FFRE Introductory Report

Introduction

This introductory report sets out to give participants in the November 2018 UNOSD FFRE workshop in Costa Rica the background information necessary to participate in the workshop discussions. The report gives workshop participants an overview of the main themes and policy processes relating to fossil fuel subsidy reform, environmental fiscal reform and renewable energy transition. This process of shifting from fossil fuels to renewable energy is referred to by UNOSD as FFRE (fossil fuels to renewable energy).

The report covers international policy processes related to fossil fuel subsidy reform and renewable energy transition, as well as introducing the reader to the concept of environmental fiscal reform. The report also takes a look at basic trends related to FFRE in the Latin America and Caribbean region (LAC).

The international context

The Sustainable Development Goals in the context of energy transition

The Sustainable Development Goals are 17 international goals ultimately agreed by the United Nations General Assembly in Resolution 70/1 "Transforming our World: The 2030 Agenda for Sustainable Development".[1] Each goal has a number of agreed targets, and for each target, several indicators are to be measured and reported on by UN member states at regular intervals leading to 2030, when all goals should be achieved. In total, there are 169 targets and 232 indicators, some of which repeat for 2-3 different targets.[2]

The High-level Political Forum on Sustainable Development (HLPF) is the central UN platform for the follow-up and review of the 2030 Agenda for Sustainable Development. The HLPF facilitates the sharing of experiences, including successes, challenges and lessons learned and provides political leadership, guidance and recommendations for follow-up. It promotes system-wide coherence and coordination of sustainable development policies and aims to ensure that the 2030 Agenda remains relevant and ambitious and focuses on the assessment of progress, achievements and challenges faced by developed and developing countries as well as new and emerging issues. The forum also sets out to link these processes with all relevant United Nations conferences and processes, including on Least Developed Countries (LDC), Small Island Developing States (SIDS) and landlocked developing countries.

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[1] The Resolution is available online here: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

[2] Making 242 indicators altogether – for more information, please see: https://unstats.un.org/sdgs/indicators/indicators-list/

As part of the Agenda 2030 follow-up and review mechanisms, member states are encouraged to conduct regular and inclusive reviews of progress at the national and sub-national levels to serve as a basis for the regular reviews by the HLPF. These reviews are to be voluntary, state-led and undertaken by both developed and developing countries with the aim of providing a platform for partnerships, including through the participation of major groups and other relevant stakeholders.

At the 2018 HLPF, 46 countries presented their voluntary national reviews. In 2018, this included the following countries from the LAC region: Bahamas, the Dominican Republic, Ecuador, Jamaica, Mexico, Paraguay and Uruguay.

The SDGs cover a wide range of crosscutting issues relating to sustainable development, including poverty, hunger, health, education, gender equality, clean water and energy, sustainable growth, consumption and production, climate action, life below water and on land, peace and cooperation.

As a result, fossil fuel subsidy reform and renewable energy transition are directly related to several of the Sustainable Development Goals (SDGs). These are shown in Table 1.

Table 1: SDGs and targets related to FFRE transition

SDG	Relevant targets
	3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix 7.3 By 2030, double the global rate of improvement in energy efficiency 7.4 By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries
	12.C Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

	13.2 Integrate climate change measures into national policies, strategies and planning 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
	14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the WTO fisheries subsidies negotiation
	17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection

Domestic revenue mobilisation and the Addis Ababa Action Agenda

To achieve the SDGs, countries will need estimated financial resources of USD 1.4 trillion annually, according to the UN Sustainable Development Solutions Network.[3] In response to this urgent financing need, the 2015 Addis Ababa Action Agenda on financing for development calls on countries to mobilise and effectively use domestic resources generated by economic growth and supported by additional measures. These measures include "sound social, environmental and economic policies, including…adequate fiscal space" (§20). The Agenda recognises that progressive, more efficient and effective tax systems with a broadened tax base to "enhance domestic revenue as part of national sustainable development strategies" would be crucial to achieve the Sustainable Development Goals (§22).[4]

While many additional sources of financing will be required, fossil fuel subsidy reform and environmental fiscal reform (EFR) have the potential to play an important role in the fulfilment of the Addis Ababa Action Agenda. On the one hand, this is because environmental taxes and fossil fuel subsidy reform are promising policy instruments to mobilise domestic revenue, which can be used to create additional fiscal space to facilitate

[3] UN Sustainable Development Solutions Network (2015). "Investment Needs to Achieve the Sustainable Development Goals." Retrieved from http://unsdsn.org/wp-content/uploads/2015/09/151112-SDG-Financing-Needs-Summary-for-Policymakers.pdf

[4] Addis Ababa Action Agenda of the Third International Conference on Financing for Development, United Nations, 2015. New York, NY. Retrieved from http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf

investments necessary to achieve the SDGs.[5] No less important, however, is that the implementation of environmental taxation and fossil fuel subsidy reform brings fiscal policy into closer alignment with sustainable development and encourages more sustainable behaviours and investment patterns.[6]

Environmental taxation, particularly carbon taxation, has considerable potential to raise revenue. Already in 2018, the total global value of carbon taxes and emissions trading was USD 82 billion, with considerable scope for this to be increased in the future.[7] The High Level Commission on Carbon Prices chaired by economists Nicholas Stern and Joseph Stiglitz provide some indication of the potential for carbon taxes to mobilise revenues and have indicated that a carbon price of USD 50-100/tCO_2 in 2020-2030 is commensurate with the achievement of the Paris targets. If a carbon price were implemented globally at the top of this tax rate range, then carbon pricing schemes would raise just under USD 4 trillion annually.[8]

Fossil fuel subsidies, which act as a negative greenhouse gas emissions price, also have the potential to free up substantial amounts of revenue if they are reformed. The IMF has estimated that fiscal instruments subsidising fossil fuels were worth USD 650 billion in 2015, while post-tax fossil fuel subsidies – a definition which understands a subsidy as being the non-inclusion of all external costs associated with fossil fuel consumption – amounted to USD 5.3 trillion or 6.5% of global GDP in the same year.[9]

Figure 1 shows the scope of subsidy definitions, from direct and indirect budget transfers through to non-internalised external costs. The figure exemplifies the range of measures that can be considered subsidies, from direct and indirect budget transfers, through risk transfers, to non-internalisation of external costs.

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[5] The term fiscal space refers to "budgetary room that allows a government to provide resources for a desired purpose without any prejudice to the sustainability of a government's financial position". This widely recognised definition is quoted in Rathin Roy et al., *Fiscal Space* (UNDP 2015): http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf

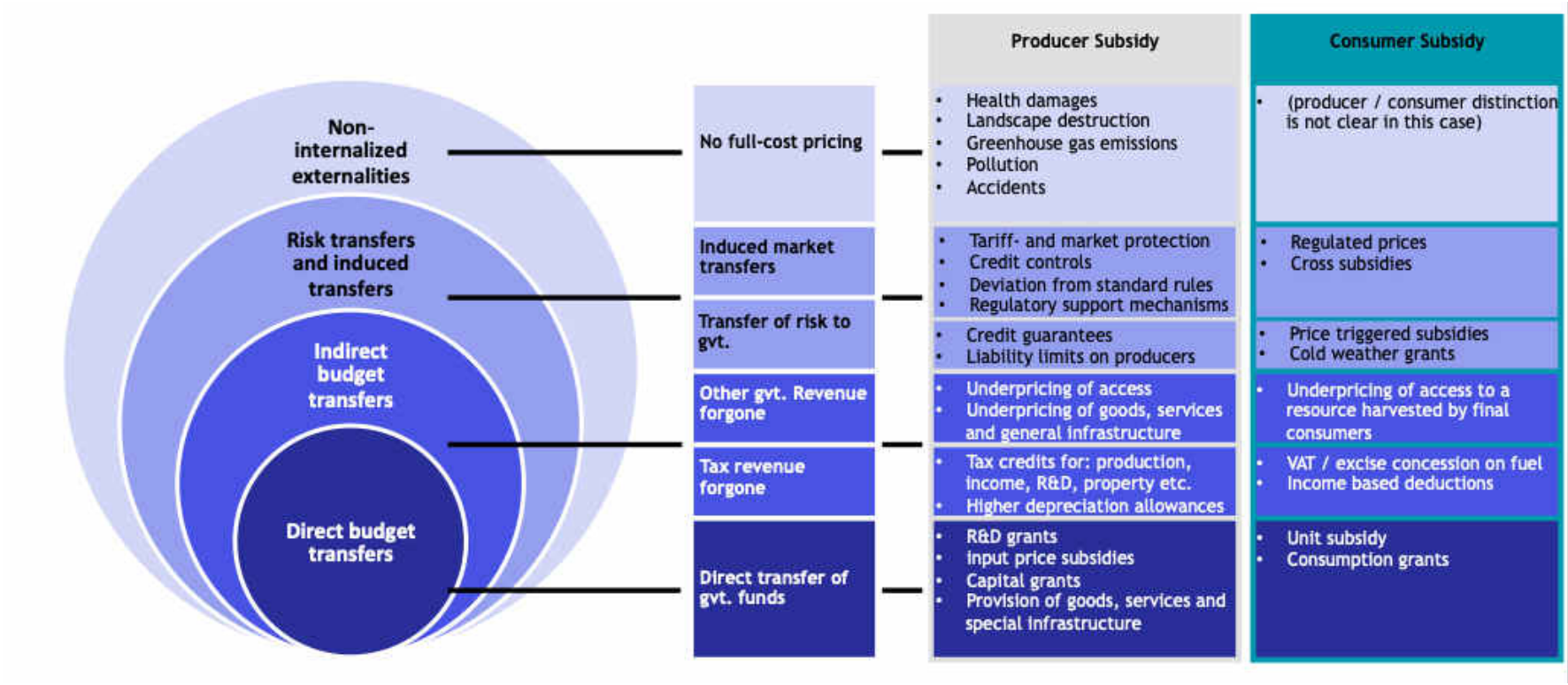
[6] See also the sections below on Environmental Fiscal Reform: Definitions and Rationale.

[7] World Bank (2018). *State and Trends of Carbon Pricing 2018*. Available online: https://openknowledge.worldbank.org/bitstream/handle/10986/29687/9781464812927.pdf

[8] World Bank (2017). *Report of the High-Level Commission on Carbon Prices.* Commission chaired by Nicholas Stern and Joseph Stiglitz. Available online at: https://static1.squarespace.com/static/54ff9c5ce4b0a53decccfb4c/t/59244eed17bffc0ac256cf16/1495551740633/CarbonPricing_Final_May29.pdf

[9] IMF Working Paper WP/15/105 (2015). How large are global energy subsidies? https://www.imf.org/en/Publications/WP/Issues/2016/12/31/How-Large-Are-Global-Energy-Subsidies-42940

Figure 1: The scope of subsidy definitions – from direct budget transfers to non-internalised externalities



Source: Forum Ökologisch-Soziale Marktwirtschaft 2018 - http://www.foes.de

Note: Different institutions apply different methodologies to quantify fossil fuel subsidies. The OECD uses an inventory approach, which lists subsidies and the spending associated with them. The IEA uses a 'price gap' approach, which compares end-use prices paid by fuel consumers with a reference price, which would prevail in a competitive market. The IMF also uses a price gap approach for pre-tax subsidies, calculating a reference price for the cost of energy including its distribution and transportation and comparing this price to the end-use price paid by consumers. To calculate post-tax subsidies, the IMF adds efficient levels of taxation on energy – including consumer product taxation and taxation to internalise external costs for human health, climate and environment – to the pre-tax subsidy.

Box 1: The WTO subsidy definition

The most widely accepted subsidy definition is the definition given in the 1994 World Trade Organisation (WTO) *Agreement on Subsidies and Countervailing Measures*, which reads:

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

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

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

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

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

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

or

(a)(2) there is any form of income or price support in the sense of Article XVI of GATT 1994;

and

(b) a benefit is thereby conferred.

Excerpt from the *Agreement on Subsidies and Countervailing Measures*, April 15 1994, Marrakesh Agreement Establishing the World Trade Organisation, Annex 1A, 1869 U.N.T.S. 14. Retrieved from: https://www.wto.org/english/docs_e/legal_e/24-scm_01_e.htm

International policy processes related to fossil fuel subsidy reform

Currently, there is considerable international political momentum behind fossil fuel subsidy reform. As shown in Table 1, in the Agenda 2030, for example, indicator 12.c under SDG 12 – ensure sustainable consumption and production patterns – requires all countries to rationalise inefficient fossil fuel subsidies (see Box 1 for an explanation of the term “inefficient fossil fuel subsidies”). As part of the Agenda 2030, indicator 12.C should be met by 2030 by all UN member countries.

The G20 group of countries[10] has also made a commitment to phase out inefficient fossil fuel subsidies. This has raised awareness amongst G20 governments regarding fossil fuel subsidies, has facilitated peer review and exchange of information on subsidies, including processes for the drawing up of subsidy inventories.

Similar commitments to fossil fuel subsidy reform have also been made by the 21 member countries of APEC[11] and the 9 non-G20 countries in the informal group, *Friends of Fossil Fuel Subsidy Reform*.[12]

Fossil fuel subsidy reform and carbon pricing are the most cost-effective and therefore the most politically feasible way of meeting the Paris Agreement target of keeping global temperature change well below 2°C above pre-industrial levels, and aiming to limit the increase to 1.5°C. Recognising this, prior to the 2015 Paris Climate Conference, 34 developing and 33 developed countries drew up Intended Nationally Determined Contributions (INDCs[13]) for greenhouse gas emissions reductions that explicitly referred to the implementation of fiscal instruments.[14] More recently, the World Bank identified references to carbon pricing in 88 Nationally Determined Contributions (NDCs).[15] In future, given the international policy background, continued fossil fuel subsidy reform, more carbon pricing schemes, and higher carbon prices all seem inevitable.

This is all the more likely important given recent publications, e.g. the Emissions Gap Report 2017 and the 2018 Special Report on the Impacts of Global Warming of 1.5°C from the Intergovernmental Panel on Climate Change (IPCC), which show that current NDC targets will not meet the greenhouse gas emissions reduction targets of the Paris Agreement.[16] Therefore CO_2 emissions per person would have to be kept below two tonnes per year – a limit the majority of countries exceed so far (for information CO_2 emissions per capita on LAC countries see Figure 10).

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[10] The G20 countries are: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States and the European Union.

[11] APEC 21 member economies are: Australia, Brunei Darussalam, Canada, Chile, People's Republic of China, Hong Kong, China, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Russia, Singapore, Chinese Taipei, Thailand, United States, and Vietnam.

[12] Current supporters of the informal friends of fossil fuel subsidy reform group are: Costa Rica, Denmark, Ethiopia, Finland, New Zealand, Norway, Sweden, Switzerland, Uruguay.

[13] The Intended Nationally Determined Contributions became Nationally Determined Contributions once the Paris Agreement was ratified.

[14] IISD, GIZ et al. (2015). *Fiscal Instruments in INDCs: How countries are looking to fiscal policies to support INDC implementation*. https://www.iisd.org/sites/default/files/publications/fiscal-instruments-indcs.pdf

[15] World Bank (2018). *State and Trends of Carbon Pricing 2018*. https://openknowledge.worldbank.org/bitstream/handle/10986/29687/9781464812927.pdf?sequence=5&isAllowed=y

[16] See: https://wedocs.unep.org/bitstream/handle/20.500.11822/22070/EGR_2017.pdf

Box 2: Inefficient fossil fuel subsidies

Many international commitments to reform fossil fuel subsidies are rather cautiously worded and refer to "inefficient" fossil fuel subsidies, which "encourage wasteful consumption". As a general rule, however, the vast majority of fossil fuel subsidies are inefficient, as they result in negative environmental and climate externalities, and thus in economic distortions and slow the pace of energy transition.

In their guide to FFS, GSI recommends evaluating inefficiency against the following criteria:

1. Cost-benefit analysis: An in-depth analysis of fiscal, administrative, social and environmental costs and benefits of a fossil fuel subsidy.

2. Investigation of whether a subsidy meets stated policy objectives, such as protecting poor households from energy price increases, or as a policy implemented in lieu of targeted social welfare programmes.
   In such cases, policymakers should be aware that subsidy benefits are very unevenly distributed in low- and middle-income countries, where the wealthiest 20% of the population capture 61% of gasoline subsidies, 54% of LPG subsidies and 42% of diesel subsidies, while the poorest 20% receive just 3%, 4% and 7% respectively.[17]

3. Consideration of whether a subsidy could be replaced with a more efficient and targeted policy to achieve the same objectives while reducing fiscal, administrative and environmental costs.

4. Whether the subsidy has outlived its rationale and is obsolete.

If governments subject fossil fuel subsidies to this kind of rigorous analysis, it is unlikely that a specific subsidy measure will be found to be efficient.

Source: IISD (2017). A guidebook to reviews of fossil fuel subsidies: From self-reports to peer learning. Available online at https://www.iisd.org/sites/default/files/publications/guidebook-reviews-fossil-fuels-subsidies.pdf

[17] IMF Working Paper WP/10/202. *The unequal benefits of fossil fuel subsidies – a review of evidence for developing countries*. https://www.imf.org/external/pubs/ft/wp/2010/wp10202.pdf

Environmental Fiscal Reform

Definitions and rationale

The World Bank definition of environmental fiscal reform is as follows:

> "...a range of taxation or pricing instruments that can raise revenue, while simultaneously furthering environmental goals. This is achieved by providing economic incentives to correct market failure in the management of natural resources and the control of pollution." (World Bank 2005)[18]

The European Environment Agency (EEA) is complementary to the World Bank definition, while emphasising the importance of subsidy reform:

> "Environmental Fiscal Reform (EFR) [….] focuses not just on shifting taxes and tax burdens, but also on reforming economically motivated subsidies, some of which are harmful to the environment and may have outlived their rationale." (EEA 2005)

Hence, EFR refers to environmental taxes, charges and fees, including carbon taxation, as well as reform of harmful subsidies – such as fossil fuel subsidies – and other market based instruments, such as emissions trading systems. Thus, the FFRE workshop will focus on those EFR policy instruments most relevant to the realisation of fossil fuel subsidy reform and renewable energy transition.

EFR works by correcting market failures by including the costs of environmental damage – pollution, greenhouse gas emissions, health impacts, and so on – in the price of goods and services. This creates a price incentive for economic actors to consume, behave and invest more sustainably. If EFR is not implemented, economic distortions remain in place, encouraging wasteful consumption and unsustainable levels of pollution.

EFR has the potential to address such market failures and to deliver a number of additional economic, social and environmental benefits. EFR is amongst the most cost-effective policy instrument to bring about the greenhouse gas emission reductions necessary to meet the targets of the Paris Agreement and is thus also one of the most politically feasible policy instruments for FFRE.

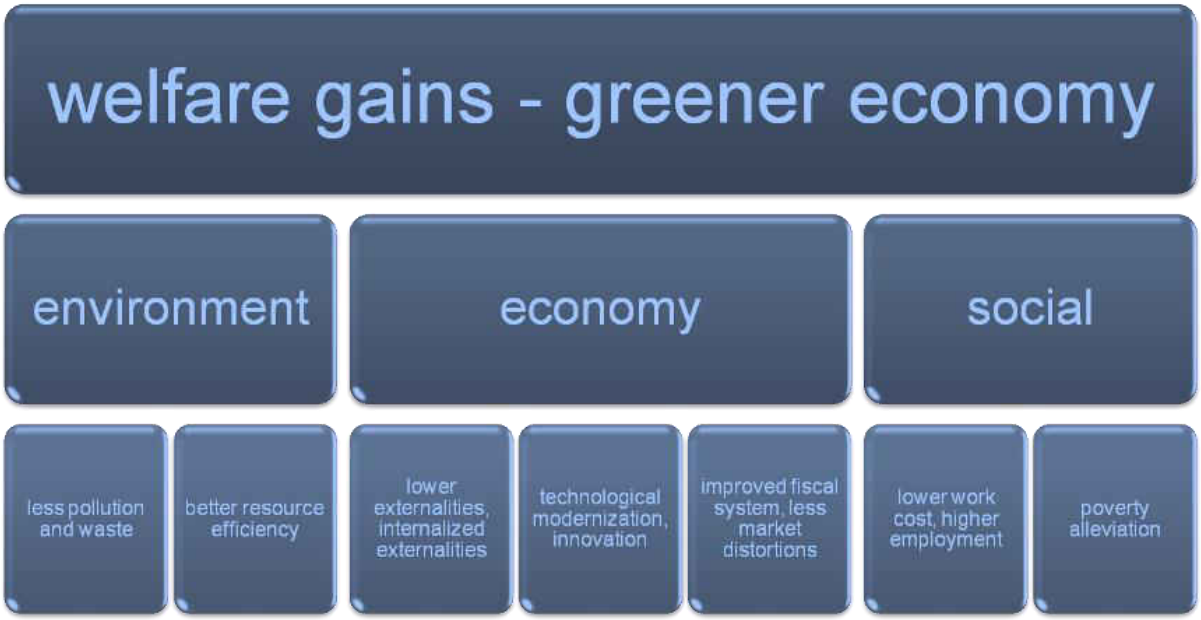
EFR can raise revenues through the implementation of environmental taxation, or reduce government spending and free up revenues by means of reform of harmful subsidies, while delivering a range of additional benefits. Indeed, EFR instruments generate multiple benefits in relation to all three pillars of sustainable development, as shown in Figure 2.

First, the direct impacts of price changes resulting from EFR can lead to improvements to environmental quality, reduce environmental pollution and degradation, and increase energy and resource efficiency. Implementing EFR to change the relative prices of energy

[18] http://siteresources.worldbank.org/INTRANETENVIRONMENT/Publications/20712869/EnvFiscalReform.pdf

sources within an economy can foster the deployment of renewable energy in preference over dirtier, carbon-intensive fossil fuel energy sources. Environmental changes may take place very rapidly in response to an EFR measure if substitutions – e.g. alternative technologies or fuels – are readily available, and economic actors are aware of their availability and can act. In some sectors, however, alternatives may not be readily or immediately available, or their cost is prohibitive. In such cases, additional measures may be necessary to foster behavioural change, e.g. green subsidies and grants for public transport, feed-in-tariffs for renewable energy, or green subsidies for low-carbon vehicles in the transport sector.

Figure 2: The multiple benefits of EFR



Second, EFR can internalize the external costs of environmental damage by including these costs within the price of a particular environmental good or service, creating a more efficient economy with fewer less market distortions, in which prices are better aligned with their environmental impact. These price changes also incentivise innovation and technological improvements, in line with these incentives. In the short-term, economic actors tend to respond to EFR by making behavioural changes, while in the medium- and longer-term, EFR will influence the investment decisions made by businesses and individuals and therefore has the potential to foster renewable energy transition.[19]

Policymakers should be aware that energy price increases may have a negative impact on energy-intensive industries subject to international competition. They may have to take

[19] For more details on the changing responses of economic actors to EFR over time see OECD (2010). *Taxation, innovation and the environment*. Paris, France. https://www.oecd.org/environment/tools-evaluation/48178034.pdf

steps to protect these industries, e.g. by supporting investment in energy efficient equipment, or implementing a border tax adjustment to compensate for higher domestic energy or carbon prices.

Finally, EFR can have direct positive social benefits e.g. on human health as a result of reduced pollution and environmental degradation. These welfare impacts are often underestimated. Use of EFR revenues for pro-poor investment, in e.g. education, health, or social welfare, can generate additional social benefits.

At the same time, increasing energy and resource prices can have negative impacts on social equity and policymakers must also take care, when implementing EFR, to ensure that households are protected from these potentially negative and regressive impacts.

IIED has proposed a hierarchy of possible policy options to better integrate social and environmental policymaking, listed in order of preference below[20] (Bass et al., 2014):

1. **Social transformation policies**, including redistributing control over assets or establishment of property rights, labour rights reform, tackling women's reproductive care burden, deepening participation, and ensuring procedural justice.
2. **Co-benefits policies** designed to exploit win-win opportunities to drive the green transition, e.g. conditional cash transfers, access to sustainable and affordable energy, water, sanitation, transport and housing, sustainable produce certification, and pro-poor payments for ecosystem services
3. **Safeguarding policies** to compensate for the social cost of green policies, e.g. unconditional cash transfers, social protection, redundancy payments, micro-finance access, and enterprise and skills training

Instruments for renewable energy transition, focussing on EFR instruments

1. Creating a level playing field in energy markets using EFR instruments

Carbon-energy taxation and emissions trading systems are appropriate policy tools to implement full-cost pricing within energy markets, i.e. the inclusion of all the negative impacts of fossil fuel combustion in the price of fossil fuels. If full-cost pricing is implemented, this eliminates market distortions stemming from the non-internalised external costs of fossil fuel combustion.[21] Correcting these market distortions means that renewable energy can compete fairly on energy markets on a level playing field.

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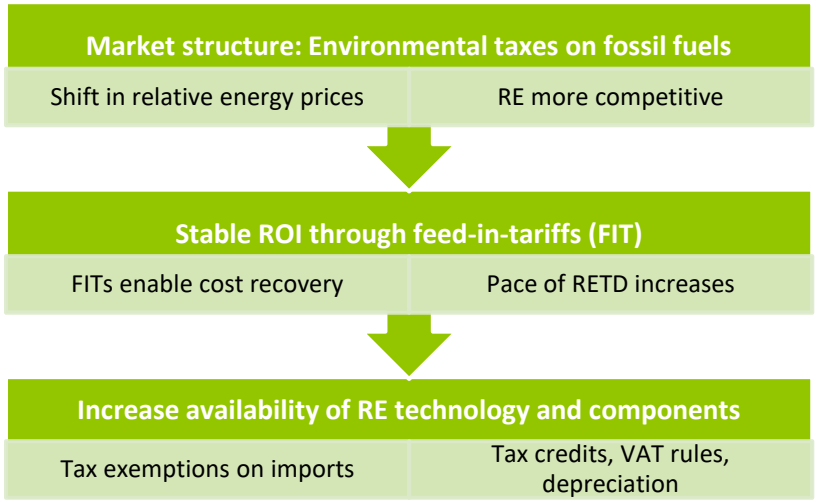
[20] IIED (2014). Securing social justice in green economies: A review and ten considerations for policymakers. http://pubs.iied.org/pdfs/16578IIED.pdf

[21] Fossil fuel combustion is associated with a range of environmental and social costs, which are examined in detail in the section on fossil fuel subsidy reform.

Alongside taxes on fossil fuels or emissions trading systems – particularly when technologies are just starting out in the market – other policy measures can also support renewable energy technology deployment, e.g. by fostering a stable investment climate, guaranteeing return on investment (ROI) and reducing risk, and reducing the cost of importing renewable energy technologies, as shown in Figure 3.

Figure 3: EFR measures to create a level playing field in energy markets



2. EFR instruments to enhance energy efficiency

A component of renewable energy transition is energy efficiency, as this has the potential to curb energy demand, reduce peaks in energy consumption, and reduce total investment required in renewable energy generation. Increasing energy prices by means of EFR measures – such as carbon-energy taxes, taxes on energy inputs, or electricity taxes – incentivises energy efficiency. Once realised, energy efficiency savings may create an opportunity for policy-makers to use money saved from higher efficiencies for expenditures for renewable energies, for which upfront capital costs can be relatively high.

Once renewable energy generation facilities are up and running, operational costs are much lower than fossil energies, or even close to zero, in the case of wind, hydro and solar. Thus, the targeted deployment of renewable energy, combined with improved energy efficiency, can significantly reduce the long-term costs of energy service.

A number of additional measures implemented alongside are also helpful, e.g. to facilitate behavioural change and access to appropriate technologies, including:

- Differentiated import duties
- Efficiency standards
- Green procurement
- Incentives to make larger energy-saving purchases (low-cost loans, grants…)
- Feebate schemes – to eliminate price spread between more and less efficient appliances
- Clear and compulsory energy efficiency labelling

3. Instruments to reduce risk

Creating a stable investment climate for renewable energy is essential to facilitate energy transition. Because operating costs for solar, wind and hydropower are very low, at 5%, 10% and 11% respectively, and upfront investment costs correspondingly high, investors are reliant on the future policy and regulatory environment to secure a return on investment.[22] Thus, policy and regulatory stability are critical.

Policymakers can reduce unnecessary risk through policy design. While EFR instruments can reduce risk by guaranteeing return on investment for renewable energy projects, many instruments to reduce risk are not EFR instruments. A range of policy approaches and instruments supportive of risk minimisation are listed below:

- Take steps to establish and communicate stable long-term political commitment to renewable energy policy – this may include carbon pricing and other EFR measures to bring about long-term changes and create a level playing field in energy prices, as well as creation of renewable energy agencies as a one-stop-shop for investors and to oversee deployment
- Credit / loan guarantees
- Insurance mechanisms to reduce cost of financing
- Policy insurance to guard against policy changes e.g. to feed-in-tariffs
- Feed-in-tariffs to guarantee a specified electricity price for renewable energy
- Power purchase agreements or other stable and enforceable contracts for electricity purchases
- Foreign exchange liquidity facility to guard against currency risk – to create a credit line which can be drawn on when the project needs money and paid back at times of project surplus
- Institutional support – including technical and training assistance
- Supportive infrastructure

Linkages between renewable energy and fossil fuel subsidy reform

Renewable energy transition can create an enabling framework for fossil fuel subsidy reform, because it reduces dependence on fossil fuels and thus the (perceived) need for the subsidy. In the case of Small Island Developing States (SIDS), one large solar PV installation or a wind farm can account for a large proportion of total electricity consumed in the country.

This is exemplified by the case of El Hierro, described in Box 3.

[22] IEA RETD (2016). *RE-TRANSITION. Transitioning to policy frameworks for cost-competitive renewables.*

Box 3: El Hierro - Renewable energy transition as an enabling factor for subsidy reform[23]

El Hierro is the smallest of the Canary islands, with a population of just over 10,000. In 1997, the island was 100% dependent on fossil fuels. In that year, El Hierro set itself the target of being the first 100% RE-powered island in the world.

In 2012-2013, 12MW of wind and 11MW of pumped hydropower generation for energy storage were installed, alongside solar PV, to replace the 13 MW of diesel generators powered by heavily subsidised diesel. Already in the first year of operation, 70-80% of total electricity came from RE sources. The system uses diesel generators as a backup only in times where there is no wind or hydropower available.

In this case, renewable energy transition generated substantial savings due to reduced expenditures on fossil fuel subsidies as a result of reduced fossil fuel use. In 2013 alone, these savings amounted to USD 2.4 million. At the time of the reform, revenues from the sale of renewable energy were expected to raise USD 5.4 million annually.

Potentials of Energy Transition[24]

There are a number of compelling reasons to reform fossil fuel subsidies and decarbonise energy systems in parallel. Fossil fuel subsidies have many negative impacts, as summarised in Figure 4. This section goes on to look at some of these effects in a little more detail and highlights the benefits of renewable energy transition.

1. The political, economic and fiscal costs of fossil fuel subsidies

Fiscal instability: Countries that are net importers of fossil fuels are extremely vulnerable to fluctuating oil, coal and natural gas prices on global energy markets. Particularly where governments subsidise fossil fuels, they may have to bear fiscal costs that amount to large proportions of total state revenue. In Mexico, for example, before fossil fuel subsidies were reformed, they amounted to USD 5 billion annually, making Mexico's spending on fossil fuel subsidised the 24th largest worldwide in absolute terms.[25]

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[23] All data included in this case study are taken from IEA-RETD (2012). *Renewable energies for remote areas and islands,* pages 164-168. http://iea-retd.org/wp-content/uploads/2012/06/IEA-RETD-REMOTE.pdf

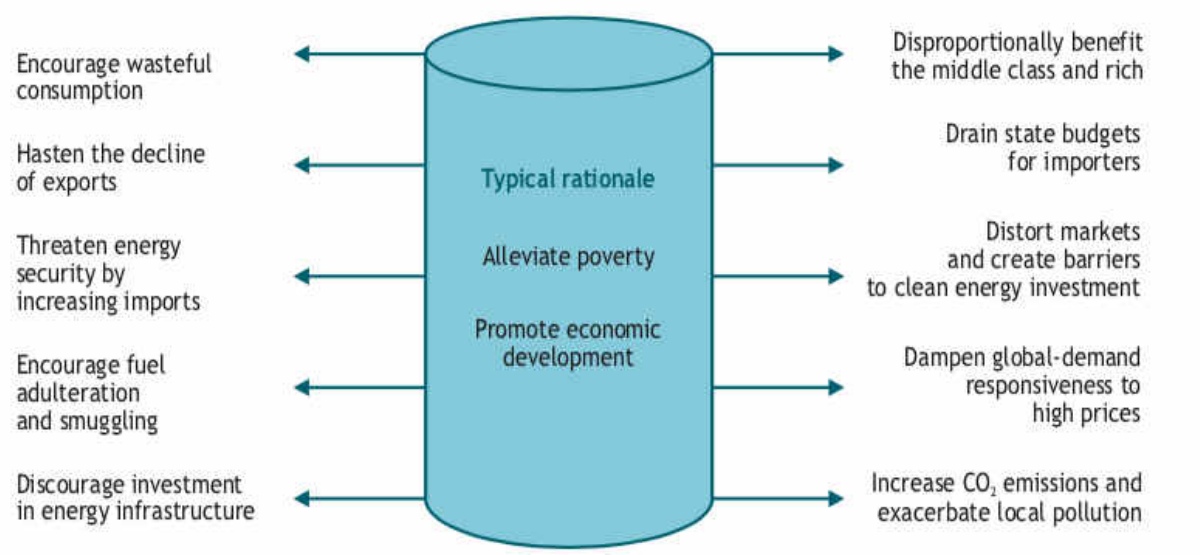
[24] A longer version of this text is available in Cottrell et al. (2015). *Fossil fuel to renewable energy: Comparator study of subsidy reforms and energy transition in African and Indian Ocean Island States*. https://www.unosd.org/content/documents/958FFRE%20Islands%20Comparator%20Study%202015-02-02.pdf

[25] IEA (2016). *Fossil Fuel Subsidy Reform in Mexico and Indonesia. Partner Country Series*. Available at: https://www.iea.org/publications/freepublications/publication/PartnerCountrySeriesFossil_Fuel_Subsidy_Reform_Mexico_Indonesia_2016_WEB.pdf

Macroeconomic and political imbalances: Fossil fuels bear extensive and long-term hidden structural and opportunity costs for both exporting and importing countries. For exporting countries, this includes overvaluation of a currency due to resource-related foreign investments, which results in the decline of the competitiveness of other sectors, notably agriculture and industry. Similarly, the so-called "resource curse" has many social and environmental impacts and may result prolonged civil unrest and conflict.

For example, the Gasolinazo protests in Mexico in January 2017 were partly triggered by global energy price increases, alongside a number of domestic policy issues.

Figure 4: Potential unintended effects of fossil fuel subsidies[26]



Note: CO_2 = carbon dioxide.
Source: IEA (2010), *World Energy Outlook 2010*, www.worldenergyoutlook.org/media/weo2010.pdf.

Market distortions: Subsidies distort energy prices in favour of inefficient energy consumption and encourage practices detrimental to livelihoods, such as agriculture with excessive irrigation, or fisheries where fossil fuel subsidies encourage stock depletion. They also distort investment decisions in a range of sectors, resulting in "lock-in" of fossil fuels and lack of investment in renewable energy and energy efficiency technologies.

Capital risks: There are longer-term risks associated with fossil fuel capital investments, as extraction and consumption of fossil fuels become more constrained under global green-house gas mitigation measures and investors "divest".

The risks of "stranded assets" are most obvious for resource-rich fossil fuel producing countries, but are also increasing for importing countries, which equally need trading, processing and retailing infrastructures and may invest in long-term path-dependent

[26] IEA (2016). *Subsidy reform in Mexico and Indonesia.* https://www.iea.org/publications/freepublications/publication/PartnerCountrySeriesFossil_Fuel_Subsidy_Reform_Mexico_Indonesia_2016_WEB.pdf

technologies (such as coal-fired power plants) that could well become unusable long before generating returns that cover their invested capital and debt.

2. Environmental costs of fossil fuel subsidies

Fossil fuel combustion not only emits greenhouse gases, but a range of pollutants, including nitrogen oxides, ozone, carbon monoxide, sulphur dioxide, particulate matter, mercury and lead, which are damaging to the natural environment and a cause of acidification of soils and ecosystems (acid rain), falling crop yields, biodiversity loss and environmental degradation.

Fossil fuel subsidies encourage wasteful consumption and higher levels of pollution and greenhouse gas emissions than would otherwise be the case. This has a serious environmental impact: Indeed, IISD has estimated that phasing out fossil fuel subsidies and increasing fuel taxation could result in a 23% reduction in CO_2 emissions globally.[27]

3. Social costs of fossil fuel subsidies

Health: Fossil fuel combustion emits a range of pollutants harmful to human health, affecting mortality, quality of life and labour productivity. The World Health Organisation has estimated that roughly 8 million people die prematurely each year from indoor and outdoor air pollution, much of it the direct result of fossil fuel combustion for electrical generation, industry and transport, as well as indoor cooking from coal, kerosene and biomass.[28]

Climate change is a threat to poverty reduction: The impacts of climate change – drought, irrigation failure, crop disease, increased natural disasters – all threaten to have more significant impacts on the poor than wealthier income groups, because the poor are more exposed, more vulnerable and have less access to social safety nets in times of hardship.[29]

Social cost of carbon: While the social cost of carbon is a disputed figure, due to the many uncertainties associated with it, it has recently been estimated that the Social Cost of Carbon may be around USD 200 per tCO_2 with costs highest in developing countries due to wider exposure to climatic extremes and stronger economic sensitivity.[30]

Inequality of subsidy benefits: Fossil fuel subsidies generally benefit higher-income groups far more than the poor. In low- and middle-income countries, the wealthiest 20% of the population capture 61% of gasoline subsidies, 54% of LPG subsidies and 42% of diesel

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[27] https://www.iisd.org/gsi/subsidy-watch-blog/fossil-fuel-subsidy-reform-research-suggests-emission-reductions-equivalent

[28] More information is available on the WHO website: http://www.who.int/airpollution/en/

[29] World Bank (2016). *Shock Waves: Managing the impacts of climate change on poverty.* https://openknowledge.worldbank.org/bitstream/handle/10986/22787/9781464806735.pdf

[30] Moore, Frances C., and Delavane B. Diaz, 2015. "Temperature Impacts on Economic Growth Warrant Stringent Mitigation Policy." *Nature Climate Change*. https://www.nature.com/articles/nclimate2481

subsidies, while the poorest 20% receive just 3%, 4% and 7% respectively.[31] Reforming unfair subsidies and pricing pollution correctly can redress this injustice, while also mobilising significant amounts of revenue for the achievement of the SDGs.

4. Benefits of energy transition

FFRE transition can mitigate the negative impacts of fossil fuels, as described above, as well as delivering a number of additional benefits:

Economic and fiscal benefits: Fossil fuel subsidy reform reduces wasteful spending on fossil fuel consumption, frees up revenues for pro-poor investment, facilitates improved fiscal governance, and leads to greater fiscal stability as vulnerability to the global hydrocarbon price fluctuations decreases. Ultimately, renewable energy transition can eliminate this vulnerability to global energy price fluctuations by making countries energy independent.

Energy transition will also create new economic opportunities and foster an investment environment appropriate for investment in both renewable and energy efficiency industries. Energy pricing which better reflects the negative environmental impacts of particular energy sources can foster investment in renewable energy.

Employment benefits: FFRE will result in a shift in employment opportunities, away from jobs in mining, fuel distillation, and power generation and towards jobs in the renewable energy sector. The International Renewable Energy Agency IRENA estimated that globally in 2017 there were 10.3 million jobs in the renewable energy sector, a 5.3% increase on 2016. This includes jobs in manufacturing, assembly, sales, installation, operations and maintenance. The distribution of these jobs is shown in Figure 5.

Social benefits: In addition, small-scale renewable energy sources also provide opportunities to increase energy security and facilitate energy access to the 1.1 billion people estimated to have been without access to modern energy in 2017, and thus have a key role to play in the achievement of SDG 7.[32] Within this process, countries can install more decentralised grids, more suited for smart distribution of renewable energy. Deployment of small-scale renewable energy can improve energy affordability and cost predictability, enabling rural and regional development and resulting in improved gender equity, human health, environmental quality, agricultural productivity and livelihood opportunities.[33]

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[31] Coady, D., Parry, I., Sears, L. and Shang, B. (2015). *How large are global energy subsidies?* IMF working paper 15/105. Retrieved from http://www.imf.org/en/Publications/WP/Issues/2016/12/31/How-Large-Are-Global-Energy-Subsidies-42940

[32] IEA (2017). World Energy Outlook.

[33] IRENA (2013). *Renewable Energy and Jobs.* Abu Dhabi: International Renewable Energy Agency. http://irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_RE_Jobs_Annual_Review_2018.pdf

The social benefits of the displacement of coal with renewable energy have been estimated to be as high as USD 100/MWh in some parts of the USA.[34] The alternatives to fossil fuels – renewable energy, energy efficiency and energy saving – offer policymakers a range of benefits that can greatly contribute to addressing various aspects of social, environmental and economic sustainability, such as in energy access, resilient livelihoods, water management, or food security.

Figure 5: Global renewable energy employment by technology 2012-2017[35]

Source: IRENA jobs database.

Note: The numbers shown in this Figure reflect those reported in past editions of the Annual Review.

a Includes liquid biofuels, solid biomass and biogas

b Other technologies include geothermal energy, hydropower (small), concentrated solar power (CSP), heat pumps (ground-based), municipal and industrial waste, and ocean energy.

Barriers to FFRE transition – and possible ways to overcome them

This section examines barriers to FFRE transition and discusses ways in which they can be overcome. The intention is rather to provide some initial ideas for discussion, than being a definitive list.

Fossil fuel subsidies: Because they keep the price of fossil fuels low and so distort energy markets, fossil fuel subsidies hinder the market entry of renewable energy and energy efficient products and fuels. Subsidy reform reduces the gap between fossil fuel and

[34] Siler-Evans, Kyle, Inês Lima Azevedo, M. Granger Morgan, and Jay Apt, 2013. "Regional Variations in the Health, Environmental, and Climate Benefits of Wind and Solar Generation." *Proceedings of the National Academy of Sciences of the USA*: 1-6.

[35] IRENA (2013). *Renewable Energy and Jobs.* Abu Dhabi: International Renewable Energy Agency. http://irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_RE_Jobs_Annual_Review_2018.pdf

renewable energy prices, while carbon-energy tax can create grid parity between renewable and fossil energy sources.

The political economy of fossil fuel energy industry: In spite of the many benefits of fossil fuel subsidy reform, it is a politically contentious process. The main obstacles to reform are not technical, but stem from the politics of the energy economy. Influential economic actors benefit from current flows of wealth creation and accumulation, and will be impacted by any changes. Therefore, understanding the political economy of actors, i.e. their interests, strategies, actions, relationships and discourses and how those change over time, is key to effective FFRE policy making and implementation.

To successfully reform subsidies, governments must prepare the ground well. A roadmap for reform should develop a strategy for how, when, and over what timescale to phase out subsidies, taking into consideration the concerns of a range of stakeholders and developing strategies to address them. Policymakers must acknowledge and confront power relations within energy systems and develop viable policy options to confront powerful players.

Limited fiscal space: In many low- and middle-income countries, tax revenues make up a relatively small proportion of GDP. As a result, fiscal space is constrained. This limits the capacity for governments to make investments in energy infrastructure and renewable energy technology for the achievement of their goals regarding energy efficiency and clean and affordable energy.

EFR measures can reduce wasteful government spending and increase the amount of state revenue raised. These revenues can be used to compensate the vulnerable, reduce the overall cost of FFRE transition by funding the installation of renewable energy or energy efficiency technology, or for research and development, fiscal consolidation, or other purposes.

Perceptions of risk: In the past, investors have tended to regard investments in renewable energy as high-risk low return in comparison to investments in fossil fuel energies. Inappropriate regulatory frameworks that fail to encourage renewable energy development or minimise risk can foster such misconceptions.

Governments can respond to these concerns by introducing policies to mitigate risk and guarantee return on investment – see above in *Instruments to reduce risk.*

Lack of economic incentives for investment in renewable energy: This may relate to lock-in of fossil fuel consumption and production, and/or a regulatory environment tailored to fossil fuel energy.

In response, governments can consider using a proportion of revenues to promote renewable energy investment and energy efficiency. This could take the form of legislation

such as low-cost loans and grants to cover capital investment costs[36], and/or softer instruments such as information campaigns, workshops and demonstration projects.

Insufficient access to renewable energy finance: The renewable energy sector has seen cumulative global investment of USD 2.9 trillion between 2004 and 2017.[37] Thus, a key question for the FFRE workshop is whether and how this investment can be leveraged and attracted to the LAC region.

Innovative financing mechanisms and exploration of a wide range of sources of financing, including the private sector, public-private partnerships, philanthropic trusts, sovereign wealth funds, and foundations, may all provide routes to boosting access to finance. Small-scale renewable energy projects can also be citizen or community owned, thus increasing and democratising energy access. Aggregating projects and seeking regional funding may also be helpful, particularly in the context of SIDS, to attract increased funding.

Technology transfer: Article 10 paragraphs 4-6 of the Paris establish a technology framework to promote and facilitate transfer and access to technology, as well as financial support, in particular to developing country parties.[38] Nonetheless, technology transfer constitutes a barrier to renewable energy deployment in many countries.

Given that many renewable energy technologies are privately owned, attracting private investment in renewable energy, or encouraging public-private-partnerships, are promising routes to address this problem. Regional cooperation may also be helpful, e.g. to facilitate research and development of appropriate technologies, exchange of best practices and access to efficient technologies.

Developing systems for small, remote areas at a reasonable cost: SIDS and small countries are generally unable to reap the benefits of economies of scale. Low capacity renewable energy installations require more investment per kWh generated and generate higher costs borne by fewer consumers.

In response, policymakers can use consumption predictions and weather forecasts, apply smart metering and smart grids, and increase the share of self-generation and self-consumption.

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[36] The operational costs associated with renewable energies are often much lower than for fossil fuels, if not close to zero. Thus, the targeted deployment of renewable energy, combined with combined with improved energy efficiency, can significantly reduce the long-term costs of energy service in remote communities such as SIDS. See IEA-RETD (2012) for details http://iea-retd.org/wp-content/uploads/2012/06/IEA-RETD-REMOTE.pdf

[37] UNEP / Frankfurt School (2018). Global trends in energy investment 2018. http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Global_Trends_in_Renewable_Energy_Investment_Report_2018.pdf

[38] https://unfccc.int/sites/default/files/english_paris_agreement.pdf

Overcoming barriers to FFRE in 2018 and beyond

Many barriers to FFRE transition have seen very substantial reductions during the past two decades. Also in developing countries, the potential of renewable energy transition is increasingly being realised, with developing economies – including China, Brazil and India – investing USD 177 billion in 2017, up 20% on the previous year and compared to USD 107 billion in the developed world.[39]

There is still a long way to go, however, to decarbonise the energy sector. The prices of many renewable energy technologies are continuing to fall – for example, solar costs have fallen by 72% between 2009-2017, due to a fall in capital costs and some efficiency improvements.[40] Fluctuations in the global oil price continue to render fossil fuel dependency destabilising and economically damaging.

Against this background, EFR instruments are powerful policy tools to facilitate FFRE transition.

Data from Latin America and the Caribbean

The data below from the World Bank, as well as reflections on the results from participants' questionnaires, is included to give participants insights into FFRE policies and progress in all participating countries. The main findings from data are below.

The data on tax revenue as a percentage of GDP in LAC countries in Figure 6 highlights the potential for many countries in the LAC region to boost fiscal space for the achievement of the SDGs by mobilising domestic revenues by means of environmental fiscal measures and fossil fuel subsidy reform, as well as through other measures. Over half all of the countries shown on the graph have tax-to-GDP ratios of less than 15%, in contrast to the EU average of around 20%. The need for many LAC countries to increase domestic revenues to meet debt obligations is highlighted in Figure 7.

As shown in Figure 8, the amount of renewables in LAC countries differs substantially: from almost 0% up to 77% of total primary energy supply. Following the content of the questionnaires we received so far, data on fossil fuel subsidies seems to be often intransparent or not existing. But also when checking only the post-tax fossil fuel subsidies data of IMF, we can see that fossil fuel subsidies in some countries sum up to a significant share of GDP (up to 13%, as shown in Figure 8). To identify the real, total share, which might be much higher, additional research would be necessary.

From the information in the questionnaires we have received, EFR measures in LAC countries seem, in the main, to have been introduced only on a rather low level. Nevertheless, most

[39] UNEP / Frankfurt School (2018). Global trends in energy investment 2018. http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Global_Trends_in_Renewable_Energy_Investment_Report_2018.pdf

[40] Ibid.

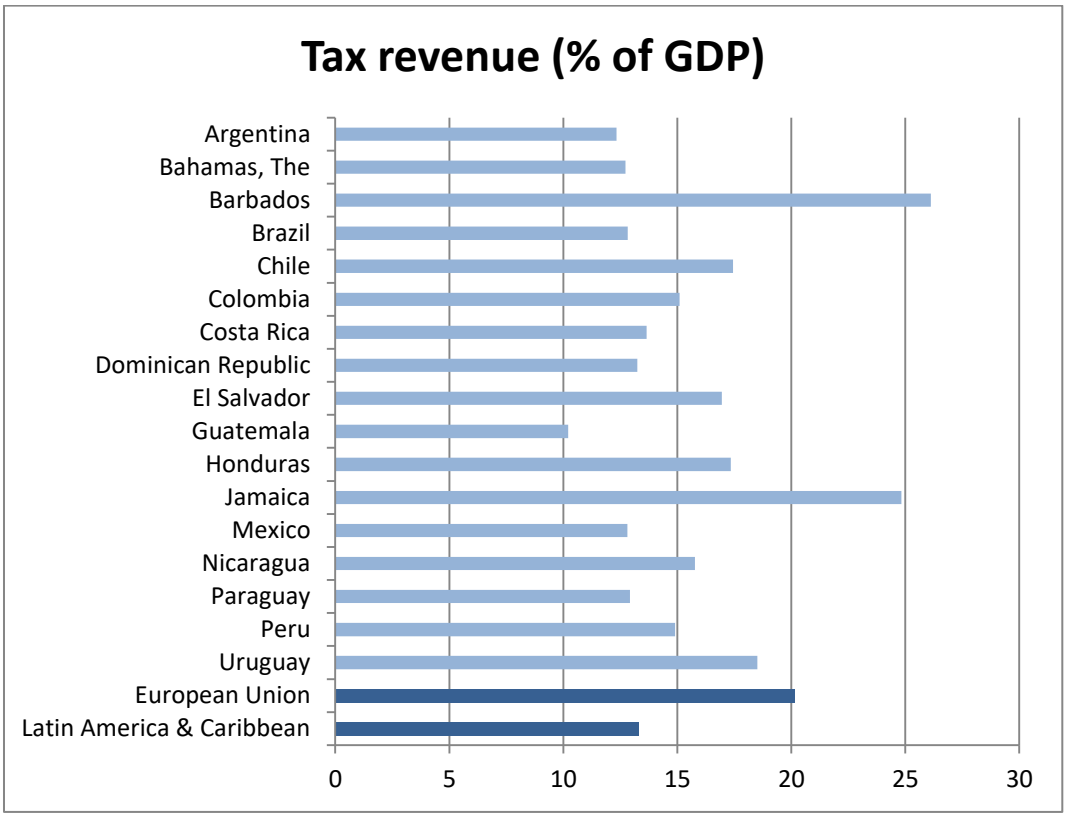
countries in LAC have rather low CO_2 emissions per person (except Trinidad and Tobago, Bermuda, Bahamas, Antigua and Barbuda), as shown in Figure 10. In addition, most of the LAC countries have higher emissions than 2 tons per person per year, which is the level of emissions required to meet the targets of the Paris Agreement. Furthermore, those countries with lower CO_2 emissions achieve these to a high amount due to rather low economic welfare.

If the LAC countries are compared to the European Union average, only Bermuda, Uruguay and Costa Rica attain or are able to improve on European levels of CO_2 efficient production (see Figure 11 on CO_2 emissions per unit of GDP). This indicates that CO_2 emissions in the majority of LAC countries will rise substantially if they achieve higher rates of GDP growth following their current economic path. Thus, to combine economic welfare and with low CO_2 emissions, a lot has to be done in most of the LAC countries to decouple CO_2 emissions from GDP growth.

The most significant countries in LAC regarding (their absolute) CO_2 emissions are Brazil, Mexico, Argentina, Venezuela, Columbia, Chile and Peru. To reduce greenhouse gas emissions of the LAC region, emissions reductions in these countries are crucial. However, as indicated above, this doesn't imply that there is no need for action in other countries.

Finally, Figure 12 shows gasoline and diesel prices in LAC countries. Some countries have relatively low fuel prices – some very close to the global oil price, which averaged just USD 0.27 in 2016 – indicating high subsidies for transport fuels. All LAC countries price gasoline and diesel differently, reflecting in most cases differential tax treatment of the two fuels and in many countries, the existence of subsidies for diesel fuel. Overall, fuel prices in LAC are such that taxes on fuels do not internalise all the external costs of the use of fossil fuels in the transport sector.

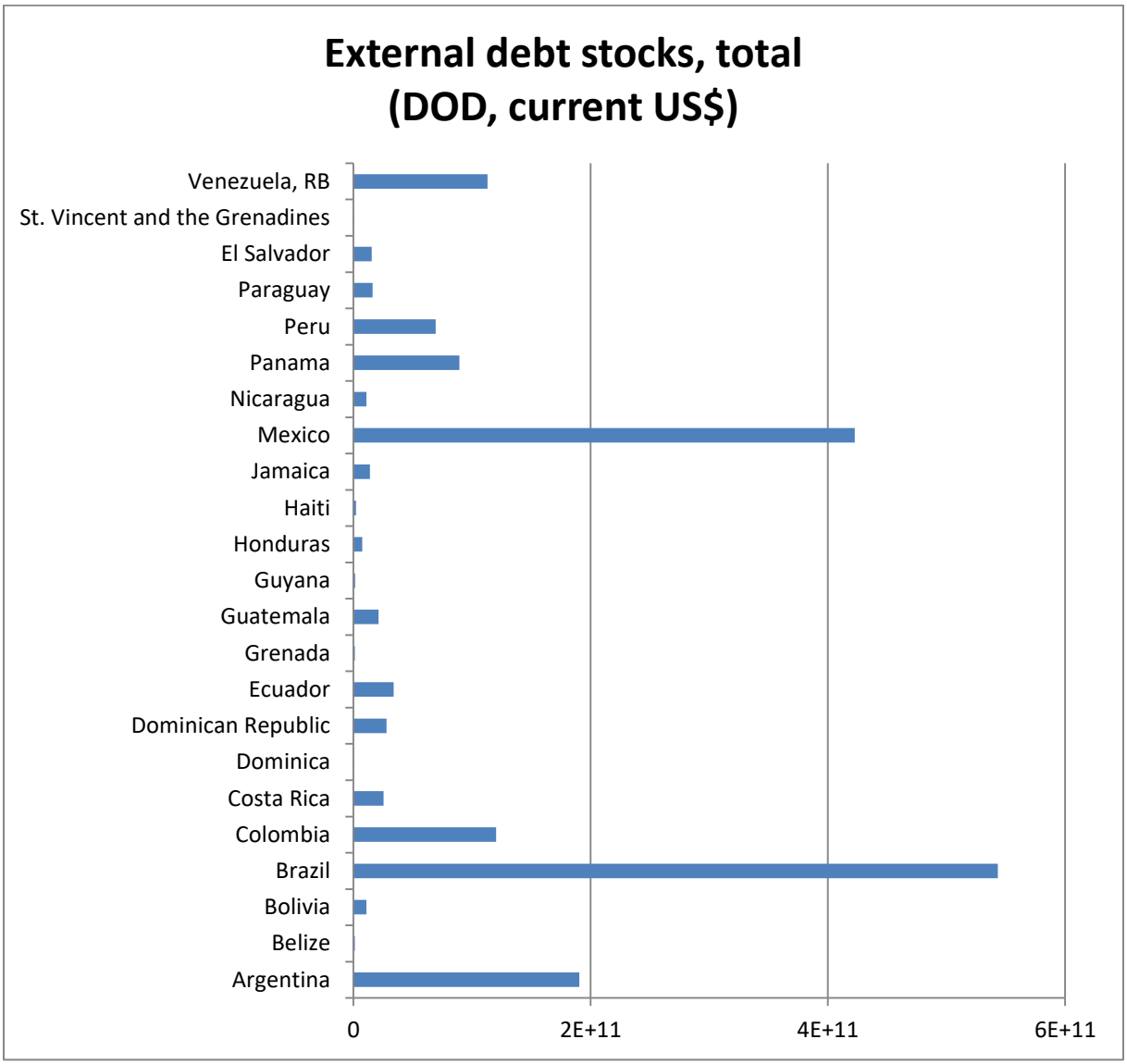
Figure 6: Tax revenue as a percentage of GDP in LAC countries



Source of data: World Bank:

http://api.worldbank.org/v2/en/indicator/GC.TAX.TOTL.GD.ZS?downloadformat=excel

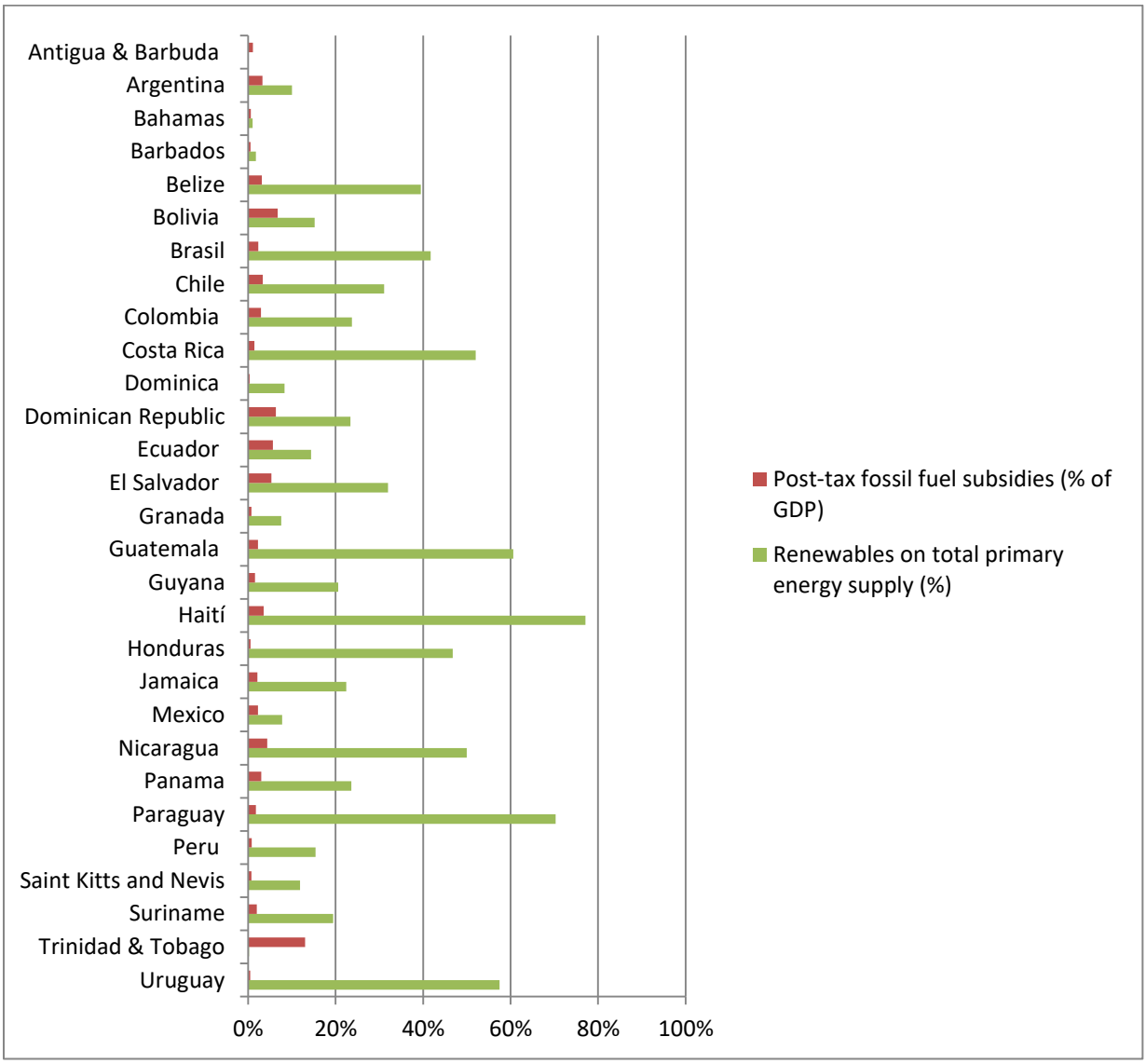
Figure 7: Public debt (DOD – debt outstanding dispersed) – total debt in USD



Source of data: World Bank:

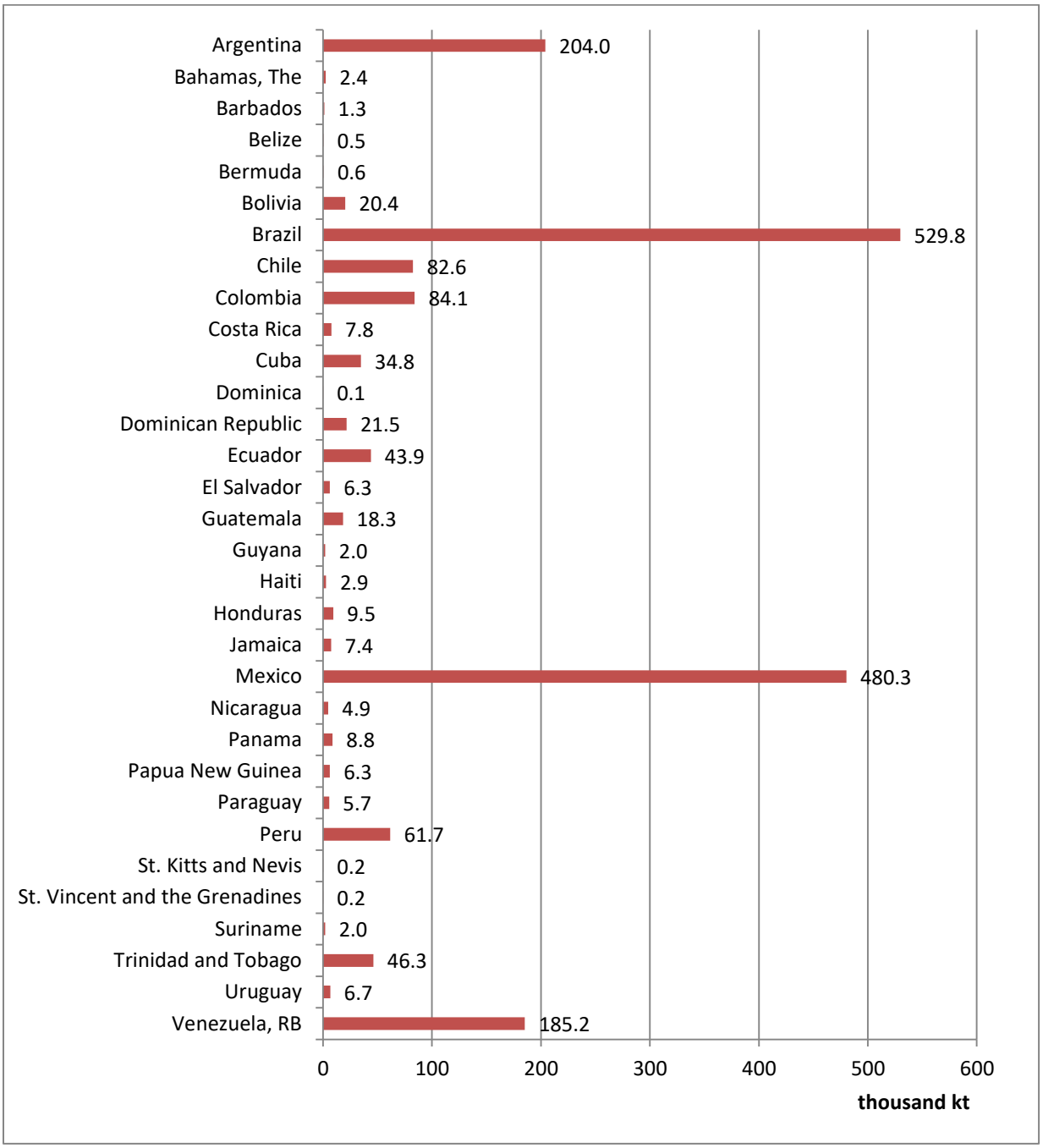
http://api.worldbank.org/v2/en/indicator/DT.DOD.DECT.CD?downloadformat=excel

Figure 8: Renewables and fossil fuel subsidies



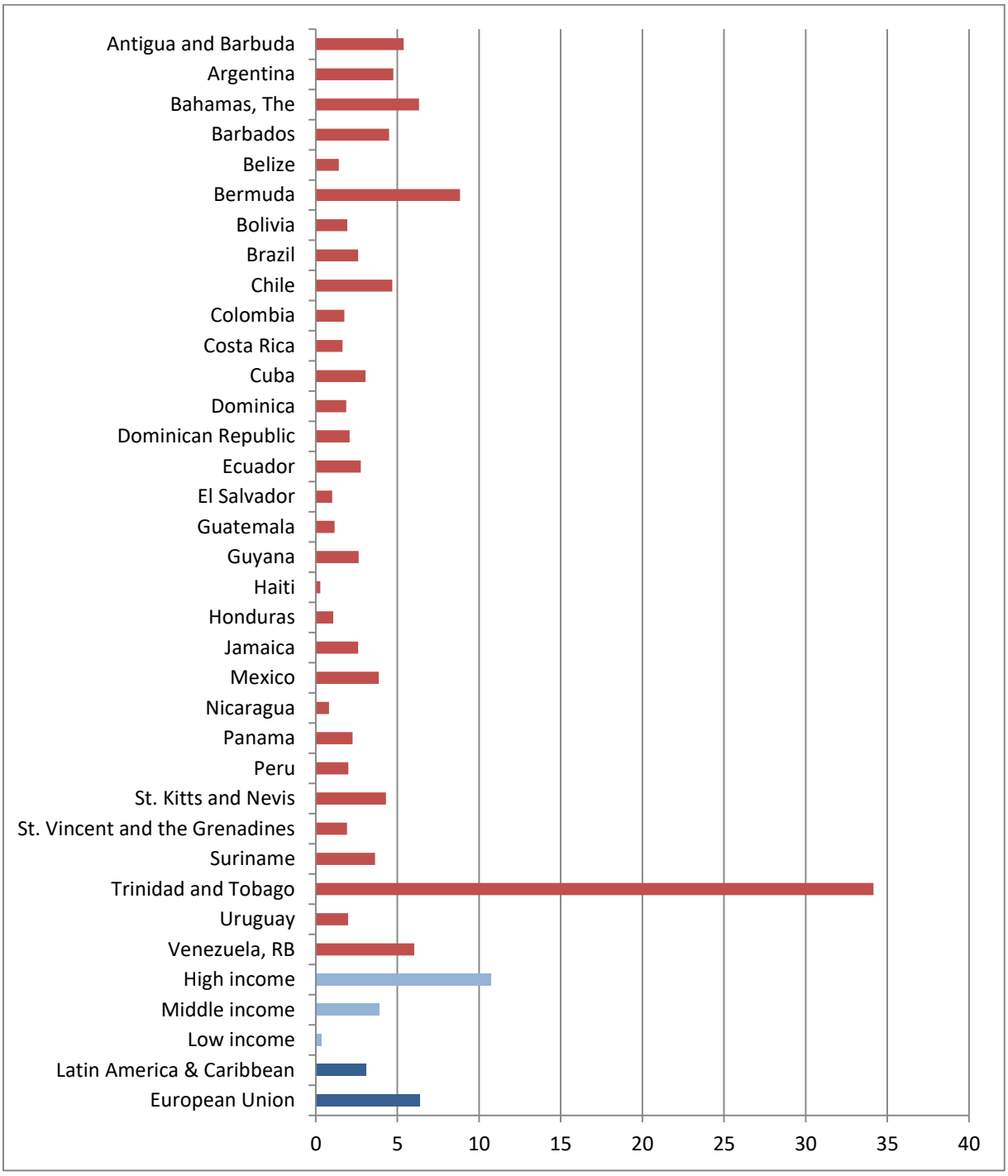
Source of data: ECLAC 2015 / IREN 2009 (Renewables on total primary energy supply) and IMF (Post-tax fossil fuel subsidies as a % of GDP 2015)

Figure 9 Absolute CO_2 emissions 2014 (in thousand kilotonnes)



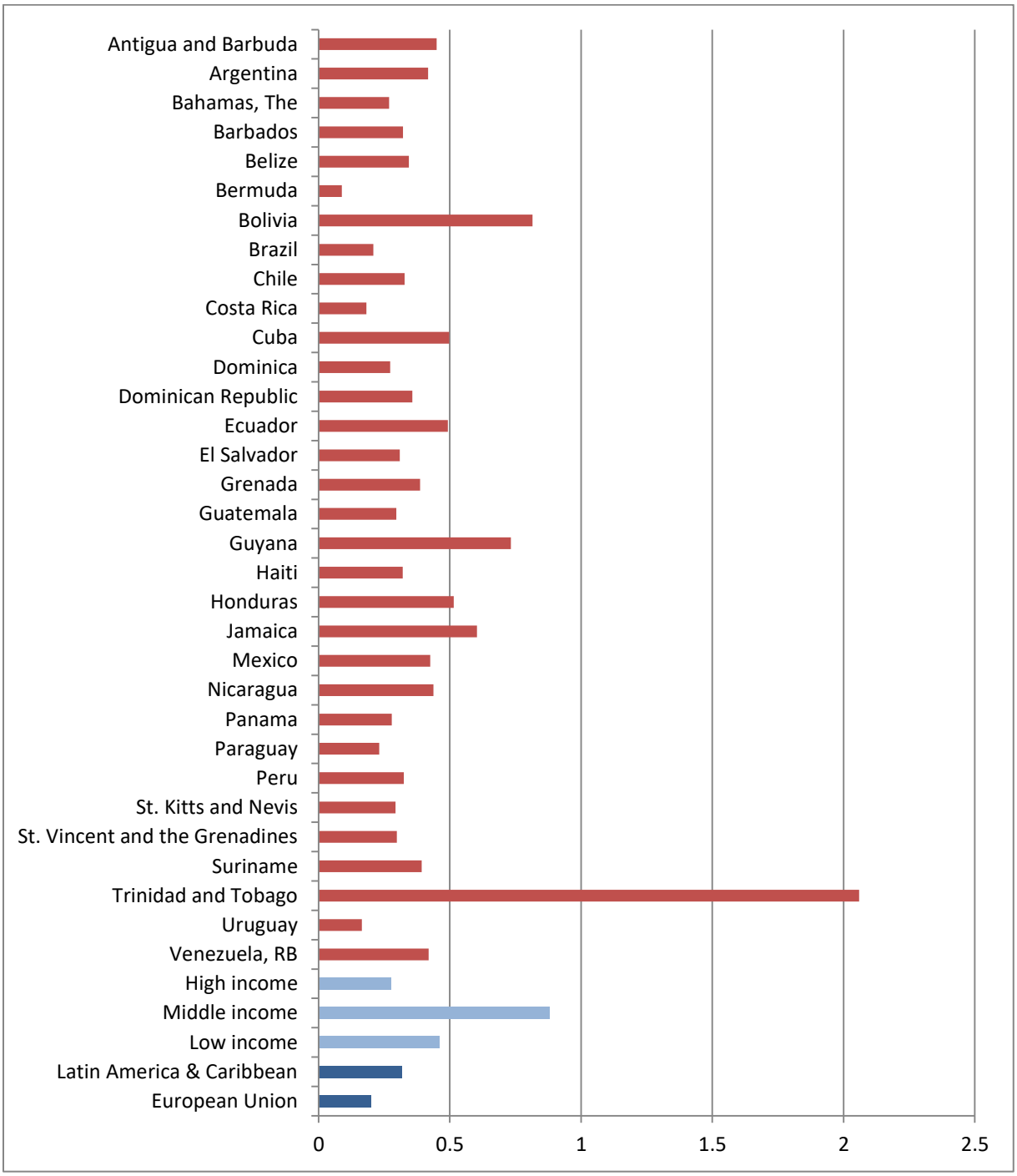
Source of data: World Bank:
http://api.worldbank.org/v2/es/indicator/EN.ATM.CO2E.KT?downloadformat=excel

Figure 10: CO_2 emissions per capita (in metric tons)



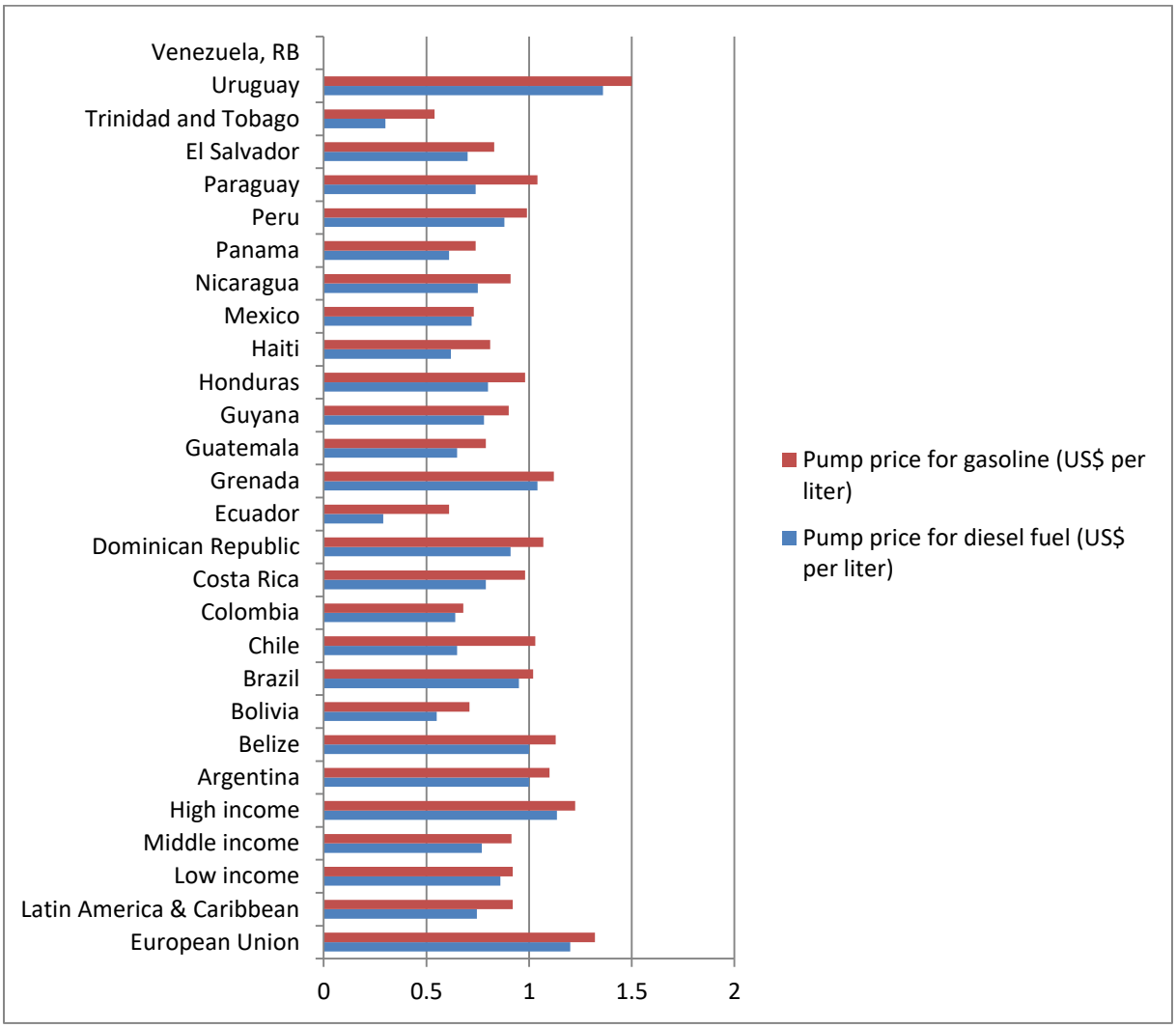
Source of data: World Bank:
http://api.worldbank.org/v2/en/indicator/EN.ATM.CO2E.PC?downloadformat=excel

Figure 11: CO_2 emissions per GDP (in kg per 2010 US$ of GDP)



Source of data: World Bank:
http://api.worldbank.org/v2/es/indicator/EN.ATM.CO2E.KD.GD?downloadformat=excel

Figure 12: Gasoline and diesel prices in LAC countries in 2016 in USD / litre



Source of data: World Bank:

http://api.worldbank.org/v2/en/indicator/EP.PMP.SGAS.CD?downloadformat=excel