**	0.0	**9.8**	31	2.6	**33**	2.9
Uganda	1	2.5	ND	0.0	**2.5**	NA	0.0	**2.5**	7.4	**9.8**	40	17	**57**	1.0
	2	1.7	ND	0.0	**1.7**	NA	0.2	**2.0**	6.7	**8.7**	38	15	**53**	1.7
	3	1.8	ND	0.0	**1.9**	NA	0.3	**2.2**	5.6	**7.8**	41	10	**51**	1.5
	4	1.3	ND	0.0	**1.3**	NA	0.8	**2.1**	4.7	**6.8**	42	6.5	**49**	2.3
	5	0.9	ND	0.6	**1.5**	NA	1.5	**3.0**	2.5	**5.5**	35	5.2	**41**	2.7
Viet Nam	1	0.6	1.2	1.6	**3.3**	NA	3.3	**6.6**	3.6	**10**	47	13	**60**	0.3
	2	0.7	2.4	2.2	**5.3**	NA	3.5	**8.8**	3.1	**12**	50	6.2	**56**	0.6
	3	0.6	4.2	3.4	**8.2**	NA	3.7	**12**	2.1	**14**	47	4.5	**51**	0.4
	4	0.3	5.1	4.4	**9.9**	NA	3.9	**14**	1.3	**15**	43	2.1	**45**	0.5
	5	0.1	5.0	5.0	**10**	NA	4.2	**14**	0.5	**15**	37	0.9	**38**	0.5

[a] Data are based on household expenditure surveys conducted during the following years: Bangladesh (2005), Cambodia (2003–04), India (2004–05), Indonesia (2005), Kenya (2005–06), Pakistan (2004–05), Thailand (2006), Uganda (2005–06), and Vietnam (2006). See Appendix A of Bacon et al. (2010) for further details.

[b] For Kenya, nearly 40% all rural households, and as much as 68% of the bottom quintile, were assigned a value of zero to non-purchased biomass.

Source: Table 3.6 in Bacon et al. (2010: 46-47), with some formatting changes.

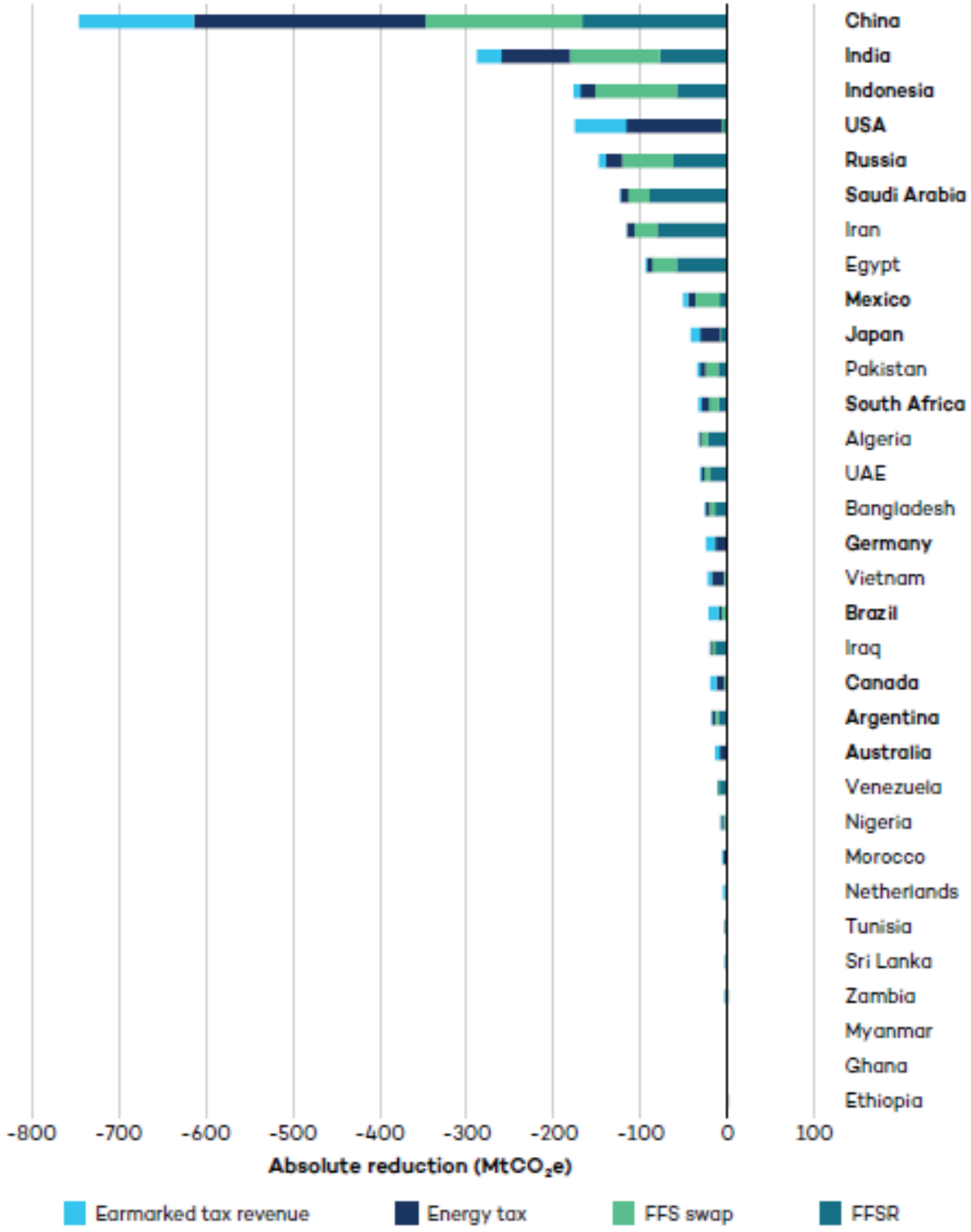
Appendix Figure A.1. Percentage of emission reductions in the year 2030 from fossil fuel subsidy reform (FFSR), an FFS swap, energy taxation, and earmarked tax revenue by country



Note: G20 countries are in bold.

Source: https://www.iisd.org/system/files/2021-07/cutting-emissions-fossil-fuel-subsidies-taxation.pdf

Appendix Figure A.1. Absolute emission reductions in the year 2030 from fossil fuel subsidy reform (FFSR), an FFS swap, energy taxation, and earmarked tax revenue by country.



Note: G20 countries are in bold.

Source: https://www.iisd.org/system/files/2021-07/cutting-emissions-fossil-fuel-subsidies-taxation.pdf

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