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Environmental Taxation and Tax Justice in Developing Countries



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LIST OF ACRONYMS

2030 Agenda	Resolution 70/1 of the UN General Assembly (“Transforming our World: the 2030 Agenda for Sustainable Development”), containing the 17 SDGs
AAAA	Addis Ababa Action Agenda
ASEAN	Association of Southeast Asian Nations
ATI	Addis Tax Initiative
BAU	Business as Usual
BEPS	Base Erosion Profit Shifting
BTA	Border Tax Adjustment
CGE	Computable General Equilibrium
CIT	Corporate Income Tax
CO	Carbon monoxide
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
COP 21	The 21st Conference of the Parties to the United Nations Framework Convention on Climate Change, also known as the 2015 Paris Climate Conference
CPLC	Carbon Pricing Leadership Coalition
CTE	Committee of Trade and Environment of the World Trade Organisation
EFR	Environmental Fiscal Reform
EPT	Environmental Protection Tax
ETR	Environmental Tax Reform
EU ETS	Emissions Trading System of the European Union
EUR	Euro
FGD	Flue Gas Desulphurisation
FNE	Fond National pour l’Environnement (National Environmental Fund, Morocco)
GATT	General Agreement on Tariffs and Trade
GATS	General Agreement on Trade in Services
GHG	Greenhouse Gas
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LIC	Low-income country
LDC	Least Developed Country
LPG	Liquid Petroleum Gas (also referred to as propane and butane)
MEA	Multilateral Environmental Agreement
MNE	Multinational Enterprise
MSME	Micro, Small and Medium Sized Enterprise
NDC	Nationally Determined Contribution
NH ₂	Amidogen (a radical compound of nitrogen and hydrogen)
NH ₃	Ammonia
NO _x	Nitrogen oxides
PIT	Personal Income Taxes
PM	Particulate Matter
PNDM	Programme National des Déchets Ménagers (National Waste Management Program, Morocco)
RMB	Chinese Yuan Renminbi
SDG	Sustainable Development Goal
SO ₂	Sulphur dioxide
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
VGGS	Vietnam Green Growth Strategy
VND	Vietnamese Dong
VOC	volatile organic compound
WTO	World Trade Organisation

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EXECUTIVE SUMMARY

Developing countries are increasingly affected by environmental pollution. Air pollution resulting from fossil fuel combustion for power generation and transport is having an increasingly high impact on life expectancy. Deforestation, soil degradation, air, soil and water pollution, and poor resource management are an obstacle to poverty alleviation. All economic predictions indicate that climate change will hit developing countries hardest.

Environmental taxes can address some of the environmental problems faced by developing countries while encouraging sustain-

able production and consumption patterns and delivering the financial means necessary to enhance environmental and social indicators. However, environmental taxes may result in both direct and indirect price increases of goods and services, which can have negative impacts on social equity, particularly in poor households.

This report aims to address this potential conflict and to consider the trade-offs and complementarities between environmental taxation and social equity. It analyses the role that environmental taxation has to play in obtaining tax justice and considers whether and

to what extent environmental taxation can contribute to more progressive and sustainable tax systems and more equitable societies in developing countries.

This report is divided into two chapters. The first chapter examines possible linkages and complementarities between environmental taxation and tax justice, by purporting to explain the policy considerations countries, and particularly developing countries, ought to undertake when introducing environmental taxes. The objective is to provide guidance both from the fiscal and regulato-

ry perspectives, while exploring the potential for environmental taxes to contribute to more progressive and sustainable tax systems and more equitable societies in developing countries.

The second chapter looks at specific examples of environmental taxes in low- and middle-income countries. The objective is to analyse the environmental, social, economic and fiscal impacts of environmental taxes in these countries and to draw conclusions on the compatibility of environmental taxation and the principles of tax justice.

CHAPTER I ENVIRONMENTAL TAXATION AND TAX JUSTICE IN DEVELOPING COUNTRIES

(by Jacqueline Cottrell and Tatiana Falcão)

ENVIRONMENTAL TAXATION: DEFINITIONS, INSTRUMENTS, LEGAL PRINCIPLES

The report starts by proposing a definition for environmental taxation whereby an environmental tax would be defined as *any compulsory, unrequited payment to general government imposed for an environmental reason and levied on a tax base that has a proven specific negative impact on the environment*. An environmental tax, for the purposes of this report, is one that is regarded to have both an environmental purpose and effect.

The report thus draws a conceptual distinction between environmental and environmentally related taxes, which are revenue raisers but only bear an indirect environmental purpose. This distinction might appear to be only theoretical in nature, but it is of utmost importance when it comes to monitor-

ing country action in connection with the Paris agreement commitments. The conceptual distinction does not place one type of tax in prominence with respect to the other – it merely highlights the purposes intended by the countries pursuing each of these policies.

In the context of this definition, an inventory of environmental taxes and environmentally related taxes is provided and highlights the kind of policy measures that are currently available to developing countries when it comes to the imposition of taxes that are motivated by environmental concerns.

Furthermore, a number of fiscal approaches to environmental taxation (charges or surcharges, fees, consumption taxes like VATs, subsidies and incentives, prohibition and excise taxes) are considered against the backdrop of the theoretical underpinnings of environmental taxation, which call for the

internalisation of external costs and the implementation of the polluter pays principle. The focus in this report will be on taxes, due to their greater potential for domestic revenue mobilisation. Subsidies, incentives and prohibitions are not addressed. Fees and charges tend to be measured against the provision of a public service, and therefore are not generic in nature.

The commitments assumed under international environmental agreements such as the UNFCCC, the Kyoto Protocol and the Paris Agreement underline the high relevance of environmental taxation to the fulfilment of mid and long-term environmental goals within other action plans such as the Agenda 2030 for Sustainable Development and the Addis Ababa Action Agenda. The requirement for the international community to fulfil these international obligations has created a political momentum for the advancement of environmental taxes and environmentally related policies.

Very few countries are on the right path to get to the required level of taxation by the due date. With the predominance of very low carbon pricing initiatives, and most of them being set at under USD 10 per tonne of carbon dioxide equivalent (CO₂e), further escalation of carbon prices is needed in most countries in order to further stimulate emission reduction and achieve the goals set by the Paris Agreement.

Action needs to occur within the context of the existing international legal framework, so that the implemented measures are consistent with the general principles of environmental taxation, the general tax principles and the broader social justice principles¹ which safeguard equitable taxation. The ob-

servance of the general principles of environmental law² and tax law³ are particularly relevant to achieve a coordinated approach between countries. Likewise, countries should be aware of the obligations assumed under the context of the World Trade Organisation Agreements.

ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACTS OF ENVIRONMENTAL TAXATION

The impact of environmental taxes on environmental degradation, social equity and the economy, examining trade-offs between them, is further examined. The criteria used are:

- (1) Environmental effectiveness: analysing whether the tax is capable of leading to an overall reduction in pollution and/or result in reduced consumption of energy or other scarce resources.
- (2) Social impacts: including indirect impacts, resulting from changing relative prices, and the potential for regressive impact of the tax.
- (3) Economic and fiscal impacts, including impacts on GDP, international competitiveness, employment, and government revenues.

Evidence that environmental taxes can bring about environmental improvement in developing countries, such as emission reductions, cleaner energy generation, and improved recycling rates is presented. In some cases (like Thailand), it can be shown that even a small difference in the tax rate between more or

1 (1) Fairness, (2) equality, (3) equity, (4) tax justice, (5) gender justice.

2 (1) The Polluter Pays Principle, (2) The Precautionary Principle, (3) Common but differentiated responsibilities and (4) Principle of historic responsibilities (not worthy of pursuit under a domestic environmental tax framework).

3 (1) Price parity across different segments and businesses, (2) Minimisation of regressiveness in the administration of environmental taxes, (3) avoidance of economic and juridical double taxation, (4) gradual introduction of new taxes and predictability when it comes to the readjustment (increase) in taxes.

less polluting substances can be enough to change consumer behaviour. Policy recommendations for tax design (particularly for policymakers from developing countries) are provided. Approaches to minimise trade-offs between environmental impact and social, political or economic considerations are discussed.

The regressive nature of environmental taxes is only one aspect of inequality associated with environmental policy. There are four dimensions of inequality which are further examined, all of which correlate to a greater or lesser extent to inequality of income: Inequality of (1) exposure to environmental degradation, (2) contributions to pollution, (3) outcomes resulting from environmental taxation, and (4) representation in policymaking. This highlights an important facet of tax justice in view of the objectives of this report. However, equity considerations rarely enter the policy discourse when defining environmental policy approaches, and environmental improvements are seldom taken into account when estimating the social equity impacts of environmental taxation.

The report finds that the greatest concern in developing countries in terms of equity impacts lies with indirect taxes on domestic fuel (electricity, cooking, heating), because substitutions are rarely available and poor households thus often have no alternative aside from paying the tax. There is also a gender dimension to this debate, as the impact of environmental taxes on domestic energy use may have a greater effect on women, who tend to pay for household costs.

The report explores how in countries with relatively unequal income distribution, environmental taxes in the transport sector may in essence act as a luxury tax, affecting high-income households far more than the poor.

The report demonstrates that environmental taxation might have the potential to address inequality resulting from environmental degradation as experienced by different income groups, particularly if social welfare measures are implemented in parallel to address potential negative equity impacts.

Earmarking of environmental tax revenues is examined as a policy approach of particular interest to developing countries, in allocating expenditure for environmental protection. It is contended that in the developing country context, it may be necessary and beneficial for governments to make political declarations regarding the use of revenues from environmental taxation to communicate policy priorities, boost government credibility, foster political acceptance and prevent policy reversals or the diversion of revenues to less desirable outcomes. In addition, spending a proportion of the environmental tax revenues on green infrastructure, renewable energy and energy efficiency technologies can increase the overall environmental effectiveness of tax measures and lessen the cost of reducing pollution.

The report also examines the competitiveness impacts of taxing environmental externalities, especially with regards to possible negative effects on employment, and looks at a range of potential economic benefits resulting from environmental taxes, including job creation in “green industries” and innovation.

RECOMMENDATIONS FOR POLICYMAKERS

When formulating the legal framework for the introduction of environmental taxes, countries should be sensitive to the difference between applying a tax directly aimed at the pollutant itself, and applying a tax on an element of pollution, or a by-product of pollu-

tion. The former will generally harness greater environmental effectiveness than the latter. In this report, we define an environmental tax as one which should have both an environmental purpose and effect, and should not be a simple revenue raiser.

In terms of design, environmental taxes should have the broadest possible coverage with few or no exemptions. If pollutants are taxed at different rates or exempt, policymakers should be aware of unintended, environmentally harmful behavioural responses, like fuel switching. Environmental tax exemptions for business should only apply to sectors exposed to international competition, and be limited in time.

Trade-offs between fiscal (revenue raising) and environmental objectives should be addressed. In the long-term, if environmental taxes are effective, revenues will decline as a result of behavioural change. This is a natural consequence of the application of an environmental tax: The successful application of the tax will most likely lead to a long-term reduction in revenue.

To stabilise revenues in the short-term, governments might find it useful to index the tax rate to inflation or GDP growth or to foresee regular tax increases. A range of possible tax rates can give policymakers flexibility to adjust the tax as necessary.

Governments can mitigate negative equity effects by using environmental tax revenues to improve capacity to implement and target social welfare schemes and pro-poor investment accurately. Governments can overcompensate as an interim solution: If policymakers are ambitious in their implementation of environmental taxation, revenues raised should be sufficient to overcompensate poor households and deliver on other policy goals at the same time. Transformative social wel-

fare policies, or co-benefits policies designed to foster green economy transition, are preferable to unconditional compensation, such as cash transfers.

Identifying which taxes have the potential to be most progressive can be helpful in all developing countries to introduce redistributive taxation, while raising revenues. Due to many developing countries' capacity constraints, it might be advisable to first target a tax base for which existing effective collection mechanisms exist. Revenues can subsequently be used to improve fiscal capacity.

Publicising the data may be an important tool to harness popular support for the tax and raise awareness capable of inflicting a change in consumer consumption habits.

In developing countries, fiscal space is limited and environmental policies tend not to be prioritised. In this context, loose symbolic earmarking, or even legal earmarking of a proportion of revenues, can be an important tool to raise awareness of the implementation of the tax, gain popular support, and to ring fence funds for a specific environmental cause. A trust fund supported by environmental tax proceeds can be a useful tool to make sure that at least part of the environmental tax revenues are used for the development of new technologies, or to protect the environment. Independent agencies can be set up to fulfil a similar role. However, countries should be aware of potential domestic limitations to earmarking revenues for a particular purpose, as revenues may not correspond to the cost of addressing the environmental problem they have been earmarked to address.

Countries should reach out to other countries adopting similar taxes to work in a coordinated fashion. Cooperation on environmental tax policy will protect countries against loss in competitiveness and may help

build a geographic region with heightened environmental protection standards.

ENVIRONMENTAL TAXATION: POTENTIALS AND PROSPECTS

The potential for environmental taxation to address equity issues in developing countries is analysed while highlighting prospects for the future application of environmental taxes. The role of environmental taxes in the improvement of fiscal governance is also assessed. Because environmental taxes are hard to evade (as they tend to be levied on immobile tax bases), the fiscal governance framework can be bettered by contributing to a framework of improved tax compliance and tax morale.

The problem of stranded nations is also looked at within this context. That is the problem faced by resource-rich developing countries dependent on revenues from fossil fuels. They might face severe financial losses due to divestment in the extractive sector as countries shift onto a low-carbon development path. The report proposes a solution to this problem along the lines of the REDD+ (Reducing Emissions from Deforestation and Degradation) scheme, which would entail developed countries paying developing countries not to extract fossil fuels. A REDD+ type approach could work in tandem with other forms of environmental taxation.

MULTILATERAL APPROACHES

From a multilateral perspective, the role of border tax adjustments is assessed as a possible measure to enable high environmental tax rates or a high carbon price in particular countries or groups of countries, without jeopardising international competitiveness. Border

Tax Adjustments work by either taxing an import, so that it is taxed at the same level as the domestically produced product, or reducing the tax on an export, in order not to impose an undue burden on the nationally produced product when it is known that the foreign product is not burdened by a like tax. By grouping countries and creating a framework for them to act collaboratively, this approach also has the potential to create momentum to enable other countries to join a carbon pricing strategy.

Moreover, the creation of a multilateral, intergovernmental body on environmental taxation under the auspices of the United Nations to address a number of global tax justice issues is further considered to place environmental taxation within a framework of multilateral cooperation. Joint oversight by the UN and the WTO would be required to align the legal framework of carbon tax regulation with international tax competition and trade regulation.

CONCLUSIONS

All countries must commit to more ambitious Greenhouse Gas emission reduction targets. Environmental taxes can help all countries, but particularly developing countries, deliver on the commitments assumed through international environmental agreements and generate a double positive, by bringing about an improved environment while mobilising domestic revenues for the achievement of the SDGs.

In many developing countries increasing the amount of revenues raised through environmental taxation has also the potential to reduce state dependence on aid and debt financing, and to facilitate the mobilisation of domestic resources for public services.

As environmental taxes are harder to evade than e.g. corporate or personal income taxes, they also have the potential to strengthen state accountability, improve tax morale and enhance fiscal governance. In countries with high levels of tax evasion, the benefits of a tax on carbon emissions – aside from any climate or environmental benefits – outweigh the costs, simply as a result of welfare gains resulting from reduced tax evasion.

This chapter has shown that there could be a role for environmental taxation in addressing inequalities, and that tax justice and the implementation of environmental taxation can indeed be compatible in theory and in

practice. It calls on policymakers to take steps to bring together the joint agendas of environmental taxation and tax justice to make progress on both agendas and to set the standards under which environmental tax and environmentally related tax mechanisms will be judged for the coming ten years.

It is imperative to get the conceptual frameworks, priorities and standards right, in order to both advise developing countries on the implementation of sound policies, and to assess the extent to which those policies are effective, both from an environmental and social justice perspective. Pollution sees no borders. Let us leave no one behind.

CHAPTER II ENVIRONMENTAL TAXATION IN PRACTICE

Environmental, Economic and Social Effects of Environmental Taxes in Selected Developing Countries

(by **Jacqueline Cottrell**)

Chapter II of the study works through a series of examples of environmental taxation in industrialising countries. For each case, on the basis of available data, it was considered whether or not an environmental tax was a successful policy within the specific policy context of the country in question. As used in Chapter I, the criteria used are: (1) environmental effectiveness, (2) social impacts and (3) economic and fiscal impacts.

The cases examined were chosen to provide a balance between different regions of the global South – Asia, Africa and South America. However, finding good cases underpinned by robust data on the impacts of specific environmental tax measures in low-income countries in particular is quite challeng-

ing. The four country cases therefore look at the impacts of environmental taxes in middle-income countries – Vietnam, Morocco, Mexico and China. These country case studies are followed by an analysis of environmental taxes in low-income countries (LICs) and attempts to draw some general conclusions for these countries.

THE ENVIRONMENTAL PROTECTION TAX IN VIETNAM

Vietnam implemented a broad-based package of environmental taxes in the Environmental Protection Tax Law in 2012 (EPT). Tax rates can be relatively easily adjusted within a given tax rate range. The tax is one element

within a broader process of greening the Vietnamese economy.

The EPT in Vietnam is often held up as a best practice example of environmental taxation in the context of non-OECD countries, because the tax law is quite comprehensive and covers a wide range of pollutants, and the design of the tax facilitates easy adjustment.

There is some evidence for positive behavioural responses and reduced pollution and emissions as a result of the EPT. It may have had a small negative impact on GDP growth and employment in comparison to a business-as-usual scenario. The EPT also appears to have had a progressive impact on household welfare, with modelling indicating that the richest income quintiles lost a comparatively greater proportion of their income in EPT payments – presumably because a large proportion of EPT revenues are raised through transport taxes, which tend to be progressive in developing countries. Nonetheless, for households living on or below the poverty line, even a small decrease in household income can impact quality of life and ability to pay for essential goods and services. While there is no data available to indicate the extent of such impacts, the report recommends that policymakers pay more attention to equity impacts when introducing higher tax rates in future and to ensure that targeted social compensation measures are in place.

THE PLASTICS TAX IN MOROCCO

Morocco's National Waste Management Programme (Programme National des Déchets Ménagers, PNDM) included a number of ambitious measures to increase recycling and improve solid waste management. To achieve the objectives of the programme, the PNDM included in its second phase a new

environmental tax on plastics, which came into force in January 2014. Tax revenues are directed to the National Environment Fund (Fond National pour l'Environnement, FNE) and are used to finance activities to promote the recycling and recovery of plastic waste, and to create a formalised waste separation sector. A minimum of 20% of total tax revenues are to be allocated to informal waste collectors, with particular attention paid to gender issues in fund distribution.

The tax has had a positive environmental impact by boosting resource efficiency, as it created an incentive for manufacturers to use recycled plastics as inputs for production. Revenues have been used to increase the number and size of sanitary landfills in the country. The plastics tax has had positive economic impacts, as it affected imported goods more than domestic products. As a result, the competitiveness of domestic industries in Morocco was not adversely affected. Revenues have been considerably higher than predicted. These revenues have been used to create new Small and Medium Enterprises (SMEs) in the waste sector and bring informal waste-pickers into formalised cooperatives.

Given the low value of many plastics, it is unlikely that the tax had more than a minimal impact on household welfare. Because the tax was introduced as part of a package of measures to bring about improvements in the waste sector, the overall impact of the tax and expenditure of plastics tax revenue has been positive, both environmentally and socially.

CARBON TAXATION IN MEXICO

The carbon tax in Mexico was introduced as part of a range of measures to reduce Greenhouse Gas emissions in Mexico in 2014, which also included fossil fuel subsidy

reform and from 2019, the piloting of an emissions trading system. The introduction of the carbon tax and the implementation of subsidy reform were internationally significant, as the Mexican economy had traditionally been reliant on income from oil sales, and because Mexico was one of the first newly industrialised countries to have introduced carbon taxes in the run-up to the UNFCCC COP21 (also known as the 2015 Paris Climate Conference) in Paris.

When the carbon tax was introduced, it was one element within a broad fiscal reform in Mexico, covering personal, corporate, consumption and energy taxes. Tax rates implemented were substantially lower than those originally proposed and natural gas (the main fuel for power generation) was ultimately zero-rated. Given the unequal income distribution in Mexico, it is likely that the direct impact of the carbon tax on transport fuels was that of a “luxury tax”, affecting high-income households far more than the poorest quintiles. Due to the low tax rate, the carbon tax had a very limited impact on domestic energy prices. Thus, the carbon tax is not likely to have had negative impacts on domestic household income, or to have had a significant negative effect on the poorest households.

The report notes that the effectiveness of the tax could be enhanced by broadening the tax base in future to include natural gas, and by increasing the tax rate. This would also raise additional revenues to compensate poorer households, to create employment, or investments to drive inclusive growth. While the equity impacts of the carbon tax itself appear to have been broadly neutral, fossil fuel subsidy reform may have had a negative impact on social equity and household incomes in early 2017 when the oil price increased and transport fuel prices rose rapidly as a result.

The report concludes that the carbon tax rate was too low to have a significant impact on climate mitigation, or on social equity, at the time of writing. Nonetheless, the tax and associated reform in the energy sector represent an important shift away from subsidising of fossil fuels and towards taxation of their use.

DIFFERENTIATED ELECTRICITY PRICING IN CHINA

In the 2000s, reducing air pollution in general and SO₂ pollution in particular became a matter of political urgency in China. In 2003, the pollution levy was reformed with the objective of improving the effectiveness of the levy and preferential grid prices for desulphurised electricity were introduced to help fund technological improvements and incentivise the installation of flue gas desulphurisation (FGD) technology. However, these initial steps did not result in SO₂ emissions being effectively reduced, in part because the levy on SO₂ was so low that it was cheaper for enterprises to pay the fee than take action to abate SO₂ emissions.

In China, getting the price right for SO₂ emissions proved crucial. In 2007, preferential grid prices were complemented by the introduction of penalties for electricity production without the application of FGD technology, and the pollution levy on SO₂ emissions was doubled. These taxes made it economical for power stations to install desulphurising technologies and thus reduce SO₂ emissions. The political commitment expressed by the government ensured that emissions targets were taken seriously, both by provincial governments and by the managers of state-owned power producers.

There were no direct social equity impacts resulting from these tax measures, as electricity prices in China are strongly regulated. Hence, the increase in the production cost of electricity due to penalties and the cost of the pollution levy were not passed through to electricity consumers. In economies where prices are regulated, the impact on poorer households of an environmental tax is less of a concern than in economies where energy prices are unregulated and all price changes can be passed through to domestic consumers. Given the strict regulation of electricity prices at government level, there were also no direct impacts on GDP growth due to higher prices.

The report notes although there were no negative social impacts resulting from the measures, the benefits of subsidies attributable to price regulation in the domestic electricity sector are captured far more by wealthier households than by poorer households. There is therefore potential to enhance social equity and fairness in the country by introducing fairer electricity prices and targeting subsidies or social protection measures to those in need of them.

ENVIRONMENTAL TAXES IN LOW-INCOME COUNTRIES

There is insufficient literature and data available on the impacts of environmental taxation in low-income countries (LICs) to analyse one specific environmental tax instrument as a specific case for this report. The report analyses the impacts of both environmental taxes and environmentally related taxes in LICs, as they tend to implement what is referred to in this report as environmentally related taxes, rather than taxes with an explicit environmental objective. Furthermore, giv-

en the lack of research and robust data available, this approach broadens the number of cases available for the analysis.

In the context of limited domestic fiscal capacity in LICs, the report notes that revenues from environmental taxes levied in LICs could be used to facilitate higher levels of spending for the achievement of the Sustainable Development Goals. Currently, LICs collect much lower tax revenues and social insurance contributions than high-income countries (13.4% on average in 27 LICs, compared to 28% in HICs). These low tax-to-GDP ratios severely restrict the capacity of governments to tackle shortfalls in fiscal governance and to invest in measures for poverty reduction, infrastructure, healthcare, education, or green economy transition. Implementing environmental taxes to increase fiscal space could be part of the solution to this problem.

The report examines measures implemented in LICs in East and Southern Africa to highlight the range of environmentally related taxes implemented in LICs. Nearly all countries levy environmentally related fuel taxes on petroleum products and impose vehicle taxes and annual circulation charges, often related to cylinder capacity. Royalties, taxes and fees on natural resource use are common, although they tend to be purely revenue-raising instruments and do not have positive environmental impacts. Fisheries are subject to fiscal measures, whereby a large proportion of fisheries revenue stems from distant water fleets, rather than from domestic fishers. Royalties are levied on timber extraction, and taxes on timber volumes. User fees on electricity and water services are widespread and usually include a lifeline tariff for low-income households or progressive tariffs based on the amount of electricity or water consumed. Finally, some LICs levy wastewa-

ter fees targeting pollutant emissions. As in OECD countries, the highest proportion of environmentally related tax revenues in LICs is attributable to transport fuel taxes.

LICs suffer from poor governance, lack of fiscal capacity and the negative impacts of tax competition, tax avoidance, trade mispricing and VAT evasion on the part of multinational enterprises. Environmental taxes may be part of the solution to these challenges, as they are comparatively difficult to evade. In addition, the report suggests that a stronger focus on taxation and domestic revenue mobilisation in LICs may have the potential to contribute to state building processes.

With regards to social impacts, the report contends that transport fuel taxes are often in effect luxury taxes. Indeed, transport fuel taxes have been shown to be strongly progressive in African and large Asian countries. In LICs, negative impacts on the poor may result from the indirect effects of environmental taxes, when public transport and food prices increase. However, there is evidence that fuel taxes can even be progressive when taking these costs into account. However, as even a small decrease in income can impact poor households' ability to pay for essential goods and services, policymakers must ensure that social compensation measures are in place to protect the vulnerable from price increases.

Definitive statements on the economic and fiscal impacts of environmental taxes in LICs cannot be made. In wealthier countries, there is evidence that environmental taxes have at best a positive impact on GDP growth and at worst, have a less negative impact than other direct and indirect taxes.

CONCLUSIONS

Environmental taxes did not result in price increases of a magnitude that could have had a significant impact on social equity or household income in the countries covered in this report. Many environmental taxes are levied upstream – at the start of the value chain – and as a result, may impact consumer prices to a limited extent. Other taxes examined were levied directly e.g. on the consumption of transport fuels, but due to the low tax rate, also had a limited impact on household income.

In the future, it is reasonable to expect environmental tax rates to be increased in low- and middle-income countries, particularly carbon and energy taxes. Environmentally related taxes, most notably fuel excise duties, have been levied at a higher rate in many countries. Higher environmental tax rates, even if implemented by means of stepwise increases over time – desirable from a theoretical perspective to compensate for devaluation due to inflation and maintain the dynamic incentive created by the tax – will require policymakers in low- and middle-income countries to evaluate carefully whether and to what extent targeted compensation measures or improved social welfare are necessary.

Indirect impacts of environmental taxes are particularly difficult to measure. Policymakers should take care to monitor not only direct impacts but also the pass through effects of price increases on basic commodities. Lack of capacity to target social welfare measures effectively amplifies this concern, as in many low-income and lower-middle-income countries, coverage of social compensation schemes does not exceed 50% of the population.

The second chapter of the report concludes that environmental taxation has considerable

potential to contribute enhanced tax justice, if it is well designed and carefully implemented. First, environmental taxation can act as a progressive tax policy that supports people to share in local and global prosperity and access public services and social protections. Second, environmental taxation can contribute to tax justice by shaping the economy so that it acts in the interest of the environment.

Finally, the report highlights the inequality of the outcomes of severe environmental degradation and climate change, both of which are significant obstacles to poverty alleviation. To prevent these significant negative impacts on equity and achieve climate justice, all countries must step up and commit to more ambitious GHG emissions reductions. The most cost-effective and thus politically feasible way of achieving these emissions reductions is the introduction of a carbon price,

alongside additional measures to facilitate the transition to a low-carbon economy.

Ultimately, the predicted outcome of the climate crisis is just one of several dimensions of inequality in environmental policy examined in the report. The report highlights the potential role of environmental taxation in addressing some of these dimensions – by implementing the polluter pays principle, by reducing negative environmental impacts, and by ensuring equality of policy outcomes by designing compensation in a way which protects the vulnerable from price increases. Thus, the report concludes by emphasising the ways in which the vision and objectives of the tax justice movement for more progressive and more sustainable taxation can be compatible with the implementation of environmental taxation.

CHAPTER I

ENVIRONMENTAL TAXATION AND TAX JUSTICE IN DEVELOPING COUNTRIES

(by Jacqueline Cottrell and Tatiana Falcão)

PART ONE: INTRODUCTION

1. INTRODUCTION AND OBJECTIVES OF THE REPORT

1.1 INTRODUCTION

This report sets out to examine possible linkages between environmental taxation and tax justice. Hence, both environmental and social dimensions are taken into account when evaluating environmental taxation in the developing country context. For the purposes of this report, for an environmental tax to be considered effective, it should have, on balance, no negative equity impacts left unaddressed by policymakers.

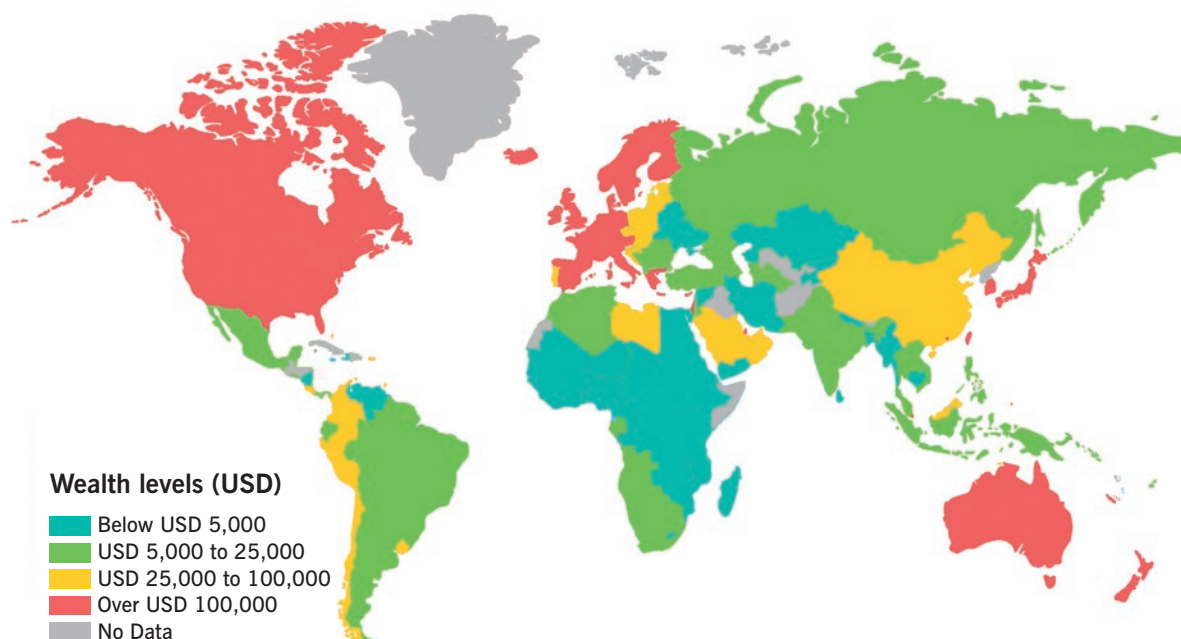
Environmental taxes are closely related to the economic dimensions of sustainable development, as they foster innovation (Sustainable Development Goal, SDG 9) and encourage more sustainable consumption and production patterns (SDG 12). Environmental taxes can also foster the achievement of social indicators within the Agenda 2030, such as target 3.4 to reduce premature mortality from non-communicable diseases through prevention (reduced air pollution), or target 7.1 of universal energy access. Indeed, if environmental taxes are effective and result in lower levels of pollution and environmental degradation, they have the potential to have

positive equity impacts – although these must always be weighed against potential negative impacts to equity due to changes to the relative prices of goods and services. This report examines this balance and considers whether and in which ways environmental taxation and the tax justice agenda can be combined.

1.2 THE INTERNATIONAL CONTEXT

A great deal of recent research has highlighted the problem of global inequality. The wealthiest 1% of the global population was found in 2017 to own an estimated 50.1% of the world's wealth, according to Credit Suisse' Global Wealth Report 2017 (Credit Suisse 2017). Figure 1 shows that wealth is concentrated in the USA, Canada, Western Europe, Australia, New Zealand and Japan, while the entire continent of Africa has the lowest concentration of wealth per adult.

Economic inequality between countries is a fundamental policy challenge, given the many factors required to provide parity between states: Economic equality requires improvement in social welfare, education, access to basic infrastructure, improvement in overall living conditions and is, in a way, dependent on the elimination or reduction of inequality within a state.

Figure 1.1: World Wealth Levels (average wealth per adult in USD in 2017)

Source: Davies, J., Lluberas, R. and Shorrocks, A. (2017). Credit Suisse Global Wealth Databook 2017.

In many rapidly growing emerging economies, the benefits of growth have not been evenly distributed. Although millions have been lifted out of absolute poverty, inequality remains a significant domestic policy challenge. The Gini index measures the extent to which income is distributed amongst individuals and households within an economy – the higher the rating, the greater the inequality. In relatively equal societies, such as Denmark (29.1) and Germany (30.1), the Gini index is relatively low, while in middle income countries such as Chile (50.5), Mexico (48.1) and Brazil (51.3), or in low income countries, such as Congo (48.9) or Rwanda (50.4), the rating is much higher (World Bank 2016a).

The lack of comprehensive data on tax evasion and avoidance means that statistics on the wealthiest 1% globally probably underestimate both intra and inter-State inequality

(Falcão and Chowla, 2016). Therefore, tax evasion and avoidance may perpetuate and exacerbate inequalities in and between nations and deprive developing countries of urgently needed domestic sources of revenue to finance development.

Developing countries, particularly developing countries rich in mineral resources, are hard-hit by tax evasion and avoidance, due to their governments' susceptibility to corruptive practices, lack of fiscal capacity to collect revenues, the large informal sector in developing economies, and the opportunities available internationally for multinational companies to shift their profits to low-tax jurisdictions. Increased transparency in the policy making process, improved fiscal governance, and better regulation of the institutional frameworks would be required to curb these unwarranted flows.

These losses to the exchequer in many countries, and the lack of capacity to mobilise domestic revenue, are endangering the achievement of the SDGs – and pose a huge challenge to developing countries trying to improve social welfare and prosperity.

While environmental taxation cannot tackle the root causes of global inequality, it can be part of the solution, as it offers policymakers one route to solving the problem of a lack of domestic resources, while improving outcomes for the poor and vulnerable and increasing capacity to achieve the SDGs.

1.3 ENVIRONMENTAL DEGRADATION AND CLIMATE CHANGE IN DEVELOPING COUNTRIES

There are close linkages between social justice, climate change and environmental degradation. The financial and social welfare costs derived from climate change, environment-related industrial hazards and natural disasters, and natural resource management is significantly higher in non-OECD countries than in the OECD (OECD 2008). Developing countries are plagued by environmental problems. Air pollution resulting from fossil fuel combustion for power generation and transport emissions – specifically, emissions from old and dirty diesel engines – are having an increasingly high impact on life expectancy worldwide. Deforestation, soil degradation, poor water quality and degrading supplies, pollution of waterways, contamination due to waste dumping, and so on, have a huge cost to human health. In 2012, the World Bank estimated that the cost of environmental and natural-resource degradation was on average equivalent to roughly 8% of GDP, while specific assessments revealed a cost of 9% of GDP in China, over 8% in Ghana, more than 7% in

both Nigeria and Iran, and 6% in Pakistan (The Economist 2012).

All economic predictions indicate that climate change will hit developing countries hardest (Hallegatte et al. 2016, OECD 2008). Nicholas Stern has predicted losses of 5-20% of global GDP per annum if the targets of the Paris Agreement are not met: an estimate that does not accurately reflect the cost of climate inaction for the poor and vulnerable (Stern 2007).

Given these close links between environmental degradation and inequality, this report explores whether and to what extent the implementation of environmental taxation has the potential to address the inequality of outcomes currently experienced by different income groups as a result of environmental degradation.

1.4 REPORT OBJECTIVES

The objective of this report is to:

1. analyse environmental taxation from a tax justice perspective. The report will do so by highlighting the ways in which the tax justice and environmental taxation agendas overlap and can be complementary.
2. provide policy approaches to the introduction of environmental taxes in general and carbon taxes in particular.
3. provide a review of the legal and regulatory frameworks surrounding environmental law and taxation.
4. provide an overview of environmental taxation and its impacts (economic, social, environmental) in the developing country context.
5. qualify what are the most efficient environmental taxes for domestic resource mobilisation and reduction of a country's

pollution ability (as perceived in the Paris Agreement).

6. share positive country experiences (i.e. experiences leading to environmental and revenue gains) with environmental taxation in developing countries.
7. explore the potential for environmental taxation to contribute to tax justice and more progressive and sustainable tax systems as well as more equitable societies in developing countries.
8. discuss how environmental taxation can contribute to the achievement of the SDGs.

PART TWO: THE CONTEXTUAL APPROACH

2. ENVIRONMENTAL TAXATION IN THE CONTEXT OF THIS REPORT

2.1 DEFINITIONS

2.1.1 Environmental taxes versus environmentally-related taxes

Several agencies have attempted to define environmental taxes without building a coherent normative conceptual framework which would differentiate between environmental policies that are driven by an environmental purpose and pursue an environmental effect, and policies that are mere revenue raisers, and are ineffective at promoting a behavioural change, although they may bring about an indirect environmental gain. In this paper, we refer to the former an environmen-

1.5 STRUCTURE AND CONTENT OF CHAPTER I

Part two of this chapter defines environmental taxation, explains its theoretical legal framework, and analyses the interaction between international environmental agreements and taxation mechanisms. Part three looks at environmental taxation in practice in developing countries and considers the positive and negative impacts of environmental taxation on the environment, social equity and economic prosperity. Part four focuses on the way forward for environmental taxation and the tax justice agenda, identifying a number of possible routes to draw the two topics closer together. Part five concludes.

tal tax, and the latter, an environmentally related tax.

This failure to distinguish between these two kinds of environmental tax can make it difficult both to monitor countries' environmental tax policies, and to provide clear guidance to new entrants in the environmental tax world, as to the best policies to pursue according to the envisaged goal.

If the goal is to apply a tax that is going to lead to a consequent reduction of carbon dioxide emissions by bringing about a change in consumer behaviour, then the type of tax applied should be one capable of attaching a price to the final product that is proportionate to the implicit carbon content of the product. In this paper, we are calling those taxes that both have the express purpose of, and result in, behavioural change and environmental gain, environmental taxes.

If, on the other hand, the goal of a particular measure is merely to raise revenues, or to address an environmental externality to a limited extent, without necessarily achieving an environmental gain or a behavioural change, then we consider this measure to be an environmentally related tax, rather than an environmental tax.

The nomenclature currently adopted by international organisations to address these policy goals does not take the objective of the tax into account. Agencies will identify as environmental tax any tax that is associated with an environmental item or good, even if there is no ulterior environmental motivation for the tax, or if it is a revenue raiser.

The OECD alone has four different definitions for an environmental/environmentally related tax, definitions that change according to which segment of the organisation is using the term. For the purposes of illustration, these are:

According to the OECD's Glossary of Statistical Terms, an environmental tax is "*a tax whose tax base is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment. Four subsets of environmental taxes are distinguished: energy taxes, transport taxes, pollution taxes and resource taxes.*" (OECD 2005a)

According to Eurostat and the OECD, an environmental tax is "*a tax whose tax base is a physical unit such as [a] litre of petrol, or a proxy of it, for instance a passenger flight, that has a proven specific negative impact on the environment* (OECD et al. 2001)."

According to the OECD's Centre for Tax Policy and Administration, an environmental tax is a "*tax imposed for environmental reasons, e.g. to provide an incentive to reduce certain emissions to an optimal level or taxes on environmentally harmful products.*" (OECD n.d.)

Environmentally related taxation, which does not entail tax shifting, has been defined as any compulsory, unrequited payment to general government levied on tax bases deemed to be of particular environmental relevance (OECD 2004).

However, for policymakers it is useful to make a clear distinction between environmental taxes (that is, taxes with both an environmental purpose and effect) and environmentally related taxes (that is, taxes with only an indirect environmental purpose) (Falcão 2013).

Making this distinction at the international level would allow countries to follow suit and implement policies that are effectively geared toward environmental protection and pollution reduction. The United Nations' Committee of Experts in International Tax Cooperation ("UN Tax Committee") has recently established a Subcommittee on Environmental Taxation, which has been mandated, among other things, to create a conceptual framework to encapsulate these terms (Falcão 2018b). An environmentally related tax is any tax with an environmental essence, even if the conferred benefit is only indirect. For example, a transport tax related to the ownership and use of a motor vehicle is as a general rule considered to be an environmentally related tax, because they tend to be levied on vehicles, ships and aircraft using public highways, rivers, and airports maintained by the government. The tax is not related to the size or the consumption of a vehicle, but to its potential to use public infrastructure maintained by the government and thus to contribute revenues for maintenance and use. In spite of that, several systems of motor vehicle registration taxation include differentials on the basis of CO₂ emissions, or other environmental impacts of the specific vehicle in ques-

tion, to encourage consumption and use of fuel-efficient and low-carbon vehicles. If that were to be the case, the tax would be an environmental tax.

Any of the above definitions is apt to portray the purpose of an environmentally related tax, that is, a tax that derives revenues from an environmentally related tax base, but that might ultimately not derive a benefit to the environment through the reduction of corresponding carbon emissions, or reduction and/or elimination of a particularly polluting substance or product.

Such measures differ from an environmental tax such as a carbon tax, for example, where the application of a tax on carbon can have the effect of changing consumer behaviour and reducing the consumption of carbon-based products. A carbon tax is a tax that has an environmental purpose and effect, in the sense that the sole application of the tax is capable of leading to a reduction in the consumption of carbon based products and to a reduction in carbon based emissions.

Falcão has argued that there ought to be a distinction between environmental taxes (taxes with both an environmental purpose and effect) and environmentally related taxes (taxes bearing an indirect environmental purpose in its conception) (Falcão 2016 and Falcão 2018b).

Therefore, and in order to distinguish our proposed definition from the existing ones previously mentioned in the literature, we add the “purpose and effect” doctrine to our definition of an environmental tax. For the purposes of this report, therefore:

An environmental tax is defined as any compulsory, unrequited payment to general government imposed for an environmental reason and levied on a tax base that has a proven specific negative impact on the environ-

ment. It is thus regarded to have environmental purpose and effect.

This definition is significant because the tax base is the only objective basis to identify the nature of the tax: neither the name, nor the purpose of the tax, the motivation for implementing it, or the use of revenues collected are taken into account. In order to be considered a tax with an environmental substrate, the tax has to work so as to inflict a direct financial burden on an environmentally relevant base.

We will use this definition for the purposes of this report, while emphasising the importance of the use of revenues raised by environmental taxes, for example to mobilise domestic sources of revenue to fund the achievement of the Sustainable Development Goals, to protect the vulnerable from possible negative impacts of environmental taxes, and to finance the transition to a more sustainable and progressive tax system.

It is to be noted that an environmentally related tax may over time convert into an environmental tax and vice-versa. A purely revenue raising tax that over time acquires an environmental purpose and effect may be just as effective as one conceived with an environmental purpose in mind. Setting the two categories apart is also not synonymous with setting them into a main and a sub-category, but an instrument of measurement and control. Environmentally related taxes can have an important role in the control of certain forms of pollution which are not behavioural, or that do not lead to the release of, per se, harmful emissions into the atmosphere, such as noise, water, and others.

Setting environmental taxes apart from environmentally related taxes is important, among other things, in order to monitor and assess how effective countries are in admin-

istering policies that are effective in reducing carbon-based emissions, and other forms of polluting emissions. Because most environmental taxes create a direct correlation between the item subject to tax (the pollution) and the revenue derived therefrom, the revenue data alone is enough to inform how high the price of carbon is set in a determined jurisdiction, and how efficient that jurisdiction is in reducing carbon-based emissions. The decline in revenue accumulation via the tax will be proportionate to the pollution (emissions) reduction verified domestically. By distinguishing the taxing types via an objective nomenclature, monitoring agencies would ideally be capable of verifying how efficient countries are in meeting the objectives of the Paris Agreement through the administration of taxes, by using revenue data. This last point is further explored in section 2.4.

2.1.2 The significance of revenue raising

The relative importance of revenue raising and expenditure is reflected in the OECD-DAC (Development Assistance Committee of the OECD) definition of environmental fiscal reform (EFR) in developing countries:

EFR can contribute to poverty reduction directly by helping address environmental problems [...] that impact the poor [...] and indirectly, by generating or freeing up resources for anti-poverty programmes [...]. (OECD 2005b, p. 12).

Although relevant to achieve the SDGs, the revenue raising aspect of the tax should not drive the policy in its entirety. Revenue raising is a feature which permeates both environmental and environmentally related taxes.

2.2 FISCAL APPROACHES

Further developing the conceptual framework outlined in the previous section, the next step would be to explore what fiscal frameworks would be appropriate to inflict a change in consumer behaviour, in order to derive the intended environmental effect. We propose six categories within the framework of fiscal approaches: (1) a charge or surcharge; (2) a fee; (3) consumption taxes like Value Added Taxes (VATs); (4) subsidies and incentives; (5) a prohibition; and (6) an excise tax.

A charge or surcharge. Charges tend to be applied in counter-payment for a public offering or the provision of a service. A surcharge is an addition to the list price of a good or a service. Generally of short duration reflecting unusual cost pressures affecting the producer. An example would be a fuel surcharge for transport operators (OECD 2003).

A fee⁴ is a public price. It is formally defined as a “*compulsory, required payment to either general government or to bodies outside general government, such as for instance an environmental fund (...)*” in return for a service (OECD et al. 2001, p. 15). It is a compulsory payment to the government because the benefits are more directly linked to the value disbursed. There has to be a direct correlation between the fee and the service provided by the public body.

A consumption tax such as a VAT can at times be used with the dual purpose of taxing consumption and internalising the cost of carbon, by dedicating a percentage of the tax to an environmental cause, for example. Some scholars have called this technique a carbon-based VAT, or Carbon Added Tax (although it is not always referenced according to the carbon content of the item subject to

⁴ In OECD et. al. (2001), pg. 15, the terms charges and fees are used interchangeably. They are both seen as required payments in exchange for a service.

tax). According to the OECD Glossary of Statistical Terms, a VAT “is a tax on products collected in stages by enterprises; it is a wide-ranging tax usually designed to cover most or all goods and services but producers are obliged to pay to government only the difference between the VAT on their sales and the VAT on their purchases for intermediate consumption or capital formation.” (OECD 2001a) The Carbon Added Tax would therefore work by taxing the emissions released in each stage of the consumption process.

Subsidies are defined as “current unrequited payments from government to producers, with the objective of influencing their levels of production, their prices or the remuneration of the factors of production.” (OECD et al. 2001). Subsidies and incentives provide for a special derogation from the main tax legislation, by conferring an exceptionally low or no rate of taxation. These instruments are not capable of producing government revenues. On the contrary, they reduce the government’s revenue generating ability to provide financial support for private parties to pursue environmentally sound practices, or comply with the SDGs.

A prohibition is inflicted in order to forestall action or forbid behaviour. The difference between policy and prohibition is that a fiscal policy does not aim to prevent the conduct in an absolute way, but merely to discourage it. A penalty or prohibition on the other hand, if not followed, may result in a criminal offence punishable via a monetary fine or physical reclusion (Määttä, 2006, p.661).

An excise tax is a tax imposed on an act, activity, or consumption, where there needs to be no correlation between the price paid by the consumer and the actual value of the commodity. There needs to be no reference price against which the tax is to be measured. Therefore, the tax can be moulded to suit the purpose intended by the legislator. Excise tax-

es can be charged as an *ad valorem*⁵ or a specific tax,⁶ which make them easy to correlate to a specific measure of volume or weight. Carbon taxes are usually excise taxes, applied on a specific basis.

The focus in this report will be on taxes, due to their greater potential for domestic revenue mobilisation (DRM). Therefore subsidies, incentives and prohibitions are immediately discredited under the terms of the present study. Fees and charges tend to be measured against the provision of a public service, and therefore are not generic in nature. Likewise, consumption taxes have to be measured against actual consumption, which imposes an obligation on the consumer to report, and one on the tax administration to certify and assess the tax. A surcharge is an extraordinary lump sum charge, and hence not suitable for a long-term policy approach. Therefore, the simplest policy approach would be to apply an excise tax on a particular pollutant. Other instruments, such as policy packages and hybrid instruments, are further discussed in part 3.

Table 1.1 below provides an inventory of the different taxes and carbon prices that are typically related to the application of environmental or environmentally related taxes. It also specifies whether the tax would be one capable of conferring a carbon price, and hence act as an internalisation mechanism to forestall future carbon emissions. In the table, N stands for No, Y for Yes and M for Maybe (depending on the framework adopted). The classification adopted follows the examples conferred in each category.

⁵ Percentage applied on the final price of the product.

⁶ Fixed price applied per litre, kg or kW of a product.

Table 1.1: Inventory of environmental and environmentally related taxes

Sector	Measures	Examples of environmental taxes in each category	Excises	Carbon price	Environmental tax	Environmentally related tax
Energy	Taxes on transport fuels	Differentiated fuel taxation on leaded and unleaded petrol or diesel and low-sulphur diesel – implemented in many countries.	Y	Implicit	M	Y
	Taxes on heating fuels, e.g. oil, gas	Taxes on domestic heating in the Netherlands are paid above a certain threshold to incentivise energy efficiency.	Y	Implicit	M	Y
	Taxes on power generation	Climate Change Levy in the UK is a tax levied on business energy use per kWh (i.e. not directly related to CO ₂ emissions).	Y	Implicit	M	Y
Carbon	Taxes on carbon content in energy sources	Carbon tax in Mexico levied at import or production stage on all fossil fuels except natural gas, which is exempt.	Y	Y	Y	N
	Taxes on CO ₂ emissions	CO ₂ tax in British Columbia, Canada, on purchase and use of fossil fuels. From April 1, 2018, B.C.'s carbon tax rate is USD27/tCO ₂ e. The tax rate will increase each year by USD 4 per tonne until it reaches USD40/tCO ₂ e in 2021.	Y	Y	Y	N
	Carbon price floor (minimum carbon price usually enforced by means of a tax)	The carbon price floor in the UK sets a minimum price for emissions in the EU ETS. If the EU ETS price is expected to be below the minimum target price, carbon price support rates are imposed on the climate change levy and fossil fuels used for electricity generation.	Y in the UK, depends on model implemented	Y	Y	N

Sector	Measures	Examples of environmental taxes in each category	Excises	Carbon price	Environmental tax	Environmentally related tax
Transport	Registration taxes based on CO ₂ emissions	Vehicle registration taxes in Thailand explicitly tax the CO ₂ emissions of road vehicles.	M (if not a fee)	N	Y	N
	Annual circulation taxes	In the UK, circulation taxes are paid on a sliding scale reflecting CO ₂ emissions per km travelled.	N	Implicit	Y	M
	Road tolls/vignette systems	Road tolls are environmentally-related taxes: their primary objective is to cover the cost of road maintenance.	N	N	N	Y
	Transport taxes to enter city centres (often referred to as congestion charges)	In Milan, congestion charging differentiates between vehicles – cleaner vehicles, like motorcycles, electric vehicles, hybrid vehicles, natural gas, LPG and bi-fuel vehicles, are exempt.	N	N	Y	N
	Vehicle Taxes	Recurrent taxes on vehicle registration or road use which do not reflect the climate or environmental impact of a vehicle.	N	N	N	Y
	Air pollution taxes	Explicit environmental taxes on air pollution from transport are rare, environmentally-related taxes on transport fuels, which also address air pollution, are common to all countries.	M, depends on model	N	Y	N
	Ticket taxes, e.g. air passenger duty	In the UK, air passenger duty differentiates between short-haul and long-haul flights and also between the space taken up by passengers in the aircraft – to reflect different CO ₂ e emissions.	N	M/Implicit	M	Y

Sector	Measures	Examples of environmental taxes in each category	Excises	Carbon price	Environmental tax	Environmentally related tax
Air	Air pollution taxes e.g. on SO ₂ , as well as VOC, NO _x , PM, NH ₂ , heavy metals, CO, NH ₃ , etc.	Pollution charge, e.g. in China on SO ₂ emissions.	Y	N (as a general rule)	Y	N
	Hydrofluorochloride (HFC) Prohibition (Montreal Protocol)	Environmental Protection Tax in Vietnam taxes HFCs. HFC commitments in the Montreal Protocol generally ask for a regulatory prohibition on the emission of HFCs.	N	N	Y	N
Water	Taxes on water supply and sanitation	Tap water tax and groundwater tax in the Netherlands, additional taxes for installations on public land or water.	Y (depends on model implemented)	N	Y	Y
	Taxes on pollutant emissions into waterways	Colombia, wastewater discharge fee.	M	N	M	M

Sector	Measures	Examples of environmental taxes in each category	Excises	Carbon price	Environmental tax	Environmentally related tax
Biodiversity	Payment for ecosystem services (PES)	In Costa Rica, a PES programme spanning more than 20 years has increased forest cover to over 50% today, from a low of just over 20% in the 1980s.	M	N	Y	N
	Stump charges	Stump charges in Ghana, levied per stump at the moment of timber extraction – which have been largely ineffective as retained at the same rate for many years, due to political pressure.	N	N	M	Y
	Tourism taxes – which may be in this context national park entry fees	Visitor entrance fees, differentiated by heavily visited sites in the Galapagos National Park in Ecuador, as well as by citizenship (higher rates for foreign tourists).	N	N	M	Y
	Land taxation, e.g. taxes on land use change	Land use change tax in the state of Vermont, USA.	M	N	M	Y
	Extraction taxes	Forestry charge in Bosnia-Herzegovina on forestry products (charged at 3% ad valorem and 0.1% on non-forestry income on forest areas), revenues earmarked for reforestation and protection.	Y	N	M	M
Waste	Landfill taxes	Landfill tax in Austria introduced in 1989, all revenues are earmarked for clean-up of contaminated sites.	N	N	M	Y
	Incineration taxes	Waste-to-energy incineration tax in Sweden introduced in 2006 to reduce incineration and encourage recycling.	N	N	Y	M
	Contamination fees	In Bulgaria, a fee for excessive soil pollution is payable on many different kinds of waste (manure, pesticides, heavy metals, radioactive waste).	M	N	Y	M
	Pay-as-you-throw schemes (PAYT) and waste taxes	All countries in the European Union with recycling rates above 45 % have used PAYT systems to drive high rates of recycling. Countries with recycling rates below 20 % have not – indicating PAYT are an effective instrument to drive up recycling.	N	N	M	M
	Plastics taxes	In Morocco, taxes on plastics (imports and manufactured plastics) have been levied since 2012.	M	N	M	Y

Sector	Measures	Examples of environmental taxes in each category	Excises	Carbon price	Environmental tax	Environmentally related tax
Resources	Taxes on natural resources	In Latvia, the natural resource tax came into force in 1991, but rate has remained unchanged – limited impact as a result	M	N	M	M
	Royalties for resource extraction	In China, taxes are levied ad valorem on the extraction of a wide range of resources – gold, oil, rare earths, ore – at rates of between 1-12% of the pre-tax price.	N	N	N	N
	Rent taxes (e.g. resource rent taxes)	Resource rent taxes in Tanzania.	N	N	N	M
	User fees (e.g. signature bonus)	A one-off fee for the assignment and securing of a license for commercial entities to conduct exploration activities and extract natural resources such as oil.	N	N	N	N
	Aggregates tax	Aggregates taxes are in place e.g. in the UK.	N	N	M	Y
	Similar arrangements: production sharing agreements, auctions, equity participation, infrastructure provision requirements	Contractual provisions foreseen in extractives contracts. Most times do not have an environmental concern.	N	N	N	N
Agriculture	Pesticide and fertiliser taxes	In Norway, pesticide taxes payable in 7 tax bands according to environmental damage resulting.	M	N	Y	M
Emissions Trading Scheme (ETS)	Introduce a regulatory approach to price carbon.	European Union ETS and British Columbia ETS are examples of existing market approaches.	N	Y	Y	N

Different types of taxes can hence be applied with the intention of making up a government's policy mix, and have as wide a coverage as possible. Broader policy mixes will typically maximise emission mitigation and revenue-raising potential, and be more cost-effective. At the same time, which option (or combination of options) works best in a given jurisdiction will depend on factors such as the emissions profile of the jurisdiction; existing and planned climate, energy, and tax policies; the structure of key sectors; and government capacities for tax administration.

The World Bank has issued a Carbon Tax Guide, which might be a useful tool for policy makers (World Bank 2017a). The United Nations Committee of Tax Experts is also currently producing guidance on environmental taxation, starting with carbon taxes. The IMF's handbook, *Fiscal Policy to Mitigate Climate Change: A Guide for Policymakers* (IMF 2012) and the OECD Development Assistance Committee's *Environmental Fiscal Reform for Poverty Reduction* (OECD 2005b) are two useful guides for policymakers wishing to implement environmental or carbon taxation. South-south cooperation, and north-south capacity development are important tools to disseminate techniques for the development of environmental tax policies and environmental tax reforms (ETRs).

2.3 The theoretical underpinnings of environmental taxation

Environmental pollution results in damages, such as impacts on human health, water quality, and biodiversity. These damages can be of considerable economic significance, but are typically not reflected in market prices and their consequences are usually borne by society as a whole. If the economy does

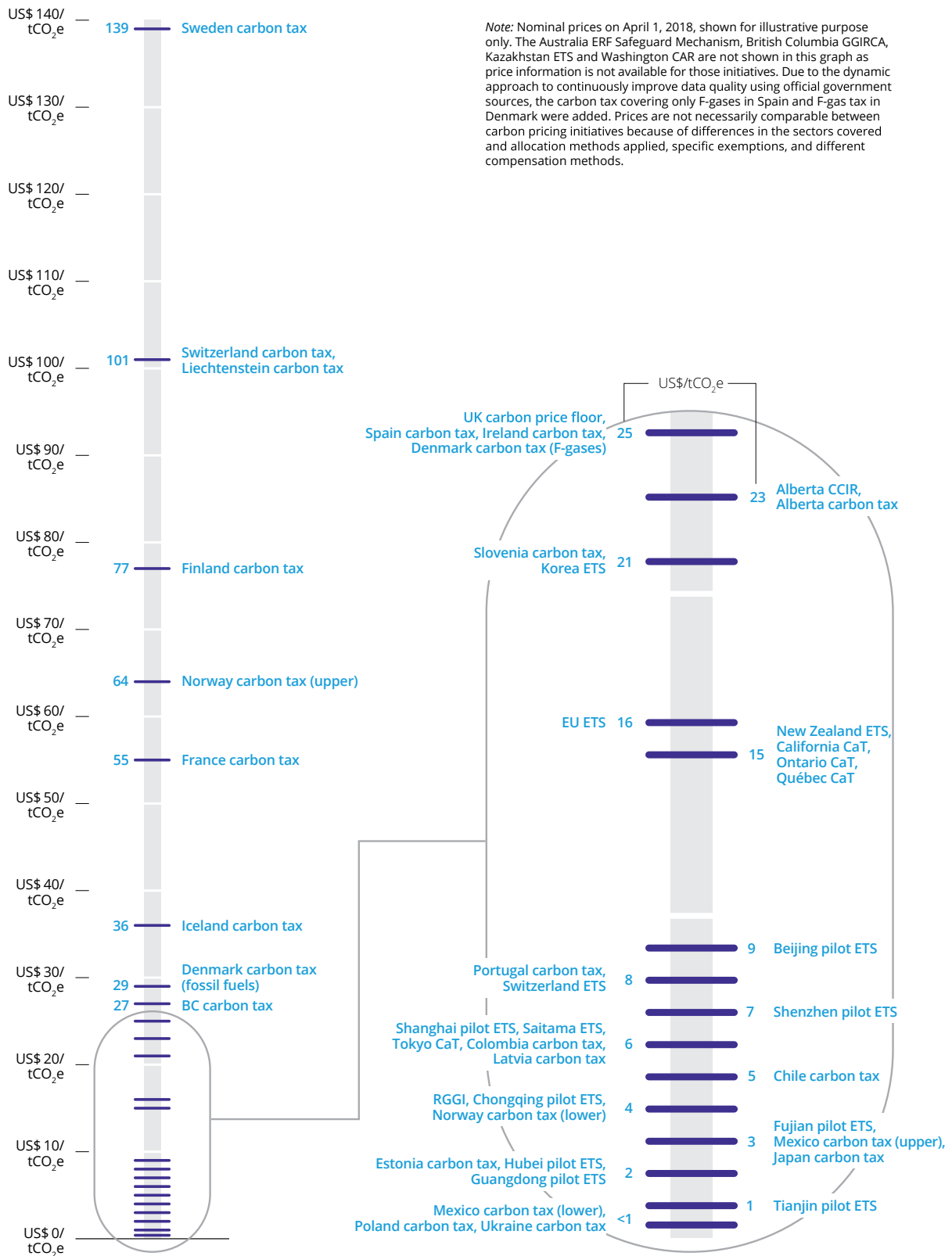
not internalise these 'external costs', it will operate inefficiently, resulting in market distortions. Environmental taxes are a means of internalising these external costs within the market price of goods and services, thus generating welfare gains that result from a government's increased revenue collection ability. Depending on how the environmental taxes are applied, and the type of tax applied, environmental taxes may also lead to an environmental gain to the extent that they reduce carbon-based pollution, for example, or deter consumers from buying a particularly polluting item. The consumer behavioural shift that may be obtained from the application of environmental taxes has the effect of reducing inefficiencies in the economy.

Environmental taxes can internalise externalities by either internalising all environmental costs within the price – a so-called Pigouvian tax, or by setting tax rates at a level commensurate to achieving a particular environmental objective (Pigou 1932, Baumol and Oates 1988).

Setting a tax rate at a level that is commensurate to achieving a particular environmental objective is a subject that has given rise to much debate. The International Panel on Climate Change (IPCC) has produced extensive studies on this issue, and the result has always been inconclusive, with different prices being reached depending on the parameters adopted by the economists in charge of the study. The result has been a wide spectrum of carbon prices, which has been unhelpful in carrying the debate forward (IPCC 2007).

The High Level Commission on Carbon Prices of the Carbon Pricing Leadership Coalition, led by Nicholas Stern and Joseph Stiglitz, has predicted that a carbon price of USD 40-80/tCO₂e by 2020, and USD 50-100/tCO₂e by 2030, would be necessary to achieve

Figure 1.2 Prices in implemented carbon pricing initiatives



Source: World Bank, Ecofys (2018). *State and Trends of Carbon Pricing 2018*. © World Bank. <https://openknowledge.worldbank.org/handle/10986/29687> License: CC BY 3.0 IGO.

the Paris targets (Carbon Pricing Leadership Coalition 2017). The most recent IPCC report released in 2018 presents models and scenarios that propose that, to be effective as a stand-alone measure, a carbon price ranging from USD 135 and USD 5,500 per tonne would be needed in order to meet the target of limiting the average global temperature increase to no more than 1.5°C above pre-industrial levels as set in the Paris Agreement in 2030 (IPCC 2018a). A carbon price at the upper end of this range would be almost impossible to achieve from a political perspective.

Very few countries are on the right path to get to the level of taxation proposed by the High Level Commission on Carbon Prices in an appropriate timeframe. The carbon pricing schemes currently in force only account for 20% of global emissions (World Bank 2018a). In spite of that, many emissions outside an explicit carbon pricing scheme are nevertheless subject to an implicit carbon price through environmental or environmentally-related taxes, although the implicit carbon prices administered to date are still significantly low. In 2018, 88% of carbon emissions covered by the OECD Effective Carbon Rates report (which covered 80% of total global emissions) were priced at less than USD 35/tCO₂, which is not sufficiently high to achieve the Paris targets (OECD 2018). With the predominance of very low carbon pricing

initiatives, with most of them being set at under USD 10/tCO₂e, there is urgent need for the disaggregation of data, to be able to correlate the carbon price floor to the social and economic gains derived from the incidence of the tax. Further escalation of carbon prices is needed in most countries in order to further stimulate emissions reduction, and achieve the goals set by the Paris Agreement.

2.4 INTERNATIONAL AGREEMENTS AND TAX FRAMEWORKS

Strictly speaking from an environmental perspective, the United Nations has produced three key agreements on climate change directing member states to undertake certain obligations and meet specific targets for the reduction of greenhouse gas emissions. In chronological order, the agreements are: the United Nations Framework Agreement on Climate Change (UNFCCC) (United Nations 1992), the Kyoto Protocol (United Nations 1997), and more recently, the aforementioned Paris Agreement (United Nations 2015a).

The UNFCCC, the first international agreement on climate change, is an umbrella convention that provides a framework for both market and non-market approaches to address climate change. It was approved in 1994 and contains an open pledge “to achieve ... [the] stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”

While the UNFCCC targeted all signatory countries — both developed and developing — only developed countries listed in Annex I overtly committed to adopting national policies and taking corresponding actions to mitigate climate change by, among other things, limiting their emission of greenhouse gases. Annex II countries,

a more restricted group of countries, had the supplementary obligation to provide financial resources to meet all costs incurred by developing country parties in complying with UNFCCC obligations.

Thus, the UNFCCC established different rights and obligations between developed and developing countries. However, it did not foresee a specific mechanism by which coun-

tries were to meet those limited rights and obligations.

The Kyoto Protocol was adopted only three years after the UNFCCC entered into force. It was clear in introducing a market-based approach for the reduction and control of greenhouse gases.

The close proximity within which the UNFCCC and the Kyoto Protocol were admitted made it appear like trading in emissions permits was, at least in political terms, the only admissible instrument under the umbrella of the convention.

Because of that choice, many countries and regions introduced cap-and-trade systems. The largest and most well-known emissions trading system is the one in the European Union, launched in January 2005 (European Union 2003).

The Kyoto Protocol recognizes that developed countries are principally responsible for the high levels of greenhouse gas emissions in the atmosphere as a result of more than 150 years of industrial activity. Therefore, the protocol only places an obligation to reduce greenhouse gases on certain developed economies (listed Annex I countries), applying the principle of common but differentiated responsibilities.

It took the U.N. and its member states over 15 years to realize that a pure market approach would not be enough to achieve the aims of the UNFCCC, a realization that was followed by the adoption of the Paris Agreement.

Introduced in 2015, the Paris Agreement brought attention back to a broader set of tools to address carbon emissions specifically and climate change more generally — tools that include green financing, green bonds, and environmental taxes.

The Paris Agreement requires all parties (developed and developing) to use their best

efforts through nationally determined contributions (that is, domestic mitigation measures, with the aim of achieving the objectives of the agreement) to curb greenhouse gas emissions and to continue to strengthen those efforts in the years ahead. The agreement is thus a return to the original objective of the UNFCCC (Falcão 2016).

Fortuitously but not by accident, 2015 was also the year of admission of the Addis Ababa Action Agenda (AAAA), which provided the foundation to support the implementation of the 2030 Agenda for Sustainable Development. The AAAA foresees a global framework for financing sustainable development by aligning all financing flows and policies with economic, social and environmental priorities.

The 2030 Agenda for Sustainable Development is a plan of action for people, planet and prosperity, which portrays 17 Sustainable Development Goals (SDGs) and 169 targets to build on the achievements of the Millennium Development Goals. They seek to realize the human rights of all and to achieve gender equality. They are integrated and indivisible and balance the three dimensions of sustainable development: economic, social and environmental (United Nations 2015b).

The 17 SDGs are currently the basis against which all UN Actions Plans are reported. The environment is such an important dimension of sustainable development that it features in ten of the seventeen goals, with a dedicated action plan specifically referencing it – SDG 13 on Climate Action.

The AAAA and the 2030 Agenda for Sustainable Development have emphasized the need for countries to mobilise resources in order to enhance development and meet with the required goal. Several agencies have been

set in order to monitor countries' progress in this field, and the UN itself produces frequent reports on countries' initiatives for resource mobilization (United Nations 2018).

The Addis Tax Initiative (ATI) was initiated by the Netherlands, Germany, United Kingdom and the United States to enhance the mobilisation and effective use of domestic revenues and to improve the fairness, transparency, efficiency and effectiveness of countries' tax systems. It is therefore an important tool to stimulate capacity building and policy development, particularly in developing countries.

It is clear from the above description of historic documents that domestic revenue mobilisation, as well as better and more comprehensive taxation systems, are becoming increasingly important in terms of financing development and are seen as an important tool with which countries can achieve the SDGs.

Some might argue that the debate extends as wide as the OECD's Base Erosion Profit Shifting (BEPS) Initiative, an initiative that has outgrown the competence of the intragovernmental organisation that instituted the debate. The OECD initiated a debate on tax avoidance techniques, which ended up being expanded to reassess the suitability of the existing international tax framework in allocating income between source and residence countries, and between developed and developing countries (Falcão 2017). A new principled framework for international taxation seems to be emerging, that allocates taxing rights to the country where the economic activity takes place or value is created, instead of focussing on source and residence allocation rules that have long lost value and, to a certain extent, relevance under the existing commercial (digital) setting (Falcão 2018a).

Efforts to fight the erosion of the tax base can be coupled with other international agreements, such as the Paris Agreement, for example, and with wider environmental tax initiatives occurring under any of the SDGs to increase domestic resource mobilisation. The BEPS Project and the Paris Agreement are only two international mechanisms which may have the potential to act as powerful tools to reform national tax systems and raise additional revenues for environmental, social and economic reform (Falcão 2017).

2.5 THE PRINCIPLED DIMENSION

An international framework already exists to guide countries as they produce their unique environmental tax approach. The principled approach can be subdivided into four main categories: (i) principles of environmental law; (ii) tax principles of general application; (iii) policy-based principles; and (iv) social justice principles. Each of these categories will be discussed separately below.

2.5.1 Principles of environmental law

These are the main principles supported or considered within the framework of the International Environmental Agreements covered in Section 2.4 – the UNFCCC, the Kyoto Protocol, and the Paris Agreement. This section discusses which principles should be upheld by countries wishing to promote environmental taxation, and which have been surpassed within the modern environmental conceptual framework.

The Polluter Pays Principle: This principle promotes the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pol-

lution, rather than shift the cost of pollution to the community as a whole. It runs from the premise that pollution that is unaccounted for either through an economic or fiscal approach, is borne by society, and hence impacts the general budget to the extent governments are required to bear the cost associated with the environmental degradation resulting from the private activity.

The Precautionary Principle: In order for precaution to apply, there should be a risk of future long-term harm to the environment that cannot be fully assessed at the time of the decision-making process. The risk does not need to be eminent, nor does it need to be certain. The principle is based on a hypothetical threat that harm can or cannot happen. This principle was recognized in the UN Rio Declaration, principle 15 that attests that: *“the lack of scientific certainty is no reason to postpone action to avoid potentially serious or irreversible harm to the environment.”* (United Nations 1997, p. 20)

Principle of Prevention: This principle is stated in multiple international environmental conventions, but more explicitly in Principle 2 of the UN Rio Convention. It provides that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. It thus delves on inter-State responsibility and duty of care, to make sure that the economic activities pursued in one’s territory do not generate a harmful environmental impact in neighbouring or third States.

Common but differentiated responsibilities: The principle assumes that all countries are to share the responsibility for environmental degradation, but with differentiated levels of engagement. The level of involvement is to take into account countries’ social and economic development (Falcão 2016). This principle has been formally recognized as such by Principle 7 of the UN Rio Declaration, which states that: *“States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth’s ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.”* (United Nations 1997)

Principle of historic responsibilities: The principle of historic responsibilities provides that the countries that have historically contributed the most to environmental degradation should bear the full economic cost for the pollution. It runs from the premise that developed countries were, for centuries, the ones to contribute the most to the release of carbon emissions as a result of going through earlier industrialisation processes. This principle was what drove the admission of a Kyoto Protocol where the obligation to reduce carbon emissions was only bestowed on Annex I countries (developed countries, generally). This principle can no longer stand in today’s day and age. To achieve environmental effectiveness, total engagement of all countries – in the context of the principle of common but differentiated responsibilities – is required. This principle should not be upheld under an environmental tax framework.

In sum, all the above principles, except the principle of historic responsibilities, are worthy of pursuit under a proposed domestic environmental tax framework. There is scholarship to sustain that the first four principles mentioned above have become principles of public international law, as a result of their application in multiple international environmental agreements (Falcão 2016).

2.5.2 Tax principles of general application

These are principles that should be promoted by any tax policy instrument in order to promote fairness, equity, social justice, and to promote a simple and transparent overall tax framework. Many of the stated principles are in line with business' understanding of environmental tax (ICC 2012), and take into account some countries' – and in particular developing countries' – interest to continue exploring domestic natural resources.

Simplicity and cost effectiveness: The environmental objective should be clearly stated and measurable.

Price-parity across different segments and businesses: Prices imposed for environmental externalities should be economy-wide, covering all relevant sectors without exception in the context of a global policy framework. Waive-in periods and different pricing policies should only be considered on a temporary basis, and the legislation introducing them should include a sunset clause. The competitive position of trade-exposed industries needs to be addressed until consistent environmental taxation applies globally.

Minimisation of regressiveness in the administration of Environmental Taxes: The policies should be integrated so that they do not adversely impact low income households. Systems should be set

in place in order to compensate for the possible regressiveness of the environmental tax. Gender issues should be taken into account where relevant (see section 3.2.2).

Avoid economic and juridical double taxation: This might be a difficult task to pursue, particularly in cross-border transactions. However, double taxation should be minimised to the fullest extent possible, particularly in a domestic context. Environmental taxes should not be added on to the tax base of other indirect taxes, such as consumption taxes (see Box 1 discussing this topic, below).

Gradual introduction of new taxes and predictability when it comes to the readjustment (increase) in tax rates: The legal instrument introducing a new environmental tax or modifying an existing environmental tax, should account for the progressive annual adjustment forecast in the tax. Taxes should be introduced at a lower rate to start with, and gradually increased over the years in order to provide legal certainty in the overall tax system and so that the jurisdiction continues being attractive for foreign investors.

2.5.3 Policy-based principles

Stable, predictable and transparent tax laws and assessment rules

Simplicity in tax allocation rules: Depending on the type of environmental tax, the election of a tax substitute might be possible to simplify tax collection

Provide an economy-wide price for the environmental externality, and apportion it according to the polluting potential of each person subject to the tax.

Consistency between tax rules and trade obligations, as agreed under the framework of the WTO, as further denoted in Chapter I, section 2.7.

2.5.4 Social justice principles

Fairness: Tax should be fair towards all players and segments of the economy, taking into account ability to pay

Equality in the administration of taxes. No exemptions, subsidies or reductions.

Equity: Individuals should be taxed according to their ability to pay. See tax justice and fairness for interrelated notions of equity.

Tax Justice: no undue burden on the segments of society with least ability to pay. A redistribution system or social welfare system might have to be put in place to compensate for excess taxes applied on the poorest segments of society.

Gender Justice where applicable, taking into account the particular circumstances of women.

Box 1

THE CASCADING EFFECT OF TAXES

One of the general principles discussed above, is to avoid economic and juridical double taxation. Part of this principle delves on the idea that a tax, in this case in particular an environmental tax, should not be added on to the tax base of other taxes, inflating the tax base and as a consequence, augmenting the effective tax rate applied.

According to M. Keen (Keen 2013), cascading “makes the structure of the tax system opaque, running counter to basic notions of transparency and simplicity: because the rate at which tax cumulates through the production chain depends on the vagaries of input-output relationships, cascading results in a pattern of effective tax rates that is ‘...almost fortuitous and largely unknown to policymakers’ (...)” The loss to the consumer thereby exceeds the revenue raised by government, in a sort of deadweight loss.

Cascading of taxes occurs when a tax is applied on top of a base that has already been burdened, and augmented by another tax. It acts so as to fictitiously increase the taxable base (input price) with a charge. It is a common practice in developing countries, increasing the complexity in the tax system. To illustrate, let us assume that Country A imports a product for 100. On that product,

the following taxes will apply: Import tax, industrialisation tax, a social security contribution, and a VAT-like tax. Let’s also assume all these taxes are levied at 10%.

A tax system that applies taxes in a cascading effect will assign an order for imposition of the taxes, and will assimilate the “burden/cost” of the tax on to the price of the product, using a “tax on tax” approach. Using the example above, this is how the tax base would gradually inflate through the imposition of the taxes in the order described above: starting tax base (100) Import tax (10%, @110), Industrialization tax (10%, @121), a social security contribution (10%, @133), and a VAT-like tax (10%, @146).

The example might seem exorbitant, but it is widely used in emerging economies like Brazil, where there is a culture for the imposition of taxes over a tax base that is not real, because already augmented by other taxes. For example, in Brazil the VAT applied on energy has as a tax base the individual’s energy consumption and a social security contribution widely known as COFINS.

Source: Tatiana Falcão

2.6 ENVIRONMENTAL TAXATION IN INDUSTRIALISED AND “DEVELOPING” COUNTRIES

Environmental taxation ought to be guided by countries' current levels of economic and social development, take into account domestic governance structures, and tax administration capabilities. Hence, higher tax rates should be administered first hand by developed countries, whereas developing countries' environmental tax policies should be levelled with their economic development and with the level of environmental protection (through internalisation of negative externalities) they aim to achieve. This is sometimes translated into longer timeframes to achieve the same level of environmental protection achieved by developed economies.

The most successful case studies in implementation of environmental taxation, the Nordic countries, started with much lower tax rates than currently supported by their domestic tax regimes. Norway, for example, started in 1991 with a system that applied different carbon prices to different segments of the economy, and currently has a much broader all-encompassing carbon tax priced at USD 64/tCO₂e (Statistics Norway 2009). Likewise, Sweden started with a carbon tax of only EUR 26/tCO₂e in 1991 and currently holds the highest carbon tax rate, valued at USD 139/tCO₂e. As shown in figure 1.2, Norway and Sweden both have different tax thresholds, with higher and lower carbon tax prices.

Of particular importance to developing countries is the need to establish transparent governance frameworks that will monitor and report on the tax revenues accumulated via the assessment of environmental taxes, and provide publicity to the data, in order to forestall corruption and mismanagement of

the revenues derived from these taxes. Ideally, the tax administration should produce reports to communicate where the tax revenues are being employed, what the tax-to-GDP ratio is, and to report on success stories. Publicising the data may be an important tool to harness popular support for the tax and raise awareness capable of inflicting a change in consumer consumption habits.

Tax revenues could be earmarked to fulfil environmental objectives, so that the proceeds may be reinvested into the economy, be employed towards governmental sponsorship of research in new renewable technologies, or be dedicated towards the alleviation of the natural regressivity of this indirect tax. Earmarking might be difficult, if not legally impossible for countries with constitutional limitations to earmarking. Options should nonetheless be investigated in the countries where earmarking is admissible. This topic is more thoroughly discussed in section 3.3.1.

Environmental taxes, such as carbon taxes, bear an intrinsic dichotomy, in that the successful administration of the tax will necessarily lead to a reduction in the accumulation of tax revenues. To the extent consumers change their behaviour and turn to consuming less carbon intensive substances, there follows a decline in the tax administration's ability to collect surplus revenues. Tax administrations should be prepared for that outcome. Some possible responses to falling revenues are discussed in part 3.1.2.

Thus, legislation introducing the environmental tax should ideally foresee or consider a contingency plan in the event of total carbon substitution. This is not a farfetched reality. In Finland, for example, the government has introduced a stockpile fee to account for the loss in revenues derived from the reduced reliance on oil-based energy sources (GoFin

2013). This is a security tax, meant to maintain equilibrium in the Finnish public finances – it is expected that the stockpile fee will gradually increase over the years, as taxpayers switch to less carbon intensive fuels.

There is a real lag between developed and developing countries in implementation of environmental taxes. Most of the countries with successful policies in place are, in fact, developed economies. This report will attempt to recount developing country examples to the fullest extent possible. When that is not possible, it will resort to developed country practices, framing those experiences within the context of developing economies.

National tax administrations should invest in national systems for environmental statistics. Global players, such as intergovernmental agencies, the academia, NGOs, the private sector and investment agencies should invest in the development of an environmental database, compiling carbon pricing-based practices in developing country markets. The markets that are likely to be most affected by climate change are also the ones with the least data reporting across all country groups. In reading the statistics reported in this study, one should bear in mind that most studies currently produced at international level only account for data derived from developed nations, and therefore the outcome might be substantially different in a developing country context.

2.7 THE WTO AND ENVIRONMENTAL TAXATION

In 1994, the WTO was created, having the Marrakesh Agreement as the constituting legal text. The Marrakesh Agreement provided an umbrella for sixty agreements, annexes, decisions and understandings, which became

collectively known as the WTO Agreements. By agreeing to the Marrakesh Agreement, members were automatically made to commit to all the accompanying instruments. There was no opportunity for a partial withdrawal (Falcão 2015).

The WTO has no (multilateral or plurilateral) agreement specifically dealing with the environment, but the objectives of: (i) sustainable development, (ii) environmental preservation and protection and (iii) optimal use and consumption of natural resources are important enough to be stated in the preamble of the Marrakesh Agreement (WTO 2011a). It reads as follows:

“Recognising that their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world’s resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development.” (emphasis added, WTO 2011c)

The Marrakesh Agreement is the Agreement establishing the WTO. It sets the guiding principles by means of which the WTO is to operate, including its scope, functions, structure, relation with other organisations, and decision-making power.

Therefore, it is an overarching agreement, guiding all other multilateral and plurilateral agreements operated under the WTO framework. The preamble to the Marrakesh Agreement is also to provide context to define the object and purpose of all the other multilateral and plurilateral agreements included in the

annexes. The inclusion of an environmental element in the object and purpose of the Marrakesh Agreement means to say that all multilateral and plurilateral agreements operated under the WTO framework (including the GATT and GATS) are to be interpreted in light of this object and purpose (Falcão 2015).⁷

There are so many synergies between tax, trade and the environment in the WTO Agreements, that the introduction of a plurilateral agreement providing for a direct connection between the three topics within the WTO framework would not be an absurd construction to make. According to the WTO:

“In addition to regulatory measures, national, regional or multilateral initiatives that deal with climate change involve the adoption by governments of price-based measures such as taxes and tariffs, market-based mechanisms as well as a variety of other measures including subsidies. As they relate to trade, these measures may be subject to WTO rules and procedures. The design of climate change programmes and the pursuit of international cooperation in this field will need to take into account the potential trade impact of these measures and the relevance of members’ rights and obligations under WTO rules.” (emphasis added, WTO 2018)

As a result of the preambular language, the WTO has created a study group, the Committee on Trade and Environment (CTE), to analyse the interrelation between issues related to trade and the environment. Its task is to study and at times negotiate formal positions, regarding questions that arise when environmental policies have a significant impact on trade.

The CTE includes all WTO members and a number of observers from intergovernmental

organizations (Sampson 2001). Its mandate is broad and involves an analysis of: (i) the interrelation between the WTO and Multilateral Environmental Agreements (MEAs), (ii) the interrelation between dispute settlement and MEAs, (iii) the relationship between the multilateral trading system and charges and taxes used with an environmental purposes; (iv) transparency in trade measures used for environmental purposes; (v) the effect of environmental measures on market access, especially with respect to developing countries; and (vi) the issues related to the export of domestically prohibited goods (Falcão 2015 and WTO 2011c).

In 2001 the scope of the CTE was further detailed in the Doha Mandate, which required the CTE to concomitantly run Special Sessions (CTESS), on negotiable issues, and non-negotiable sessions, (also referred to as CTE Regular) where much of the original agenda was still to be analysed.

Under the Special Session mandate, CTES was to negotiate: (i) the relationship between WTO rules and specific trade obligations contained in MEAs, but only with respect to Members which are part of both WTO and MEAs; (ii) procedures for regular information exchange between the MEA secretariats and the relevant WTO committees and the requirements for granting observer status; and (iii) the elimination or reduction of tariff and non-tariff barriers to environmental goods and services. (para. 31, WTO 2001)

Under the Regular CTE appointment, the Committee was to concentrate on: (i) the effects of environmental measures on market access, especially with respect to developing countries and Least Developed Countries (LDCs); (ii) the relevant provisions of the TRIPS; and (iii) labelling requirements for environmental purposes (para 32). Paragraph

⁷ As per: *US-Shrimp*, Appellate Body Report adopted on 6 Nov. 1998, WT/DS58, para. 153. For the full rationale see Falcão 2015.

33 further called for technical assistance activities in the field of trade and environment, in cooperation with the secretariats of UNEP, the United Nations Conference on Trade and Development (UNCTAD) and MEAs (WTO, 2011c).⁸

The CTE was created on account of the environmental object and purpose pursued by the WTO via the WTO Agreements. The preamble of the WTO Agreements is thus referenced in the decision instituting it. However, following developing countries' concerns that environmental objectives would be forwarded at the expense of international trade, the instrument creating the CTE expressed that the WTO is to “coordinate policies in the field of trade and environment (...) without exceeding the competence of the multilateral trading system, which is limited to trade policies, and those trade related

aspects of environmental policies which may result in significant trade effects for its members.” (WTO, 2011b)

Therefore the CTE's competence is not to turn the WTO into an environmental protection agency. The WTO is to pursue trade liberalization by taking environmental protection into account (Falcão 2015).

Although the scope of environmental protection conferred by the WTO to date is one which is related to trade, there is a growing number of case laws (concerning the application of the GATT and the GATS),⁹ delving on standards of environmental protection. Therefore, countries interested in the introduction of environmental and carbon taxes, should be aware of the obligations assumed under the context of the WTO Agreements (Falcão, 2016).

PART THREE: ENVIRONMENTAL TAXATION IN PRACTICE

3.1 ENVIRONMENTAL TAXATION: EFFECTIVENESS, TRADE-OFFS, DESIGN

3.1.1 Introduction

This chapter examines the effectiveness of environmental taxation in developing countries along the three dimensions of sustainable development – environmental protection, social inclusion and economic prosperity, while also taking fiscal sustainability and

domestic resource mobilisation into account. The objective of the chapter is to highlight ways in which environmental taxation impacts environmental quality, social equity, the broader economy and the fiscal system. The chapter has a particular focus on how environmental taxation can be implemented in a way that is fair to foster social equity. It also examines the trade-offs policymakers may have to consider when implementing environmental taxes, while operating in challenging political

⁸ In the discussions on technical assistance, the Members were also said to have encouraged further cooperation and coordination between the WTO, UNEP, UNCTAD and MEAs in delivering technical assistance. On the specific issue of Sustainable Development, para. 51 calls for cooperation between the CTE and the Committee on Trade and Development in order to achieve the proper synergy between developmental issues and the environment in pursuance of developmental sustainability.

⁹ See in this respect, for example: WTO, Report of the Panel, *United States – taxes in Petroleum and Certain Imported Substances (US-Superfund case)*, L/6175 – 34S/136 17 Jun. 1987, WTO, Appellate Body report, *European Communities – Measures affecting asbestos and Asbestos-containing Products (EC-Asbestos)*, DS135, 12 Mar. 2001, *US-Shrimp*, Appellate Body Report adopted on 6 Nov. 1998, WT/DS58, *US-Gasoline*, Panel Report, WT/DS2/R, 29 Jan. 1996.

environments which demand further compromise in order to secure buy-in from powerful opponents.

3.1.2 Design of environmental taxation in theory and practice

Trade-offs between environmental effectiveness and tax principles

As implied by the tax and policy-based principles described in part 2, to maximise environmental effectiveness, environmental taxes should target pollutants or polluting behaviour as accurately as possible (OECD 2010). The tax rate should be set at a level commensurate to achieving a particular environmental objective (Baumol and Oates 1988) and increases should be predictable, while coverage should be as broad as possible, with exemptions kept to a minimum, to avoid distortions and minimise opportunities for tax evasion (OECD 2010).

A plastic bag tax is an example of an environmental tax that can meet these criteria. The tax targets the pollutant directly – typically, the tax is paid by the consumer per plastic bag purchased – and can be set at a high enough level to reduce plastic bag use in a relatively short timeframe. In Ireland, for example, the plastic bag levy imposed in 2002 resulted in a 90% fall in plastic bag purchase within twelve months, with increases to the levy in 2007 counteracting increasing plastic bag use. However, the levy reduced plastic bags to just 0.13% of total marine litter, whereas prior to the levy's implementation 5% of marine litter was made up of plastic bags (Anastasio and Nix 2017). If the tax were to be set at too low a rate, as was the case in South Africa, then the response to the plastic bag tax would have been much less dramatic. In

South Africa, there was a 44% fall in plastic bag use between the tax being introduced in 2003 and the 2007/8 financial year. Although plastic bag use fell by 90% in the short-term, consumers adjusted to the slightly higher price and bag use crept up once more, meaning that the tax missed its target of reducing plastic bag use by 50% (Dikgang 2010).

In practice, policymakers may have to accept trade-offs between environmental effectiveness, tax principles, and social justice. The policy-based principles of environmental taxation indicate that to maximise efficiency and cost-effectiveness, and avoid distortions, environmental taxes should have as broad a coverage as possible with few exemptions. This implies an upstream tax levied at an early stage in the supply chain (IMF 2012). However, in some developing countries, the economic and regulatory context may mean that taxes are more effective when levied downstream. In regulated energy markets, for example, an upstream tax on the energy inputted into power generation will have little or no impact on energy prices on consumers, as prices are regulated and pass-through of price increases to consumers is limited.

In some cases, the benefits can be verified in spite of a trade-off. India's Clean Energy Cess is a tax levied per tonne of all domestic and imported coal, lignite and peat – while other fossil fuels, such as natural gas or oil for power generation, are exempt. The Cess is administratively easy to collect, because all producers of coal, lignite and peat are registered with the central excise authority and the electronic systems already in place for the collection of customs and sales taxes are also used to collect the Cess (Cottrell et al. 2016). However, the Cess does not ensure price parity across all sectors and businesses – a tax principle – and also does not implement an economy-wide

price for an environmental externality (in this case, greenhouse gas emissions from fossil fuel combustion) – a policy-based principle of environmental taxation. While fuel excise prices the externalities associated with the combustion of transport fuels, these different instruments do not engender an economy-wide price. Nonetheless, the Cess and the

associated National Clean Energy Fund have been reasonably successful in driving renewable energy transition (see box 2).

Trade-offs between fiscal and environmental policy objectives

Policymakers may also come under pressure to find a balance between environmen-

Box 2

THE CLEAN ENVIRONMENT CESS IN INDIA

The Clean Environment Cess introduced in India in 2010 exemplifies the advantages of using existing taxpaying mechanisms and implementing an upstream tax, which usually implies fewer suppliers and hence fewer taxpayers, which is often essential to ensure easy enforcement and collection.

The Clean Environment Cess is an upstream tax levied on coal, lignite and peat. All producers of coal, lignite and peat are registered with the central excise authority. Electronic payments are made monthly on a self-assessment basis. Adjustments are made where producers overpay or underpay. Thus, the administrative effort is minimised to the point where the Ministry of Finance has stated that the Cess is not associated with any additional costs above business as usual (Cottrell et al. 2018). Revenues from the Cess flowed into the National Clean Environment Fund and were used to fund environment-related projects within the ministries, covering half of the total budget of the Ministry for New and Renewable Energy from 2016-17, when revenues raised amounted to USD 4.5 billion. From mid-2017, revenues from the Cess flowed into the General Services Tax compensation fund, rather than being used for clean

energy investment (The Hindu Business Line 2017).

The tax rate of the Cess has been increased three times since the measure was introduced. The last increase in 2016 implemented a carbon tax on coal, lignite and peat of USD 6 per tonne. The Cess has several aims: to raise revenues for investment in renewable energy; to provide a clear indication of the risk of investing in fossil fuels in the future; and to boost business confidence in the renewables sector by narrowing the price gap between fossil fuels and renewable energy (Climate Home 2016). The Clean Environment Cess is seen as a central policy instrument for India's Nationally Determined Contribution (NDC) target of 40% of cumulative electric power installed capacity from non-fossil fuel based energy sources by 2030. (GoI, 2016)

As part of a package of measures to drive renewable energy investment in India, the Cess has had a positive environmental impact, with annual renewable energy investment ranging between USD 6 billion and USD 14 billion since 2010, and the fourth highest investment volumes for renewable energy in the world in 2017 (Frankfurt School 2018).

tal effectiveness and fiscal objectives – i.e. between reducing pollution and creating a stable revenue stream over time (Schlegelmilch and Joas 2015). Two issues should be noted in relation to this problem. First, as noted in part 2, the primary objective of an environmental tax as defined in this report is to bring about behavioural change and environmental improvement, with revenue-raising a secondary objective.

The nature and extent of the environmental impact may vary according to the design of the tax and its specific objectives. Some environmental taxes are environmentally effective within a short timeframe and result in rapid behavioural change (such as plastic bag taxes) while other taxes influence behaviour

and investment decisions in the longer term (transport fuel taxes).

In practice, taxes can be designed to address this potential trade-off and ensure that policymakers achieve both environmental and fiscal objectives. Environmental taxes in Mauritius fulfil this goal, as they have a positive environmental effect while also raising substantial revenues (see box 3).

Trade-offs between environmental effectiveness and political feasibility

The environmental effectiveness of a particular environmental tax may also be compromised if the tax principle of parity across business segments and business sectors is not implemented due to the granting of exemp-

Box 3

ENVIRONMENTAL TAXES IN MAURITIUS

Mauritius has implemented a number of environmental taxes, including the Maurice Ile Durable levy, or MID levy, an upstream tax on fossil fuels. While one of the primary objectives of environmentally related taxation in Mauritius is revenue raising – in the 2008/9 fiscal year, environmentally related taxes accounted for more than 11% of total tax revenues – some of the taxes were introduced with the explicit objective of implementing sustainability on the island of Mauritius (Parry 2011). The levy was introduced in June 2008 at a rate of EUR 3.53/tonne on coal and LPG, and EUR 3.35/1,000 litres of diesel, fuel oil and jet fuel (UNEP 2014). The tax rates were doubled in 2011. On the basis of the purchasing power exchange rate for the Mauritian Rand, the price for carbon generated by the MID levy was about one third lower than the recommended rate to

bring about CO₂ emissions reductions (Parry 2011).

For 40 years, from the 1970s to the 2000s, CO₂ emissions per capita in Mauritius were rising at a higher rate than GDP growth (Khadaroo and Sultan 2012). From 2013-2016, CO₂ emissions from the energy and transport sectors were decoupled from GDP growth, with CO₂ emissions roughly stable, while annual GDP growth averaged 3.6% in the same period, as shown in the table below. However, the imposition of the MID levy alone on coal, while diesel and gasoline are subject to both the MID levy and excise duties, resulted in some fuel switching away from gasoline and diesel to coal (a more carbon intensive product) for electricity generation, which in 2016 amounted to a 2.6% increase in the quantity of coal used and a 4.5% decrease in the amount of fuel oil used

tions or reduced tax rates for specific industrial sectors. Trade-offs are often necessary to address the more or less legitimate concerns of political opponents to environmental taxation, or influential industry stakeholders, to win their support and in so-doing, guarantee the political feasibility of a particular environmental tax (Withana et al. 2014). As noted in part 2, any exemption or reduced tax rate should be restricted to economic sectors exposed to international competition and limited in time. Otherwise, there is a risk that business will not pay a carbon price that is commensurate with their environmental impact. Possible ways of minimising the impact of such trade-offs on environmental effectiveness, particularly with respect to industries

that compete in international markets, are discussed in part 4.

Unforeseen responses to environmental taxation

Finally, policymakers should also be aware of unintended or unforeseen responses to environmental taxes, which may result in negative environmental impacts and so undermine environmental effectiveness. Taxes may lead to fuel switching between fossil fuels, e.g. if gasoline taxes are increased but kerosene taxes are not – due to social equity concerns – scooter drivers may mix kerosene with gasoline, resulting in far higher levels of pollution and engine damage (Shenoy 2010). If kero-

(Statistics Mauritius 2016). Mauritius has a target of 35% of total electricity generation to be from renewable sources by 2025 and although this is unlikely to be met, progress is noticeable – total renewable energy in electricity generation amounted to 22% in 2016, down by 2.6% on the previous year.

Revenues raised specifically by the MID levy amounted to USD 3.8 million in 2013 – contributed to the MID fund, which instituted sustainability-related projects in the country across a number of sectors, including energy, transport, buildings, tourism, fisheries, industry and agriculture.

The MID levy was only one of many environmental fiscal measures in Mauritius. The revenues raised by environmental and environmentally related taxes – excise on PET and plastic bottles, the MID levy, a petrol charge earmarked for public transport purchasing, environmental protection fees, a CO₂ levy/rebate programme on vehicles,

fishing access rights charges, fees to operate in marine protected areas, and the energy inefficient products charge fuel excise, excise on motor vehicles, registration fees for imported vehicles and road taxes – raised revenues worth USD 270 million in Mauritius in 2012 – a forty-fold increase on environmental tax revenues in just ten years (UNEP 2016). Many of these revenues were earmarked for a specific fund or purpose, even if the purpose was not an environmental one: for example, the petrol tax was earmarked for purchase of publicly-owned buses.

In 2013, USD 103 million was spent on green subsidies to drive energy transition and greening of the transport and agricultural sectors. Alongside these subsidies, USD 123 million was expended in the renewable energy sector in the same year (UNEP 2016). Environmentally related taxes played a significant role in domestic revenue mobilisation for the potential realisation of the SDGs.

Box 4**DIFFERENTIATED TAX RATES TO DRIVE SUBSTITUTIONS IN THAILAND**

Several environmental tax policies in Thailand have not actually resulted in tax increases, but rather a reduction to the tax rate for the cleaner option. This includes changing tax regimes for vehicles – both motorcycles and cars – as well as for fuels.

In 1991, a package of measures was introduced to raise awareness about the health impacts of leaded fuel, liberalise fuel markets and support oil companies to produce unleaded fuels, which also included a differential tax rate for leaded and unleaded gasoline. The tax was environmentally effective within a short timeframe. Within 30 days, in spite of a price differential of just 1 THB, the share of unleaded gasoline had risen to 30% (Institute for Global Environmental Strategies 2004). Within 2 years, lead concentrations at monitoring stations had dropped by 70% in comparison to 1990 levels and within four years, leaded gasoline had been eliminated (Lovei 1998). Administrative costs of the environmental tax were minimal as existing collection mechanisms were used. Given the small differential between the leaded and unleaded tax rates, revenue losses

resulting from the measure were low. On balance, the measure more than paid for itself, with health benefits estimated to have been worth THB 7 billion, giving a cost-benefit ratio of 32:1 for the policy (Institute for Global Environmental Strategies 2004). Also in Thailand, a 10% excise tax has been levied on battery producers using new lead as an input in the battery production process, while battery producers using recycled lead from used car batteries were subject to a 5% rate, boosting demand for recycled lead.

A less successful example of differentiated excise rates in Thailand is the differentiated excise taxes levied on motorcycles. An excise tax of 10% was introduced on two-stroke motorcycles, which emit larger amounts of CO and CO₂, and a tax of just 3% on cleaner four-stroke motorcycles. However, this measure was less successful and only in force for one year, as the Ministry of Finance came under pressure from manufacturers (Israngkura 2014). In this case, substitutions were economically painful for certain actors, and the political cost of the measure proved to be too high.

sene taxes are increased, households dependent on kerosene for cooking may switch to fuel wood if suitable alternatives are not available, leading to increased deforestation and more severe human health impacts.¹⁰

Trade-offs of this nature can be addressed by providing suitable alternatives, ideally by means of access to or investment in renew-

able electricity. Improved energy access removes the need for kerosene prices to be regulated and thus kept artificially low, as is the case in many developing countries. Pricing kerosene in line with its external costs for human health and the environment by means of environmental taxation will result in its disuse as a household or road transport fuel (OECD 2005b).

The interactions and possible trade-offs between environmental taxation and social justice are discussed in section 3.2.

¹⁰ Although kerosene has significant impacts on human health when used as a cooking fuel, health impacts from solid fuel are more severe. See Silwal and McKay (2014) for research into the relative impacts of solid fuel and kerosene stoves on human respiratory health.

3.1.3 Design of effective environmental taxes: Setting the tax rate

Environmental taxes can take the form of so-called Pigouvian taxes, which internalise externalities by either internalising all environmental costs within the price, or tax rates can be set at a level commensurate to achieving a particular environmental objective (Pigou 1932, Baumol and Oates 1988). The Baumol and Oates approach is more practice-oriented. Calculating the value of environmental externalities is a difficult process and the results are often disputed. A further advantage to the Baumol and Oates approach is that it allows a government to set environmental taxes at a level that is commensurate with the intended environmental objective (Baumol and Oates 1988).

A concrete example of this approach is the UK Landfill Tax. The initial tax rate was set with the objective of internalising the external costs associated with landfill. However, the objective of the tax was amended in 2002 following a review, when it became clear that a much higher tax rate would be necessary to encourage waste producers and the waste industry to switch to more sustainable alternatives to landfill (Herd, Courneade and Sutherland 2004, GoUK 2016). Today, the tax rate has been described as “*several times greater than any reasonable estimate of the external costs associated with landfill*” (Mirrlees et al. 2011, Part 2, p. 243). From this case one can derive two important lessons on tax rate setting. First, from a political economy point of view, a high tax rate may be necessary to achieve the specified objectives of an environmental tax. Second, review is necessary to optimise environmental taxes and ensure that they are effective. Both elements can help optimise the environmental effectiveness of environmental taxes and both lessons are in line with the tax and policy

based principles described in part 2, section 2.5.

In some cases a high tax rate is not necessary to bring about behavioural change. The most environmentally effective taxes in the short-term are those where cleaner alternatives are easily available at a comparable price and thus, substitutions are easy to implement. In such cases, differentiated tax rates e.g. on leaded and unleaded petrol, on low-sulphur and conventional diesel, or car batteries using recycled lead or new lead in the manufacturing process have proven to be effective within a fairly short timeframe (see box 4).

Environmental taxes on products with relatively high elasticity of demand where substitutions are easy typically result in a short-term rise in tax revenues at the start of the tax programme and a reduction in revenues over time as economic actors respond to the tax by consuming and producing more sustainably. The environmental effectiveness of such taxes can be optimised by facilitating access to substitutions and raising awareness of their availability, e.g. time-limited subsidies to level out higher purchase costs, or labelling schemes. In such cases, trends in tax revenues can generally be used as an indicator for the environmental effectiveness of the tax, as falling revenues indicate that the tax has led to a change in consumer or producer behaviour and has reduced pollution as a result.¹¹

In cases where substitutions are less readily available and the price elasticity of demand is therefore higher, environmental taxes as a share of total government revenues may decline for reasons other than environmental effectiveness in the short-term. One reason

11 The extent to which falling revenues indicate reduced pollution is dependent on a number of factors – not least whether substitution effects lead to take-up of cleaner alternatives, or equally polluting alternatives not subject to an equivalent environmental tax.

is that energy taxes tend to be levied per unit of physical consumption – ad quantum – and to be fixed in nominal terms. Thus, their real value in relation to the price of the product taxed tends to fall over time. In response to this devaluation, policymakers can lay down automatic increases to the tax rate in law (a so-called escalator) or increase the tax rate

regularly and predictably in accordance with the tax principles described in part 2. Such measures can stabilise revenue streams over time, while maintaining the dynamic impact of the tax on behavioural change, investment patterns and innovation.

In some cases, in OECD countries, environmental taxes have brought about relative-

Box 5

VIETNAM'S ENVIRONMENTAL PROTECTION TAX (EPT)

In 2012, Vietnam implemented an Environmental Protection Tax, which set a range of tax rates for pollutants, including fossil fuels, pesticides and plastics. For details of the tax, including tax rate ranges and details of the tax base see Chapter II..

In terms of environmental effectiveness, there is evidence of behavioural responses to the tax. In a business as usual scenario, CO₂ emissions in Vietnam are predicted to increase from 247 million tonnes of CO₂e in 2010 to almost 800 million tonnes of CO₂e by 2030 (GoV 2015). Stable tax revenues during the first phase of the tax from 2012-2014 reflect the relative stability of transport fuel consumption – which accounts for at least 90% of total revenue. Subsequent rises in revenues were attributable to tax rate increases, not increases in transport fuel consumption. This would seem to indicate that the EPT slowed the rapid rise of transport fuel consumption and thus growth in emissions from the transport sector and created incentives for behavioural change.

Modelling commissioned by the GIZ in 2014 suggests that the tax resulted in CO₂ emissions reductions of about 2 million tonnes in both 2012 and 2013, equivalent to a decrease of about 1.7% (Huong 2014). Sub-

sequent increases to the tax rate in 2015 and 2018 can be expected to have a greater impact on CO₂ emissions, with modelling indicating annual CO₂ emissions reductions of over 9 million tonnes, or 7.9%, under a high tax scenario (Willenbockel 2011).

Nonetheless, the full potential of environmental improvements from the EPT is yet to be realised. The initial introduction of the EPT in 2012 and subsequent tax rate increases in 2015 were accompanied by tax reductions elsewhere in the value chain. In 2012, by the abolition of the gasoline price surcharge and in 2015, increases to tax rates on gasoline, diesel and kerosene alongside import tax rate reductions in ASEAN. Tax rates were therefore partially motivated by the need to mobilise domestic revenue, rather than to a requirement to reduce pollution in the country. In addition, tax rates on coal and other pollutants aside from road transport fuels remain towards the lower end of the range of rates proposed. While robust data is limited, it is possible that the EPT has encouraged fuel shifting towards dirtier fuels for transport and power generation – diesel and coal – which would result in increasing pollutant emissions into the air (see Cottrell et al. 2016).

ly radical changes in behaviour, which have resulted in falling revenues on a scale that cannot be addressed by means of a tax rate escalator. For example, Finland has been a long-time user of carbon taxes and is now at a stage where the revenues the government is able to accumulate through the tax are not commensurate with what they had previously obtained. Finland is therefore introducing a new type of tax (stockpile fees) whose sole objective is to account for the loss in revenue derived from the application of the carbon tax. It is worth noting that it took Finland almost 20 years to get to the point where it is suffering from a substantial reduction in carbon tax revenues and therefore, the potential long-term loss in the accumulation of revenues should not deter developing countries from implementing environmental taxation in the medium term.

The legal framework for the Environmental Protection Tax in Vietnam incorporates the possibility for policymakers to respond to falling revenues or to lack of behavioural responses to the tax, as it specifies a range of possible tax rates on several pollutants, which can be increased relatively easily within the tax rate range by a committee in the National Assembly. This design has the potential to maintain the environmental effectiveness of the tax over time, as tax rates can be adjusted easily in response to changing behaviour or falling revenues (for more details see box 5).

The potential to increase tax rates is an especially important consideration in low-income countries, where tax-to-GDP ratios typically amount to 10-20% of GDP – indicating an urgent need to mobilise domestic revenues to fund sustainable development (Besley and Persson 2014). Proposing a range of tax rates in framework legislation means that policymakers can introduce taxes at a

low rate, so ensuring that the tax is politically feasible, while creating a framework within which rates can be increased later on at a relatively low administrative cost in response to a review of the fiscal, economic, environmental and social impacts of the tax or in response to changing requirements for domestic revenue mobilisation.

A further reason to adjust tax rates or modify environmental tax policy packages is that economic actors respond to a tax in different ways over time. In general, the price-elasticity of demand, i.e. how responsive demand is to price change, is higher in the long term than in the short term. This is particularly true for cases where demand in the short term is relatively inelastic, i.e. where demand is relatively unresponsive to price change. A case in point is the transport sector, where substitutions from less to more efficient vehicles, or from fossil fuel to electric vehicles, have only recently begun to gain momentum. In such cases in the first instance, economic actors adopt less polluting behaviours in response to a tax – shifting to other transport modes, eco-driving, etc. – and in the longer term, make structural changes and investments (OECD 2010). This has implications for the environmental effectiveness of the tax and its optimal design and implies that regular tax rate increases are necessary to keep revenues stable and maintain a dynamic incentive in favour of continuous environmental improvement.

3.2 SOCIAL IMPACTS AND CONSIDERATIONS

3.2.1 Taxes and equity

Taxation can reduce inequality through direct redistribution and through revenue mobilisation to fund progressive public spending. In OECD countries, progressive public

spending accounts for the bulk of inequality reduction, as it does also in Latin America, which has seen considerable progress in the period 1998-2012 in relation to the reduction of inequality as a result of fiscal policy (Clifton et al. 2017). In many developing countries, however, neither taxation nor public spending is effective in reducing inequality (Zheng et al. 2018). Whether and how environmental taxation might be able to contribute to inequality reduction in developing countries is a question that will still be left open.

Justice in taxation cannot be determined without considering how a government reallocates resources (Murphy and Nagel 2002). Thus, from a tax justice perspective, this report assumes that one of the goals of the fiscal system as a whole should be to realise vertical equity within the tax system, i.e. to reduce inequality (GIZ 2015, Murphy 2015).

Given the potential inherent regressiveness of consumption taxes in general, and environmental taxes in particular, we propose for governments to strive to obtain a neutral impact once flanking measures directly linked to the tax are taken into account. At best, the overall impact of an environmental tax policy package – taking accompanying measures to compensate or protect the poor into account – should ideally attempt to improve the opportunities of people living in poverty (see e.g. GIZ 2015).

As previously noted, many low- and middle-income countries have relatively unequal societies in comparison to high-income countries. As a result, there is a clear risk that environmental taxation, a policy instrument that deliberately brings about an increase in the price of goods and services, can have a negative impact on the most vulnerable. These high rates of inequality in low- and middle-income countries feed into concerns about neg-

ative equity impacts, which are a major barrier to the implementation of environmental taxation.

The potentially regressive impacts of environmental taxation are only one aspect of inequality associated with environmental policy. Four dimensions of inequality are discussed in this report: Inequality of exposure to environmental degradation, inequality of contributions to pollution, inequality of outcomes resulting from environmental taxation and inequality of representation in policymaking (Chancel and Piketty 2015).

Inequality of exposure to degradation

The poor suffer disproportionately from the impacts of many forms of environmental degradation – air and water pollution, forest degradation – and thus, environmental policy instruments have the potential to contribute directly to poverty reduction and social equity (OECD 2005b). Moreover, climate-related shocks and stress, as well as environmental degradation, are major obstacles to poverty reduction, and failure to mitigate climate change represents a serious long-term threat to poverty eradication and the achievement of the SDGs (Hallegatte et al. 2016). Thus, the poor may also benefit disproportionately from efforts to reduce environmental degradation or mitigate climate change.

Inequality of contributions to pollution

In relation to equality of contributions to pollution, Lucas Chancel and Thomas Piketty have found that global emitters of CO₂ are highly concentrated. They estimate that the richest 1% emit 14-19% of total global CO₂e emissions and the richest 10% emit 40-51% of the global total. The poorest 50% emit just 11-

15% and the poorest 10% somewhere in the range of 0.9-1.5% (Chancel and Piketty 2015). While income alone cannot predict individual CO₂e emissions, income and consumption levels remain the main drivers to explain variations in total CO₂e emissions by households and individuals, and thus these factors are the best available proxies to construct global distribution of emissions.

Given the ability of the wealthy to consume more than the poor, it is reasonable to assume that there are similar distribution patterns by income group for other kinds of consumption-related pollution, such as natural resource use and waste. Therefore, implementing the polluter pays principle will lead to the wealthiest in society being disproportionately liable to pay environmental taxation.

Implementing the polluter pays principle would set out to deliver both fairness (those who pollute, pay) and equity (subjects of the state contribute in proportion to their respective abilities).

Inequality of outcomes: Progressive and regressive effects of environmental taxation

All environmental policy instruments can have regressive or progressive impacts on household incomes. However, while the impact of environmental taxation on household income tends to be closely examined by stakeholders in the policy process, the impacts of regulation or inaction tend to be less transparent and less closely scrutinised.

While trends may be identified, it is not possible to make generalisations when comparing the impact of different environmental policies, as this requires specific information on the measures at hand. Some research has

shown that for the energy sector, non-price instruments, such as feed-in-tariffs or energy efficiency standards, tend to have more significant regressive impacts than taxation or pricing (Fay et al 2015, Levinson 2018). Other researchers suggest that environmental regulation may have fewer direct impacts on a household's disposable income (Goulder and Parry 2008).

What is clear is that inaction in the face of severe environmental degradation will have a negative impact on social equity, because the poorest in developing countries suffer disproportionately from environmental degradation, as they are least able to adapt to change, and are most dependent on natural resources for their livelihoods. Severe environmental deterioration is itself an obstacle to poverty alleviation (Cottrell et al. 2013, Hallegatte et al. 2016, OECD 2005b).

In practice, regulation is in many cases suboptimal in terms of both cost-effectiveness and environmental effectiveness, and may therefore represent a poor use of limited budgetary resources – a particularly important consideration in a developing country context (see e.g. Pizer and Sexton 2017, Goulder and Parry 2008).

Modelling has indicated that economic instruments bring about pollution abatement at a considerably lower cost than regulations used to achieve the same objective. In simulations applied to a range of pollutants, abatement costs are 45-90% lower for economic instruments (taxes or trading) than regulation (technology mandates) and 65% lower for fuel taxes (Goulder and Parry 2008). However, the simulations used to produce these estimates did not take administrative costs or the possible negative impact of the tax on consumption – which may fall in response to higher prices – and thus on GDP growth. Some of the

potentially negative effects on GDP growth can be addressed by targeting spending on energy efficiency technologies to foster a shift towards greener, energy efficient consumption (Ekins 2009, Goulder and Parry 2008).

What kinds of environmental taxes can be regressive?

It is difficult to infer from the outset whether environmental and environmentally related taxes will have regressive or progressive impacts. The following reviews the research currently available and attempts to draw some cautious conclusions.

Evaluating the impacts of environmental taxation on specific income groups is not a simple exercise, as the impacts are not necessarily uniform, even within individual countries. Regressive impacts are a minor concern if household spending on items subject to environmental taxation are relatively low, but more of a concern in cases where spending is much higher. In Mexico, for example, average expenditure on electricity does not exceed 2% of household spending across all income deciles and thus represents only a small share of the household consumption basket (Pizer and Sexton 2017).

Environmental taxes and environmentally related taxes can have indirect impacts due to rising commodity and product prices as a result of the pass-through effect of tax increases, e.g. rising fuel prices result in higher food prices. These impacts are hard to predict and vary depending on the consumption baskets of poor households, their ability to substitute for greener alternatives, and their direct and indirect sensitivity to changing transport, energy or commodity costs. The urban poor, generally most dependent for their basic needs on goods transported from elsewhere, can be

expected to be most vulnerable to such effects (Fay et al. 2015). As a high proportion of income of poor households is spent on food, energy and fuel, indirect effects should be monitored carefully and compensated for where necessary.

Environmental taxes and environmentally related taxes applied on stationary uses of energy such as electricity and gas for heating and cooling tend to have (more or less) regressive impacts in most countries. As shown in table 1.1, these kinds of taxes include carbon and energy taxes on fuels and taxes on electricity. In developing countries where electrification rates are relatively low, or where energy-consuming durable goods are beyond the reach of poor households, energy and electricity taxes tend to be progressive. However, as incomes grow, and households are connected to the grid, energy taxes are likely to have a higher impact on low-income households (Pizer and Sexton 2017). Regressivity of domestic energy taxes may be exacerbated if poorer households live in older, less efficient housing and use less efficient household appliances. Therefore, when implementing environmental taxes on domestic energy use, low- and middle-income countries should take particular care to design appropriate compensation mechanisms, e.g. lifeline tariffs or progressive electricity prices.

Transport taxes, such as vehicle registration taxes, and congestion charges (see table 1.1), can generally be regarded as progressive or neutral in middle-income and low-income countries, particularly in countries with low levels of car ownership amongst poorer income deciles (Flues and Dender 2017, Sterner 2012). Transport fuel taxes have been shown to be strongly progressive in African and large Asian countries, as well as in Turkey, Chile, Mexico, Costa Rica and Brazil (Mor-

ris and Sterner 2013; Pizer and Sexton 2017). Research in India has shown that agriculture is also not very sensitive to fuel taxation increases, and that few fuel-sensitive sectors affect the poor more than the rich (Morris and Sterner 2013).

On the other hand, small-scale fishermen, farmers and Small and Medium Enterprises (SMEs) may be vulnerable to negative equity impacts from transport fuel price increases. These impacts will affect household income and should be taken into account when designing taxes in the transport sector (Fay et al. 2015). In the main, however, transport taxes can be reasonably expected to have progressive outcomes.

The impact of taxes on water supply and sanitation on households depend on whether poor households are connected to water supply and sanitation services, or/and access irrigation services. If they are connected to and use such services, then taxes or user fees on water and wastewater will tend to have regressive impacts (OECD 2005b). Indeed, water affordability poses a problem for the poorest households in both developed and developing countries (OECD 2017a).

Not to tax water supply and sanitation is not a solution, however. Keeping water prices artificially low for all consumers prevents cost coverage and often leads to deteriorating services and infrastructure, which may disproportionately affect the poorest households, as switching to alternatives such as bottled water is expensive. Hence, to avoid negative equity impacts, water charges should be complemented by appropriate welfare mechanisms while ensuring that sufficient revenues are raised from wealthier deciles to maintain infrastructure and services (OECD 2017a).

There has been little research done on taxes on biodiversity, waste, natural resources and agriculture that permit generalisations on their equity impacts, as these vary substantially by country and instrument. Where the livelihoods or expenditures of poor households are directly affected, as tends to be the case for taxes in the agricultural sector, regressive impacts are more likely. Impact assessment and the development of accompanying measures are crucial to prevent negative equity impacts. Where natural resources are extracted for export, whether minerals or timber, populations in developing countries will benefit from additional revenues to the exchequer, although regressive indirect effects may also result (OECD 2005b, Cottrell et al. 2016).

The majority of studies on the distributional impact of environmental taxes do not take behavioural change into account but approach the issue from a static perspective (Kosonen 2012). Given that the underlying reason for introducing environmental taxation is to reduce pressure on the environment by bringing about behavioural change, and given that price elasticity of demand for energy products tends to be much higher in the short run than the long term, this is a major oversight. This finding implies that the economic actors financially able to adjust to price changes, do so, and are thus at least able to influence their own tax burden to some extent (Kosonen et al. 2012). Social compensation measures to enable households to purchase more energy-efficient equipment, such as LPG stoves, can facilitate substitutions and thus foster behavioural change.

Synergies and trade-offs

Studies of macroeconomic reforms in Cote d'Ivoire, Mexico and Thailand have concluded that poverty and environmental deterioration are mutually reinforcing (Sheng 2017). In an article proposing a conceptual framework for public financial management, Sheng Fulai of the United Nations Environment Programme suggests that the close relationship between poverty and environment calls for an integrated approach to budgetary decision making, as public spending on the environment can contribute to poverty alleviation and vice versa, and linking the two in budgetary decisions can generate positive effects in both areas (Sheng 2017).

Further synergies can be identified between environmental taxation and social equity in the case of environmental taxes with progressive impacts. Transport fuel taxation is likely to have socially progressive impacts in developing countries, where transport fuel taxation can be considered a 'luxury tax'. In India, for example, transport fuel expenditure amounts to less than 2% of total income for the lowest income decile and 8% of total income for the wealthiest income decile (Morris and Sterner 2013). The same can be said of taxation of air travel, which can be implemented by means of a kerosene tax on aeroplane fuel, air ticket taxes on individual passengers, or tourism eco-taxes and charges which explicitly target comparatively wealthy tourists. Implementing environmental taxes on luxury items can hence generate multiple benefits, including enhanced social equity, improved environmental quality, and additional revenues.

Policymakers can also exploit synergies between environmental taxation and social equity by using the tax revenues as a means of domestic revenue mobilisation to finance de-

velopment and the achievement of the sustainable development goals (SDGs) as called for in the Addis Ababa Action Agenda. For example, in Tunisia environmentally related taxes on registration of vehicles have been used to part-fund the PROSOL project, which installed solar water heating equipment in 119,000 households and saved the government USD 100 million in fossil fuel imports over the lifespan of the installed solar water heaters (Trabacchi et al. 2012). In Morocco, revenues from an environmentally related tax on plastics imports have been directed to an environmental fund to foster the creation of a formalised waste separation sector (Ghariani 2015). More details on Morocco can be found in Chapter II.

There are also clear synergies between social equity and environmental taxation in relation to the potential for environmental taxes to contribute towards improved fiscal governance. Given that many kinds of environmental and environmentally related taxes are difficult to evade, these taxes can boost total welfare and capture resources previously lost to tax evasion (Subhanij et al. 2018). Indeed, it has been estimated that in countries with higher rates of tax evasion, the benefits of introducing hard-to-evade carbon-energy taxes more than pay for themselves as a result of improvements in the efficiency of the tax system, whether or not they have a positive impact on environmental quality (Liu 2013).

Policymakers may have to accept trade-offs between environmental effectiveness and social justice considerations, particularly in countries where fuels used by the poor (such as kerosene for cooking) are exempt from tax, taxed at lower rates, or subsidised due to social concerns. The trend of taxing diesel fuel used for commercial, industrial and farming activities and for public transport and haulage

at a lower rate than gasoline, despite the fact it has a higher impact on local air pollution, is attributable to such concerns (OECD 2005b).

Such trade-offs can be minimised or avoided if environmental tax rates are designed to take social justice into account, e.g. by means of progressive or lifeline tariffs, which guarantee the provision of a certain amount of electricity or water at no or minimal cost to vulnerable households. Lifeline tariffs are common in many developing countries, e.g. the Republic of South Africa, where poor households eligible for the scheme receive a monthly allocation of free basic electricity of 50 kWh from the national treasury – which may be increased by local authorities – and a subsidised tariff for consumption of up to 350 kWh, consumption which is effectively cross-subsidised by wealthier electricity users (see Kruyshaar 2017 for details). Countries with a wide prominence of informal housing (slums and favelas), should consider the introduction of subsidised lump-sum charges on

energy products. The purpose of such a charge is to make a policy statement, that all levels of society are being equally burdened by a carbon price, and at the same time make the price commensurate to the taxpayer's ability to pay.

Win-win measures, such as distribution of substituting products – clean stoves, energy-efficient appliances and technologies – are preferable to tax exemptions or lifeline tariffs, as the latter undermine incentives to consume more efficiently. The extent of the trade-off between environmental effectiveness and social equity is likely to be extremely limited, given that the poorest 50% of population globally emit 11-15% of total CO₂e emissions (Chancel and Piketty 2015).

The impacts of environmental taxation on household income should be carefully assessed prior to implementation of any tax. Suitable compensation mechanisms should be put in place in parallel to the tax to avoid the risk of higher prices increasing the depth and severity of poverty. It is likely that envi-

Box 6

INEQUALITY IN POLICYMAKING – THE UNEQUAL BENEFITS OF FOSSIL FUEL SUBSIDIES

The unequal benefits of fossil fuel subsidies deliver further insights into inequality in policymaking in relation to environmental fiscal policy. Fossil fuel subsidies are fiscal or regulatory instruments that put a negative incentive on the consumption of fossil fuels. In many low- and middle-income countries, reform of fossil fuel subsidies is the first step to the introduction of environmental taxes. Reform is in effect difficult because subsidies are an untargeted welfare measure, which maintain energy prices at low levels for all consumers in society.

These benefits are not captured equally by all income groups. 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 subsidies, while the poorest 20% of the population receive just 3%, 4% and 7% respectively (Coady, D., Flamini, V. and Sears, L. 2015). Therefore, the poorest and least represented sectors of society have the least to lose and the most to gain from fossil fuel subsidy reform.

ronmental and environmentally related taxes levied on household energy and water consumption will have the greatest negative equity impacts. In these cases, it is important to use limited revenues cost-effectively, by targeting compensation to poor households wherever possible, rather than keeping prices low for all domestic consumers. Where targeting is not possible, lifeline tariffs and relatively broad-based compensation are an alternative.

Environmental taxation and inequality in policymaking

This is the fourth dimension of inequality and stems from lower levels of involvement of certain social groups – such the urban and rural poor, women, children, ethnic minorities, populations in geographically remote regions – in the policy process. In relation to environmental taxation, this may refer to lack of involvement in the choice of and design of the tax as well as unequal access on the part of vulnerable groups to social welfare or compensation mechanisms. Lack of representation of vulnerable groups is significant, because it may lead to policies that favour greater protection of higher-income groups, and perpetuate the administration of regressive policies. Failing to incorporate marginalised groups in decision-making is also likely to have implications for the environmental effectiveness of policies, particularly in cases where communities have long-standing traditions of natural resource management (Hallegatte 2015). Evidence of the specific impact of the marginalisation of social groups on the design of environmental taxation is scarce and a field for further research.

3.2.2 ETR and other dimensions of inequality

Environmental taxation and gender

A number of complexities are associated with assessing the gender impact of tax policies, including a lack of gender disaggregated data and lack of clarity on the broader impact of redistributive policies on women (Joshi 2015, Chalifour 2010). At the same time, little research has been conducted on the gender-specific impacts of environmental taxation. In industrialised countries, Nathalie Chalifour has explored the gender impacts of carbon taxation in Canada from a feminist perspective (2010) and a considerable body of research has looked into the gender impacts of indirect taxes, but not specifically environmental taxes (see e.g. Grown and Valodia 2010, Joshi 2015). Research has also been conducted on the gender impacts of fossil fuel subsidy reform (IISD 2016a). Extrapolating from these findings can inform some initial conclusions on the gender impacts of environmental taxation, although area requires further research.

Environmental taxation does not have an explicit bias against women, i.e. environmental taxes do not have specific provisions that treat men and women differently. However, environmental taxes may have an implicit bias against women if provisions in tax law have a differentiated impact on women and men due to gendered social or economic behaviour – i.e. if men and women spend their income on goods that are taxed differently (Casale 2012).

If a fiscal system is focussed on indirect taxation rather than corporate and personal income taxes – and in developing countries, indirect taxes typically contribute as much as

50-60% of government revenues – there is a danger that this could lead to an implicit bias against women, because women tend to have lower incomes than men and are thus less able to take advantage of tax exemptions and work-related deductions available to those in formal employment (GTZ/BMZ n.d., Grown and Valodia 2010). Female-headed households may also be more vulnerable to energy price rises resulting from environmental taxation, due to women's lower incomes (IISD 2016a). Women in developing countries tend to purchase more goods and services that promote health, education and nutrition and to spend more of their income on basic commodities and consumer goods, which creates the potential for women to bear a larger burden of indirect consumption taxes than men (Femnet 2017, GTZ/BMZ n.d.). However, as many basic consumption items are zero-rated for VAT or subject to reduced VAT rates in developing countries, and given substantial variations between countries, such concerns must be examined in light of specific national tax provisions (Grown and Valodia 2010, Joshi 2015). If environmental taxes are imposed on goods and services which women are more likely to pay for – such as household energy or water – then women are likely to be disproportionately affected by such a tax, unless provisions are made to exempt vulnerable households.

Table 1.2 shows the results of existing research on tax and gender and draws some initial conclusions on the potential impacts of environmental taxation on a sectoral basis using an abbreviated version of the analytical framework proposed by Chalifour (2010). While generalisations can be a useful indicator of possible impacts, given the special social and economic conditions of women in different country contexts, empirical research

on the basis of disaggregated data is required to make definitive statements about particular types of environmental taxation in a particular country. Because assumptions cannot be made about use of revenues and flanking measures, the table does not include criteria relating to the gender impacts of tax policy packages, such as revenue use.

As shown in table 1.2, it is likely that income disparities between genders will be negatively affected by environmental taxes on energy, natural resources and wastewater, but positively affected by transport fuel taxation, due to the different gendered spending behaviours of women and men – although it is conceivable that men shift the incidence of environmental taxation increases, e.g. on transport fuels, to their female partners (Grown and Valodia 2010). On balance women are likely to disproportionately benefit from efforts to mitigate climate change, as they tend to be poorer and more exposed to the negative impacts of environmental degradation and will be hardest hit by climate change impacts (OECD 2008).

Furthermore, revenue use is an important aspect of environmental taxation, such that the analysis of an environmental tax policy should include an examination of the tax and complementary policies, including decisions relating to use of revenues, and not the impact of the tax in isolation (Chalifour 2010). Policymakers can design compensation measures and safeguarding policies that compensate for inequalities in intra-household revenue distribution and ensure that women are principle recipients of the revenues, e.g. by means of conditional cash transfers, or by focussing benefits on low-income households (IISD 2016a). If such measures are implemented, policymakers can ensure that environmental taxes have, at worst, a gender-neutral impact

Table 1.2: Framework for the gender analysis of environmental taxation in developing countries

	ENERGY TAXES (heating, cooking, cooling)	TAXES ON NATURAL RESOURCES (including waste)	TRANSPORT TAXES (fuel, circulation and registration)	TAXES ON WATER AND WASTEWATER
Distributional impacts on women vs. men	Negative: Women tend to spend more on household energy than men and where they exercise discretion, may prioritise domestic spending (IISD 2016a). Indirect impacts e.g. rising food prices also tend to affect women more (OECD 2008)	Neutral: If taxes on exports of natural resources Negative: Women spend a greater proportion of their income on household services, e.g. waste taxes (Joshi 2015)	Positive: women tend to have fewer cars and use public transport more than men (OECD 2008, Cassale 2012)	Positive: Improved service such as water supply may free up more time for women to participate in paid work (GTZ/BMZ n.d.). Benefits from improved services in urban areas (reduced spending on bottled water) Negative: Women spend a greater proportion of their income on household services (Joshi 2015)
Gender impacts attributable to socio-economic roles of men and women Do these impacts perpetuate gender inequalities	Positive: If shift to cleaner fuels and improved energy access results, women may spend less time on e.g. gathering fuel and more time in paid work (GTZ/BMZ n.d.). Negative: Possible increase in non-paid work for women resulting from fuel shifting towards biomass / fuel wood may perpetuate gender inequalities (GTZ/BMZ n.d.). Women may suffer disproportionately from health impacts of using dirtier fuels for cooking.	Positive: If taxes reduce environmental degradation and e.g. deforestation, this will increase opportunities for women to earn their livelihood from the natural environment Positive: Impacts will not perpetuate gender inequality Negative: If a tax were levied on artisanal miners, this may hit women disproportionately – but as a general rule, artisanal miners are active in the informal sector and thus not subject to natural resource or extraction taxes	Positive: women stand to benefit from transport taxes, esp. if revenues are used to boost public transport Negative: indirect impacts on commodity prices	Negative direct impact: User fees on basic public goods tend to discriminate against women (Joshi 2015) Positive indirect impact: More time for women to engage in productive work (reduced time spent on water collecting or on care burden)
How will environmental benefits of tax impact men and women	Positive: Health benefits due to reduced emissions from cleaner stoves / improved access to clean energy (IISD 2016a)	Positive: poorest (i.e. women) benefit most from reduced environmental degradation	Positive: reduced exposure to local air pollution	Positive: health benefits for women and their dependents (reduced care burden)

and at best, result in higher levels of gender equality (Joshi 2015, Chalifour 2010).

Morocco introduced compensation measures with a specific gender focus. Tax revenues from the plastic tax are directed to the *Fond National pour l'Environnement* (FNE) and used to finance activities to promote the recycling and recovery of plastic waste and to create a formalised waste separation sector. A minimum of 20% of total tax revenues are to be allocated to informal waste collectors, with particular attention paid to gender issues in fund distribution (Ghariani 2015). After the first two years of the tax, a total of USD 44 million had been allocated to the FNE. Eighteen recycling projects had been awarded funding, expected to generate 1,050 jobs for waste pickers, 5% of whom are estimated to be female (World Bank 2016b). Funds were used to encourage the formation of waste picker cooperatives at regularly inspected and sanitary landfill sites. Formalised waste pickers were becoming the owners and employees of waste sorting facilities, thus improving working and sanitary conditions, and providing a more stable source of income including social insurance provision (see Chapter II for more information). Section 3.2.3. looks at the design of compensation measures.

Environmental taxation and marginalised groups

Very little research has been conducted looking into the impact of environmental taxation on marginalised groups, such as ethnic minorities, persons with disabilities, or populations in geographically remote regions. Multiple and cross-cutting dimensions of inequality are likely to produce greater disadvantage than one dimension of inequality alone. Therefore, it is reasonable to assume

that negative social impacts are likely to be similar, but more pronounced, to those for women from low-income households. However, further research is necessary to draw any substantive conclusions.

3.2.3 Addressing regressive impacts with social compensation mechanisms

Several studies have highlighted the importance of revenue use in relation to the ultimate impact of environmental taxation on social equity. Indeed, in almost all modelling simulations where all or a sufficiently high proportion of carbon-energy taxes are recycled as lump sum cash transfers to the population, the overall impact of a carbon tax is to improve social equity (Fay et al 2015, GTZ/BMZ 2015, OECD 2014). An analysis of 20 developing countries has shown that for each USD 100 of additional carbon-energy taxation collected and redistributed, the bottom quintile gains USD 13, while the richest quintile loses USD 23 (del Granado, Coady and Gillingham 2010, Fay et al. 2015). A 2017 OECD paper by Flues and Dender (2017) has investigated methods of reducing affordability risk using CGE modelling, and projected that using around one-third of revenues from the tax reform for income-tested cash transfers would improve energy affordability against a business-as-usual scenario without the tax (Flues and Dender 2017).

The results of this research suggest that sound design of compensation measures can prevent negative impacts on social equity while retaining a substantial proportion of revenues for other purposes. In theory, then, it is clearly possible to recycle revenues or design compensation measures in a way that is progressive and shields the vast majority of low-income households from the negative

impacts associated with energy price rises (Preston et al. 2013, OECD 2014). In practice, many developing countries face difficulties in targeting compensation measures accurately, and broad coverage of compensation measures is implemented as a means of ensuring that vulnerable households are not negatively affected. This may result in a relatively high proportion of the revenues raised through environmental taxation being used for social protection purposes, but, if well designed, will not undermine the environmental effectiveness of the tax – particularly given the distribution of polluters by income group.

A range of policy options can address negative social impacts. Raworth et al. have ranked the options available to policymakers according to their impacts and design. Most prefer-

able are socially transformative policies, such as redistribution of control over assets, labour rights reform or measures which tackle women's care burdens. Ranked second are co-benefits policies designed to exploit win-win outcomes for sustainable development, such as conditional cash transfers or access to affordable renewable energy, water, or other household services. Least preferable are safeguarding policies, which compensate for the social cost of environmental taxation through cash transfers or social protection (for details see Raworth et al. 2014).

Ultimately in relation to social equity, what is important is the progressivity of the fiscal system as a whole, including social welfare and other forms of compensation, rather than the progressivity of individual measures. As

Box 7

SOCIAL COMPENSATION IN INDONESIA

Since 2005, Indonesia has developed a wider arc of social assistance policies and targeted interventions, starting with time-bound cash transfers parallel to energy pricing reforms in 2005 and 2008. Since 2005, the development of social security has been a response to rising energy prices resulting from fossil fuel subsidy reform.

Reform of transport fuel subsidies on gasoline and diesel in Indonesia in 2015 saved the government USD 17 billion in that year and led to substantial price increases. The government protected the population in a number of ways. Some policies directly targeted the vulnerable: The 1 million house programme, development of a sustainable social security system and a targeted social assistance programme using smart cards to support access to education, healthcare and

cash transfers. Other policies focussed on increasing spending – on education by 28%, on health by 75% and on infrastructure by 104%.

An ongoing impact evaluation scheme was built into the Hopeful Family Programme (PKH) to monitor the social welfare scheme's impact, effectiveness and coverage. This showed that, in the short term, transfers within the PKH directly increased the income of very poor households while promoting healthy behaviour, increasing health spending and encouraging children to stay in schools for longer. Higher allocations of funding to rural villages and infrastructure have also had a positive impact on the poor in the country.

Sources: IISD 2016b, IEA 2016a, ADB 2015.

demonstrated, revenue collection and spending policies may complement each other and derive a larger purpose, with revenues raised by means of potentially regressive environmental taxes used to mitigate possible regressive impacts. Best case examples include Indonesia and Morocco (see also Chapter II).

3.3 POLITICAL ECONOMY AND ECONOMIC CONSIDERATIONS

3.3.1 The earmarking debate in developing countries

Taxes are by definition unrequited payments that flow into the government budget and are typically centrally administered (OECD 2001b). There is no theoretical reason to treat revenues from environmental taxation any differently from revenues from other kinds of taxes (Schlegelmilch and Joas 2015). On the other hand, expenditure of environmental tax revenues for non-environmental purposes is often called into question – not least by environment ministries. This is a particular issue in developing countries, where environment ministries tend not to be prioritised and are as a rule relatively poorly funded. Nonetheless upon reflection, it is clear that it is neither feasible nor desirable to earmark all environmental tax revenues for environmental purposes.

From a theoretical perspective, earmarking of environmental tax revenue may constrain the effective management of public finances, leading to revenue misallocation (see e.g. World Bank 2005a). In many countries, earmarking of tax revenues is not permitted by law. In Chile, for example, earmarking would require constitutional amendment and in Vietnam, earmarking is not legally feasible (Cottrell et al. 2016).

This theoretical example highlights the problem: If a country were to implement a carbon tax at the same rate as the carbon tax in Sweden, i.e. roughly USD 130 per tonne (see GoSwe n.d. for details), this would have the potential to raise very substantial amounts of revenue, perhaps as much as 20% of total tax revenue in a low- or middle-income country. Depending on the country's social and economic level of development, it may very well not be desirable for it to allocate 20% of its total tax revenue for environmental purposes. Indeed, calling for the revenues to be used in this way might fundamentally undermine calls for a relatively high tax rate, which may be required to drive the behavioural changes necessary to reduce carbon emissions or bring about environmental improvement.

Nonetheless, many governments make political declarations regarding the use of revenues from environmental taxation. This kind of loose symbolic earmarking can be helpful to communicate policy priorities, boost the credibility of government, foster political acceptance, bring potential opponents on side and prevent policy reversals, or diversion of revenues to less desirable outcomes (Cottrell et al. 2018). Spending a portion of the environmental tax revenues on green infrastructure, renewable energy and energy efficiency technologies can increase the overall environmental effectiveness of tax measures and lessen the cost of reducing pollution (Ekins 2009).

In some circumstances, legally earmarking at least a portion of revenues can address issues relating to mistrust of government, corruption, and related concerns that revenues will not be spent on a declared purpose. To address these issues, one option is to create an independently managed fund to distribute revenues from environmental fees or charges. A successful example of this model can

be seen in Denmark, where the Public Service Obligations Tariff, in place from 1998 to 2016, raised funds that were administered by a non-profit, independent agency *Energiøkonomi* being responsible for security of supply,

energy infrastructure and renewable energy deployment.

However, independent funds may also face governance and implementation challenges. When it was introduced in 2012, revenues

Box 8

ENVIRONMENTAL PROTECTION FEES IN VIETNAM, HA GIANG PROVINCE

Ha Giang province has 215 mines. In 2016, the Ministry of Natural Resources and Environment and the Ha Giang Provincial People's Committee have granted 72 effective mining exploitation licences in the province. The An Thong Joint Stock Company operates an iron mine in Minh Son commune, Bac Me district. The mine has an annual exploitation capacity of 750 tons and a permitted exploitation period of 30 years.

In 2016 – 2017, the An Thong company paid over USD 8.7 million to the state budget including USD 5.7 million in royalties and USD 3.3 million in environmental protection fees. In Minh Son commune, a total of 30 hectares of protected forest was lost for mining site development, while a water source was seriously polluted due to wastewater discharged from mineral processing activities. This caused a water shortage for 600 households with 3,000 people in the commune. Mineral transportation activities damaged 10 km of road from Minh Ngoc to Minh Son commune (Bac Me district).

The Vietnamese government has been collecting a mining environmental fee to mobilise revenues for environmental rehabilitation activities since 2016. However, revenues have not been properly managed or spent for environmental purposes in the affected areas. In December 2016, an

amended Decree on the mining environmental fee (Decree No 164/2016/NĐ-CP) was approved, including much clearer requirements on environmental fee transparency and allocation. It established that fee revenues would be allocated to those localities where mining activities took place.

Since this change, various civil society organisations – including Oxfam in Vietnam, the Vietnam Mining Coalition, Center of Development and Integration (CDI) and Ha Giang Union of Science and Technology Association (Ha Giang USTA) – have raised awareness about the potential for the environmental protection fee to address the negative impacts of mining in the Minh Son commune through capacity building for local authorities and citizens. The group in Ha Giang successfully used the decree as a legal basis to support citizens and facilitate dialogues to promote fair benefit sharing in the community. As a result, in February 2018, Bac Me District People's Committee allocated USD 500,000 of environmental protection fee revenue for infrastructure development in Minh Son commune, while the company invested USD 175,000 to repair and upgrade the road system and implement dust control measures from January to March 2018.

Source: Vietnam Mining Coalition, Oxfam Vietnam

from the Clean Environment Cess in India were earmarked for the National Clean Environment Fund, renamed the National Clean Energy and Environment Fund in 2017. In practice, however, a significant proportion of revenues have been diverted to cover budgetary shortfalls within ministries, and the fund

itself has been criticised for lack of transparency and slow funding allocation (Cottrell et al. 2013). Whichever model is used, the challenge in practice in developing countries is that revenues may be diverted by successive governments to cover non-environmental spending requirements.

Box 9

THE BRAZILIAN ECOLOGIC ICMS (CONSUMPTION TAX): ESTABLISHING CONDITIONAL ENVIRONMENTAL FISCAL TRANSFER SYSTEMS

One of the Brazilian VAT type taxes is called ICMS (*Imposto sobre Circulação de Mercadorias e Serviços*). The Ecologic ICMS is not an environmental tax per se, but it strives to have an environmental effect, to the extent that it conditions revenue transfer – from the state to the municipalities – for the fulfillment of certain environmental policies.

The ICMS is a VAT that is imposed and paid at state level. According to the Brazilian constitution, 75% of the revenues accumulated via the ICMS are kept by the state and 25% are transferred to the municipalities. Of these 25% owed to the municipalities, 75% should be distributed according to certain factors determined by the constitution and the remaining 25% should be distributed according to certain rules instituted by state law. The Ecologic ICMS comes out of these disposable 25% identified in state law.

The purpose of the Ecologic ICMS is twofold: (i) to reimburse the municipalities for the environmental investments they make (especially in increasing conservation areas); and (ii) to reward the municipalities for the environmental investments made, since the benefits are shared by all neighboring municipalities, especially when it comes to sewage treatment and waste management.

Each state has its own legislation. However, the main areas of action at municipality level are: maintenance (and possibly expansion) of municipal and state conservation areas, sanitation, waste management, and water quality control. In the State of Rio de Janeiro, for example, the Green ICMS, as it is known in that state, is calculated in the following proportions: 45% for conservation units, 30% for water quality, and 25% for administration of solid residues.

The transfer of Green ICMS is not a right. The transfers are proportionate to the goals achieved by the municipalities in each of the priority areas. The higher the score, the higher the transfer.

The Ecologic ICMS has been adopted by 17 Brazilian States. It has been extremely successful in attaching environmental obligations to municipalities, in exchange for a greater share of the State revenues accumulated via consumption. The Ecologic ICMS revenues are not generally earmarked to support the local government's environmental expenditures, although municipalities may pass additional legislation to that effect.

Source: Tatiana Falcão

Environmental fees or charges are levied to pay for a particular service, such as water supply and sanitation, or waste collection. In theory, all revenues from fees and charges should be used for this stated purpose. Implementing fees and charges, rather than taxes, can be a route in developing countries to ensure that revenues are used for an environmental purpose. Thus, environment ministries in developing countries in particular often have a preference for environmental fees and charges that flow to a specified fund, rather than to the general budget. However, this can result in inter-ministerial disagreement on the implementation of environmental taxes. For example, the failure of Thailand's Draft Framework Law on Economic Instruments for Environmental Management and later proposals for environmental taxation instruments included in the Framework Law (see box 4) was in part due to disagreements between environment and finance ministries on the responsibility for revenue use and distribution.

The implementation of fees and charges cannot guarantee that the revenue will be employed for environmental purposes. For example, environmental protection fees paid by mining companies in Vietnam since 2006 have not necessarily been used to address the adverse impacts of mining on the natural environment. To address such policy failures, a transparent and robust legal framework is important, as demonstrated by the case of Ha Giang province in Vietnam (see box 8). If the legal basis for earmarking is clear, stakeholders within and outside can make a strong case for appropriate levels of expenditure on environmental protection.

The ICMS Ecologico in Brazil – a VAT-type tax – is an interesting case of fiscal transfer from the central government to municipalities conditional on the fulfilment of environ-

mental priorities (see box 9). Fiscal transfers within the ICMS Ecologico are proportionate to the environmental goals achieved in the municipalities. In this way, central government revenue allocation creates incentives for investment in environmental protection at municipality level. Conditional fiscal transfers are a means for central government to address challenges in prioritising revenues for environmental purposes at municipality level.

3.3.2 Economic impacts and considerations

Impacts on GDP growth, competitiveness and investment

By definition, environmental taxes are “intended to distort production decisions and have a disproportionate impact on polluters” (OECD 2010, p.144). In general, taxes which negatively impact some firms will tend to benefit other firms and thus, at national level, negative impacts will tend to be attenuated by positive impacts elsewhere (OECD 2008). An effective environmental tax should have a positive influence on investment decisions in favour of energy efficiency or pollution-reducing technologies. Given this required shift towards more environmentally friendly investment, the potential impact of an environmental tax on GDP growth is generally not a pertinent measure of whether or not an environmental tax can be considered effective.

At the same time, environmental taxes are often found to be less detrimental to a country's economic performance than other forms of taxation. A green tax shift, reducing capital or labour taxation while increasing environmental taxation (typically in a revenue-neutral way), may increase economic output, as

modelling approaches indicate (Hewett and Ekins 2014). For example, the 2007 COMETR report found an increase of up to 1% in GDP as a result of environmental tax reform in six European countries and implied that the effect of environmental taxes may even increase national competitiveness over time (COMETR 2007). Similarly, a 2015 report by the OECD and IMF for the G20 found that environmental taxes are amongst the most preferable fiscal policy instruments to boost environmentally sustainable growth by pricing environmental externalities and improving resource allocation (OECD and IMF 2015).

The global economy is not a level playing field in relation to energy and resource taxation. In the face of resource or energy price increases, industrial stakeholders with relatively inelastic demand for energy and/or resources are concerned about their competitiveness and tend to oppose the introduction of environmental taxation. In such cases, there may indeed be trade-offs between the international competitiveness of energy-intensive industries and environmental effectiveness. If support measures are implemented to protect industry from price increases, the environmental effectiveness of a tax may be compromised. Conversely, without support measures, it may not be possible to guarantee political acceptance for environmental taxes and the competitiveness of energy- and resource-intensive industry may suffer.

Competitiveness concerns linked to energy price increases are often exaggerated, for a number of reasons. First, fluctuations on global markets tend to be more significant than price increases stemming from a tax. Second, many energy-intensive goods are not highly traded internationally and where they are, the costs can generally be passed on to the consumer. Third, responses to the tax may lead to

significant energy efficiency savings. Fourth, revenues can be used to mitigate negative impacts and support investment in appropriate technologies (Green Fiscal Commission 2010).

Nonetheless, as a general rule, countries tend to protect their energy-intensive industry from international competition and implement support measures. These measures should be time-limited and subject to regular review to prevent lock-in, minimise trade-offs between international competitiveness and environmental effectiveness, and to ensure that large potentials for pollution reductions are exploited. Ways of ensuring international competitiveness include carbon tax exemptions for energy-intensive industries and border tax adjustments to ensure that products traded on the international market are not disadvantaged by domestic taxes, and that imports do not have an unfair competitive advantage due to tax regulations elsewhere. We return to the issue of border tax adjustments in part 4.

As a general rule, the trade-off between environmental quality and the distortive impact of pricing industrial pollution at a sufficiently low level to safeguard international competitiveness does not pay off and delivers limited benefits for the economy and for society. Low tax rates send a distorted signal to producers and lead to misallocation of capital and resources, poor investment decisions, and reduced incentives for energy efficiency. Insufficient monetary incentives to avoid polluting behaviour by adopting new technology or investing in innovation to reduce pollution, result in pollution oversupply and innovation undersupply, creating an inappropriate competitive advantage for environmentally harmful products and industries (OECD 2010). Nonetheless, many countries choose

to exempt industry from environmental taxes for political economy reasons. It would be preferable for countries to levy the tax in the first instance, and support industry to install new energy-efficient or low-polluting technologies. Two innovative domestic approaches to address competitiveness in Sweden and Denmark are described below in box 10.

There are clear synergies between sustainable investment and environmental taxation. Increasing the price of environmental pollutants, such as carbon, increases the return on investment in mitigating technologies, such as renewable energy. In the UK, for example, the introduction of a minimum carbon price with the specific objective of incentivising investment in low-carbon electricity generation, alongside strict emissions rules and a shift to biomass at Drax, previously the UK's largest coal power station, has resulted in the share of coal in electricity generation falling

by over 71%, to just 5.8% of total electricity generation between 2014 and 2016 (Department for Business, Energy and Industrial Strategy 2016). An increase in the tax rate of India's Clean Environment Cess was similarly conceived with the objective of increasing investment in renewable energy (see box 2).

Job creation, new industries and innovation

The potential for green economy transition to create jobs is relatively undisputed, with renewable energy employment just under 10 million in 2017 (see e.g. IRENA 2017, UNEP 2011). Investments in new green economic sectors incentivised by environmental taxation have considerable potential to create new employment.

While it is not easy to isolate the impacts of environmental tax incentives from other

Box 10

INNOVATIVE APPROACHES TO SAFEGUARD COMPETITIVENESS: SWEDEN AND DENMARK

In Sweden, a charge on NO_x emissions was introduced in 1992. NO_x emissions do not increase proportionally to fuel consumption and therefore cannot be derived from the nitrogen content of fuel, but have to physically be measured. To reduce the administrative burden, the NO_x charge was levied on larger power installations producing more than 25 GWH annually. To minimise competitiveness impacts, all of the revenue was recycled back into the industry, in proportion to the volume energy generated – meaning that the most efficient plants received a highest refund, thus incentivising both reduced emissions and higher ef-

iciency in electricity generation. This innovative environmental charge reduced NO_x emissions by 60% between 1990-1995 (see Cottrell et al. 2016).

In Denmark, energy and carbon taxes have been levied on industrial lighting and heating, while energy-intensive manufacturing processes have been made subject to lower tax rates or exempt. In this way only energy-intensive processes are exempted from taxation, rather than the entire energy consumption of energy-intensive firms.

Source: Cottrell et al. (2016); Green Budget Europe and Danish Ecological Council (n.d.).

factors influencing job creation and job losses within the economy, there is evidence that environmental taxation has led to job creation in both OECD countries and developing countries. However, environmental taxation may also cause employment losses in energy-intensive and “brown” industrial sectors. Policymakers must take care to ensure that job losses in brown sectors such as mining, natural resource extraction, and highly polluting manufacturing – many of which tend to employ poor, low-skilled workers – are compensated for to avoid negative equity impacts. Preferably, employment programmes should be linked to environmental goals to exploit possible win-win outcomes of the transition to a green economy. For example, Bangladesh’s solar homes programme has brought solar power to around 2 million homes and has created more than 60,000 jobs for women and youths installing and maintaining solar equipment (Raworth et al. 2014).

The typical approach in OECD countries is to recycle revenues to reduce labour costs (see e.g. Ekins 2009). In the case of the EU, modelling has indicated that a Europe-wide carbon-energy tax sufficiently high to bring about CO₂ emissions reductions to meet the EU’s 2020 targets, with 10% of revenues re-invested in energy-efficiency technologies, would create 1 million jobs by 2020 with statistically immaterial impacts on GDP growth (down by 0.04% compared to baseline) (Ekins 2009). Similarly, in Germany, the so-called Ecotax implemented from 1999 had created 250,000 jobs by 2003, or 0.75% more jobs than predicted in a business as usual scenario (EEA 2011). In Tunisia, it has been estimated that the PROSOL programme, which is partly funded by import duties on the import of air conditioning units to the country, created around 3,000 jobs in solar water heating for

households by 2012 (Trabacchi, Micale and Frisari 2012). In terms of equity considerations, it is important that policymakers consider potential negative impacts on the employed, and implement support and compensation measures.

Environmental taxation stimulates innovation by increasing the price paid by polluters, thus engendering suitable incentives within the economy for innovation to take place. While measuring innovation can be challenging, it is clear that taxation gives business more scope to innovate than regulation, either through patented inventions or through modifications to existing technologies and processes (OECD 2010). The Swedish NO_x charge described in box 10 for example resulted in 55% of firms subject to the charge installing abatement technology within one year (OECD 2010). For innovation to be stimulated by environmental taxation the rate has to be sufficiently high and predictable (to guarantee return on innovation investment) and there has to be a degree of policy commitment and credibility (OECD 2010). The benefits of innovations tend to be international, as they can be shared across jurisdictions.

Inflation and environmental taxation

Environmental taxes are as a general rule levied *ad quantum*, i.e. on a quantity of a pollutant, rather than *ad valorem*, i.e. as a set proportion of the total value of an environmental good or service. This is logical, as it is the amount of pollutant, not its value, that will impact the environment. Over time, against a background of inflation, *ad quantum* taxes will lose value as a proportion of the total price of a pollutant and may impart less of a burden on the taxpayer (Falcão 2016). As a result, many

policy analysts have called for automatic escalators, indexed to inflation or GDP growth, to be integrated within environmental tax policy instruments (see e.g. Ekins 2009, Cottrell et al. 2018). Turkey, for example, has introduced a Special Consumption Tax indexed to inflation.

Some have argued that there is a risk that environmental taxation might drive inflation. Developing countries are particularly vulnerable to price shocks and tend to have higher rates of inflation. In these countries, there is a risk of a tax escalator leading to anticipatory inflation, which may feed back into price lev-

els and amplify inflation inertia (Beaton et al. 2013). In general, however, the influence of environmental taxes on prices tends to be relatively small in comparison to global price fluctuations, and rising prices tend to cause short-term spikes in inflation, which flatten out in the medium term (Beaton et al. 2013). If implemented, multilateral approaches to carbon pricing would require pricing carbon by using an international index composed of a number of string currencies in order to mitigate inflationary and currency related risks (Falcão 2016).

PART FOUR: POTENTIAL AND PROSPECTS

The potential equity benefits of providing an environmental purpose and effect to environmental taxes outweigh the risk of potentially regressive impacts, provided welfare measures are carefully designed to protect vulnerable groups. In light of this, part 4 looks at the potential synergies between greater fairness in the tax systems of developing countries and the administration of environmental taxes, both nationally and internationally.

4.1 IMPROVING DOMESTIC FISCAL GOVERNANCE WITH ENVIRONMENTAL TAXATION

Taxation is one of the central functions of a state, necessary to raise revenue and provide the services required to support the functioning of society and its underlying economy (see e.g. Besley and Persson 2014, Murphy 2015). A tax system that increases equality by allocating the tax burden according to one's ability to pay, and invests in improved fiscal

governance, can influence the public sense of solidarity and responsibility, and thus boost tax morale. Improving fiscal governance has the potential to create a virtuous circle of rising tax revenues, increased trust in government and improved tax compliance, governance and institution-building (Besley and Persson 2014, Bräutigam 2008).

There is a significant difference between the administrative capacity of developed and developing countries to raise and administer taxes (Besley and Persson 2014). Typically, developing countries raise revenues equivalent to 10-20% of GDP. In comparison, OECD countries on average raised revenues worth 34.3% of GDP in 2015, and seven OECD countries had tax-to-GDP ratios of over 40% (OECD 2016a). This discrepancy in tax-to-GDP ratios does not reflect differences in statutory tax rates in developing and OECD countries, but rather points to differences in the size of the informal economy in developing countries and fiscal capacity to collect and

enforce taxes and thus to prevent tax avoidance and evasion. Informal economies are estimated to account for approximately 39% of total GDP in developing countries and 20% in developed countries (Jun 2018). These figures indicate that formalising work relations, reducing tax evasion and investing into simplicity and transparency in the tax system should be absolute priorities for developing countries.

Environmental taxes could be part of the solution to these challenges. The taxation of fossil fuels and other energy sources derives income both from the formal and the informal sector. By taxing the fossil fuels on an upstream level, for example, prior to reaching the informal sector as a final consumer, it captures the rent associated with that economic sector and hence indirectly accounts for at least part of the income generated by the informal sector (Falcão 2018b).

Moreover environmental taxes are difficult to evade, as they tend to be levied on immobile tax bases, such as energy consumption, agricultural inputs, carbon emissions and waste, and on goods and services which tend to have prices which are relatively transparent (Cottrell et al. 2018, Fay et al. 2015, Liu 2013). Introducing taxes that are not easy to evade may have intangible benefits in terms of improvements to tax morale. In countries with high rates of tax evasion, carbon-energy taxes more than pay for themselves as a result of improvements in the efficiency of the tax system (Liu 2013). Moreover, recycling mechanisms for environmental tax revenues can reduce the gap between the tax burden in the formal and informal sectors and thus encourage micro, small and medium enterprises (MSMEs) to enter the formal sector (Fay et al. 2015).

This approach could be challenged under a tax justice perspective, as it would purport a preference for indirect taxes, which risks having a more regressive impact than direct taxes on income. However, this criticism would only stand if one were to only consider the progressivity of individual measures. In fact, from a tax justice perspective, the overall progressivity of the tax system should be privileged over the progressivity of individual measures.

In low-income countries characterized by widespread poverty, strengthening revenue mobilization and accountability seems to be the most promising approach to tax policy (Zheng et al. 2018).

4.2 STRANDED NATIONS: LOSS OF CARBON WEALTH DUE TO DEVALUATION OF FOSSIL FUEL ASSETS

The United Nations Environment Programme (UNEP 2011, p. 14) has labelled the last decades “*an era of gross capital misallocation*”, with much capital invested in property, financial assets and fossil fuels. Although investment in renewable energy reached a new high of USD 266 billion in 2015, substantial capital misallocation continues, with ongoing investment in coal and gas generation and a ‘locked in’ of capital in conventional power production.

In the future, assuming the goals set in the 2015 Paris Agreement (UNFCCC 2015a) are met, a large proportion of the past investment made in fossil fuels and other conventional (yet polluting) energy sources is likely to devalue. 80% of coal deposits, 50% of oil reserves, and 40% of gas reserves will need to be kept in the ground, if the rise in global temperature is to remain below 2 degrees Celsius by 2050 (Lange et al. 2018).

The countries most impacted by these developments will be low- and middle-income countries. Carbon assets in Middle Eastern and North African countries made up on average 40% of the region's total wealth in 2014, while in Sub-Saharan Africa this figure amounted to 9% (Lange et al. 2018). In 2012 alone, extractive fossil fuel industries generated resource rents worth five times the total

aid flows (Oxfam 2016a). Moreover, the value of fossil fuel reserves in developing countries, excluding China, have been estimated to be worth about USD 21 trillion – or about USD 627 billion per year up to 2050 (Oxfam 2016b). Divestment on a large scale poses a serious threat, with the least resourceful countries facing the greatest loss in prospective revenue raising ability.

Box 11

REDUCING EMISSIONS FROM FOSSIL FUEL EXTRACTION

Reducing Emissions from Deforestation and forest Degradation (REDD+) is a mechanism developed by the signatories of the UNFCCC. REDD+ creates a financial value stored in forests and offers developing countries results-based payments for actions to reduce or remove forest-based CO₂ emissions and to invest in low-carbon development. The REDD+ mechanism could provide an interim policy solution to incentivise developing countries not to use fossil fuel reserves. Both deforestation and fossil fuel extraction relate to an activity that bears harmful climate impacts – and in both cases, not engaging in the activity will impose a cost.

Paying developing countries not to extract fossil fuels would live up to the international environmental legal principle of “common but differentiated responsibility” discussed in part 2. Implementing such a mechanism, while requiring political will internationally, would have the advantage of being able to build on the experience of REDD+, where the mechanism has been shown to be relatively effective. One advantage of paying developing countries not to extract fossil fuels is that measuring

the CO₂ emissions avoided as a result of the non-extraction of fossil fuels would be a fairly simple exercise. A formula to calculate the amount of compensation to be paid for non-extraction of fossil fuels could be developed relatively easily, taking a number of factors into account, including avoided emissions and global fossil fuel prices.

This approach is equitable and might be politically feasible in the future, given that political will has been forthcoming in relation to the ratification of the Paris Agreement and the implementation of measures such as REDD+. Moreover, the proposal has the potential to appeal to developed countries, if they are permitted to use payments for avoided emissions as part of their contribution to mitigation. Likewise, developing countries are likely to live up to their Paris Agreement commitments if they are offered a financial incentive not to extract fossil fuels. A REDD+ type approach could work in tandem with other forms of environmental taxation to re-compose the revenue mix in fossil fuel-reliant developing countries.

Source: Adapted from Caney 2016.

These countries are referred to in literature as the “stranded nations”. Typically, these states are highly dependent on fossil fuel-derived revenues, and host carbon-dependent industries and infrastructure. Poverty still tends to be the main concern in these stranded nations.

While it is imperative to find a solution to the problems faced by stranded nations, there are already, in international policy-making, a few alternatives that could be effective transitioning policies to assist them to reduce their dependence on carbon-based energy sources. One possibility might be the development of a mechanism along the lines of the REDD+ programme (Reducing Emissions from Deforestation and Forest Degradation). REDD+ pays those who would otherwise harvest tim-

ber, to protect the integrity of the forest. Likewise, developed countries could commit to paying developing countries not to extract fossil fuels. This proposal is developed further in box 11.

4.3 BORDER TAX ADJUSTMENT TO ENABLE UNILATERAL HIGH ENVIRONMENTAL TAXES

If countries implement environmental taxes unilaterally, they may have concerns about competitiveness impacts on the industries that are subject to international competition. Losses in international competitiveness are more of a concern in a scenario where few countries adopt environmental taxes, or where tax rates are comparatively high. This is a particular concern for taxes on carbon or

Box 12

INTERNATIONAL COMPETITION AND BORDER TAX ADJUSTMENTS (BTAS)

Equity is an issue that ought to be taken in account also under a competition framework. Because petrol is a commodity that is traded internationally, many countries apply border taxes in order to safeguard the domestic industry’s competitiveness in international markets. Border Tax Adjustments work by either taxing an import, so that it is taxed at the same level as the domestically produced product, or on export, in order not to impose an undue burden on the nationally produced product when it is known that the foreign product is not burdened by a like tax.

The WTO is responsible for regulating when a border adjustment is admissible and when it is not. In order for BTAs to be admissible, the tax so applied (or credited) must be applied both in the foreign and in the

domestically produced products – it cannot unduly burden the foreign derived product. Moreover the tax can only be applied in a product, not a process (also referred to as *tax ocultes*) (Falcão, 2016).

For example, a domestic tax on fuel can legitimately be applied on similar imported fuel, but a tax that is domestically applied on the energy consumed during an industrial process (for example, to produce steel) cannot be applied on similarly imported steel. Since environmental (and environmentally related) taxes can be both product and process-oriented taxes, the design of the tax is determinant in defining the types of like-charges that one can apply at the border with the intent to safeguard the competitiveness of the national industry.

energy, which can affect energy-intensive industry quite substantially. While competitiveness impacts due to energy price increases tend to be exaggerated, particularly in cases where taxes are low, governments wishing to implement a tax at a higher rate may wish to explore options to protect their industry internationally.

Border Tax Adjustments (BTA) could be used by a number of countries cooperating on carbon pricing schemes, to the extent they all apply a pre-agreed carbon price (see box 12). That would allow them to keep the carbon price applied domestically, without having to grant an exemption at the border when the product finally comes to be exported. Agreeing on a pre-set price range for carbon could create a market for products that internalise the cost of pollution.

By bundling into groups, or acting unilaterally, countries interested in factoring in the cost of carbon into production can help create momentum for other countries to also adopt carbon pricing strategies.

Concerted action by like-minded groups of countries could help protect the countries involved from shortfalls in international competitiveness, and create pockets of geographic zones where the environmental cost of doing business is not subsidised. This is an approach that could already be currently employed by the Nordic countries, for example, taking into account their similar views and practices towards carbon taxation (Falcão 2016).

Moreover, unilateral border tax adjustments could be employed by countries currently applying carbon taxes, for example, in order to keep their competitive position in the global market. This approach would not be ideal, because it would demur from the positive environmental action employed domestically. However, it might be a good stepping

stone to provide an incentive for countries to implement domestic environmental taxes without exposing their markets to a potential competitive disadvantage when competing for markets internationally.

To the extent more countries adopt similar measures, efficiency and environmental gains can be derived by drawing political decisions and working as a group to heighten the regional, and potentially global level of environmental protection.

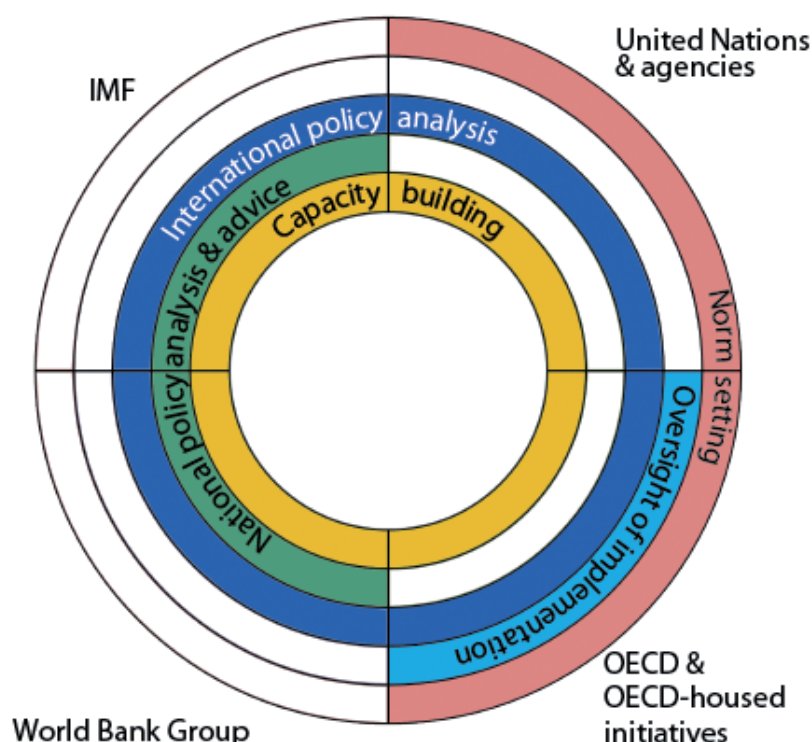
4.4 CREATION OF AN INTERGOVERNMENTAL BODY TO DRIVE ENVIRONMENTAL TAX REGULATION UNDER THE UNITED NATIONS AND THE WTO

One potential route towards enhanced cooperation would be to create an intergovernmental body to address environmental tax issues that cannot be addressed unilaterally.

As further demonstrated in the 2017 Inter-Agency Task Force Report, four intergovernmental agencies lead the work on international tax policy analysis: the World Bank (WB), the International Monetary Fund (IMF), the OECD and the United Nations. Of these four, only the latter two work on policy setting, many times with diametrically opposed viewpoints that are consistent with the membership base of each organisation. Although this is a changing picture, particularly at OECD level, where membership is expanding to be inclusive of emerging economies, it is unlikely that it will ever be inclusive, at policy development level, of developing and least developed countries.

In light of the above, there is serious disagreement, between these four intergovernmental organisations and their agencies, in the characterisation of certain issues and their corresponding regulation. The discussion on

Fig. 1.3 Schematic representation of international organisation roles in international tax cooperation



Source: United Nations (2017) Financing for Development: Progress and Prospects 2017. ©2017 United Nations. Reprinted with the permission of the United Nations.

Notes: Examples of norm setting include model conventions and multilateral treaties. International policy analysis examples are research papers, handbooks, BEPS Action Plan reports. Oversight of implementation includes peer reviews and the assessment of compliance with international standards. National policy analysis and advice includes surveillance, assessment of tax administrations, and policy proposals. Examples of capacity building work are the OECD/UNDP Tax Inspectors without borders initiative, the Global Tax Program of the World Bank, the UN DESA Capacity Development Unit, the OECD Global Relations programme and IMF technical assistance.

Illicit Financial Flows (IFFs) is a prime example. There is, as of yet, no standard definition of IFFs, making it extremely difficult to monitor and to report produce data on such flows. (Falcão and Chowla, 2016). Political considerations make it impossible to agree on one conceptual framework, impacting the very countries that these organisations aim to assist.

As with the international tax work, environmental taxation and regulation is currently being discussed and monitored by all four organizations. However, only the United Nations (via UNEP) has the prerogative to

set environmental policies and targets that involve environmental taxation and regulation. As further explored in Section 2, the UN-FCCC and the Paris Agreement have made viable the introduction of environmental tax policies aimed towards the fulfilment of the goals set at the Paris Agreement.

If we were to translate the picture above to environmental regulation, therefore, only the United Nations would have a norm setting function.

In addition to hosting an intergovernmental agency, the United Nations Committee

of Experts, the United Nations' tax regulatory body, has recently taken on the mandate to analyse the suitability of applying environmental taxes, starting with carbon taxes. The United Nations Committee of Experts is a committee composed of 25 tax experts, nominated by their governments, to sit at the Committee and act in their personal capacity. Many NGOs have argued for the elevation of the tax committee to the status of an intergovernmental organisation. However, consensus has been proven difficult to achieve on this topic.

In spite of that, it is to be recognised that the United Nations currently hosts (i) the widest country membership (ii) policy making capabilities in both environmental law and international taxation (iii) an agenda that fits environmental objectives within the 2030 development goals for sustainable development and (iv) the normative framework in international public law to effectively host unilateral, bilateral and multilateral environmental tax frameworks to oversee the objectives of the Paris Agreement.

An all inclusive governance structure for a 360 degree regulation of all areas of environmental law, including taxation, would be the next natural step in this field.

4.5 INTERNATIONAL TAX COOPERATION – COULD CARBON PRICING SET A PRECEDENT?

Reducing the scope from environmental to carbon taxation further improves the prospect of having one or two cooperative institutions to regulate the outflow of carbon emissions.

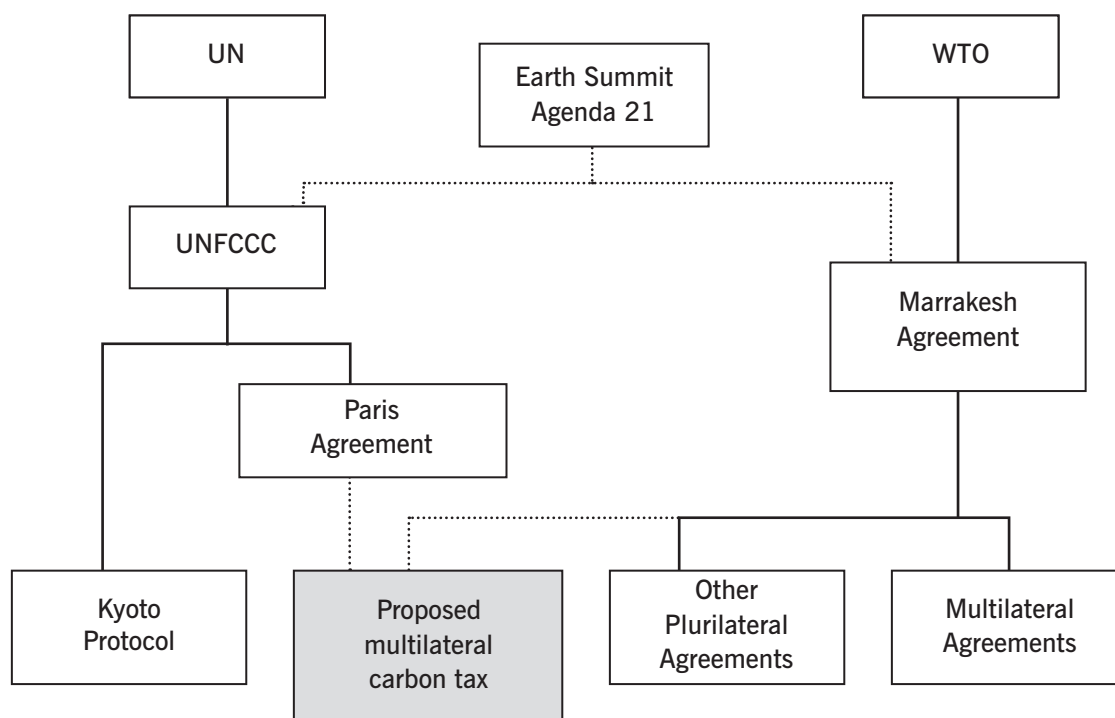
When analysing the basic structure of the UNFCCC, the most authoritative legislation piece in the administration of climate-based

emissions, one sees enormous attention devoted to countries' emissions reporting obligations. As previously discussed in part 2, this is justified by the timely introduction of the Kyoto Protocol, imposing quantitative restrictions on carbon emissions for some countries. It is a policy designed to operate nationally or regionally, therefore on a downstream basis at retail level, and concentrating on emissions control.

The more recent Paris Agreement (United Nations 2015a) was introduced with the intent to correct that, by recognising the importance of integrated, holistic and balanced non-market approaches (United Nations 2015a, Article 6 (8)) to assist developed and developing countries in fulfilling their commitments to reduce greenhouse gas emissions. As further supported in Falcão (Falcão 2016), the Paris Agreement denotes the first time since the inception of the UNFCCC, that the parties to the Convention have made an overt commitment to make use of non-market approaches including carbon prices, carbon taxes and other fiscal measures aimed at curbing and eventually peaking carbon emissions release into the atmosphere.

There are two dimensions to carbon tax regulation. One is the policy setting, legal framework, that is clearly delimited by the United Nations under the UNFCCC and the Paris Agreement. The second dimension refers to international tax competition and trade regulation. Both have to be aligned in order for domestic, bilateral and multilateral carbon pricing techniques to work, particularly on a cross-border basis. In 2016, Falcão suggested an institutional framework to oversee policy formulation, legal regulation and dispute resolution, through a joint oversight of the carbon pricing techniques at UN and WTO levels (Falcão 2016).

Fig. 1.4: WTO and UN shared competence over a proposed Multilateral carbon tax approach



Source: © Falcão 2016

According to Falcão, the WTO would be conferred the duty to oversee any domestic law or treaty covering both indirect taxes and environmental policies that have a cross border effect on trade. The WTO has a Dispute Settlement Body (DSB) which would be fully apt to resolve conflicts regarding the administration and application of a carbon tax, and confer binding power to the decision granted. The picture below illustrates how the UN and the WTO might interact within their respective institutional frameworks:

Ideally, a global multilateral solution should be drawn to price carbon on a global scale, taking into account the economic and social constraints of each country. In 2016, Falcão (Falcão 2016) proposed a framework for the administration of a Multilateral Carbon Tax Treaty (MCTT) which would engage both de-

veloped and developing countries on an equal footing. The objective of the proposed MCTT was to create a binding obligation for countries to apply a tax. This is an extremely unusual commitment to be made internationally, where the standard is for countries to come to an agreement on how to partition a tax. Levying a tax is a State act intrinsically connected to the enforcement of a country's sovereign rights. As a result, international tax treaties seldom create an obligation to tax, or identify the level at which the tax should be levied. However, the ratification of the Paris Agreement has created the legal construct for the admission of one such multilateral agreement that would propose tax rates to be applied by countries according to their levels of economic development.

4.5.1 Other Initiatives

During the COP21 in Paris, the World Bank and the IMF initiated a high-level Carbon Pricing Leadership Coalition (CPLC) which brings together leaders from government, private sector, academia and civil society to expand and promote the use of carbon pricing policies. The CPLC aims to enhance cooperation to share information, expertise and lessons learned on developing and implementing carbon pricing, and to strengthen and improve carbon pricing policies to redirect investment and manage investment risks and opportunities. It works to bring together government and business to accelerate the use of carbon pricing around the world. Its

long-term vision is to implement carbon pricing on a global scale and with rising ambition sufficient to help meet the Paris Agreement temperature goals, aiming for carbon pricing to cover 50% of all emissions by 2025. One explicit means by which this vision should be achieved is by promoting global cooperation.

The High Level Commission on Carbon Prices of the CPLC, led by Nicholas Stern and Joseph Stiglitz, has predicted that a carbon price of USD 40-80/tCO₂e by 2020, and USD 50-100/tCO₂e by 2030, will be necessary to achieve the Paris targets. (Carbon Pricing Leadership Coalition 2017). To achieve carbon prices of this magnitude, multilateral cooperation will be necessary.

PART FIVE: CONCLUSIONS

This report set out to explore whether and in what ways environmental taxation might have the potential to address the inequality of outcomes currently experienced by different income groups as a result of environmental degradation. This report has shown that environmental taxation is a cost-effective policy instrument that can improve environmental standards and reduce the impacts of pollution on human health. Thus, if well designed, taking both environmental and equity impacts into account, environmental taxation can result in environmental improvement while also meeting the requirements of social equity and tax justice.

Environmental taxes can help countries deliver on the commitments assumed through international environmental agreements, such as the UNFCCC and the Paris Agreement, and on the sustainable development goals envisaged through the 2030 Agenda

that require heightened social and economic standards, for which development resource mobilisation is key. The internalisation of the cost of pollution through the attribution of a local and, subsequently, a global price on carbon should be an aim pursued by all nations across the globe.

For developing countries with relatively scarce financial resources, environmental taxes can generate a double positive, to the extent they are able to lead to a heightened environmental standard while mobilising domestic revenues for the achievement of the SDGs. The designation of a clear definition for “environmental tax” according to its ability to carry an environmental purpose, but also to deliver a positive environmental effect, is key in seeing through the objectives of an environmental tax policy that is capable of generating a “double positive” effect.

Environmentally related taxes should be pursued within the context of a wider fiscal and environmental policy approach but should be distinguished to the extent they are not able to deliver on the environmental commitments assumed through the Paris Agreement. To that effect, the principles of environmental law, general principles of taxation and the principles of social justice should be promoted.

Given the differing impact levels of climate change and the imbalanced contributions to pollution, limiting average global temperature rise to 2 degrees Celsius may require differing levels of commitment by certain nations, and the proposition of short-term support policies such as the development of a mechanism along similar lines to the REDD+ programme, i.e. paying developing countries to not extract fossil fuels, might be an interim solution.

Living up to the Paris Agreement commitment implies developing multilateral approaches capable of reducing GHG emissions in general and carbon emissions in particular. An institutional governance framework is suggested within the scope of this report, to draw political compromise and stir multi-party agreement on environmental protection measures in international tax cooperation for the implementation of measures to reduce greenhouse gas emissions, including carbon taxation.

In implementing environmental taxation in developing countries, the country context should be analysed and appropriate measures developed to protect the vulnerable, taking multiple dimensions of inequality into account.

There are clear synergies between environmental taxation and improved fiscal governance. Environmental taxes tend to be difficult to evade, which has the potential to boost tax morale and create a virtuous circle of institution building, creating acceptance for the imposition of other taxes. These synergies may be positive for developing countries as they can improve fiscal capacity to address other tax justice issues and develop a more vertically progressive fiscal system with broad coverage.

The time is now to set the standards under which environmental tax and environmentally related tax mechanisms will be judged for the coming ten years. It is imperative to get the conceptual frameworks, and standards right, in order to both advise developing countries on the implementation of sound policies, and to assess the extent to which those policies are effective, both from an environmental and social justice perspectives. Pollution sees no borders. Let us leave no one behind.

CHAPTER II

ENVIRONMENTAL TAXATION IN PRACTICE

Environmental, Economic and Social Effects of Environmental Taxes in Selected Developing Countries

(by Jacqueline Cottrell)

PART ONE: INTRODUCTION AND OBJECTIVES OF THE REPORT

1.1 INTRODUCTION AND REPORT OBJECTIVES

This report looks at several case studies of environmental taxation in so-called developing countries. The first objective of the report is to provide a deeper understanding of environmental taxation and its environmental, economic and social impacts in developing countries. The second objective of the report is to consider the potential for environmental taxes to be implemented in developing countries within broader tax reform processes to create a more progressive tax system.

The third objective of this report is to consider the degree to which environmental taxation in so-called developing countries may be able to contribute to fair taxation by complying with the vision and objectives of the Global Alliance for Tax Justice. The Alliance's vision is a world where progressive tax policies support people to share in local and global prosperity, access public services and social protections, and benefit from an economy that acts in the interest of people and the environment. The objectives of the Alliance are to affirm the roles of governments to implement such policies, mobilise domestic resources for

public services and other government functions, strengthen state accountability, reduce state dependence on aid and debt financing, and correct the power imbalance between citizens and multinational corporations (Global Alliance for Tax Justice 2018).

The fourth and final objective of this report is to supplement and complement the scoping study by examining the impacts of environmental taxation in depth in several short case studies focussing on countries and instruments also covered in the scoping study.

1.2 THE CASES COVERED IN THIS REPORT

The report works through a series of examples of environmental taxation in industrialising countries. The cases examined were chosen to provide a balance between different regions of the world – Asia, Africa and South America. However, finding good cases underpinned by robust data on the impacts of specific environmental tax measures in low-income countries in particular is quite challenging.

For this reason, the four country cases in this report look at the impacts of environmen-

tal tax in four middle-income countries, as follows:

- The Environmental Protection Tax in Vietnam
- The Plastics Tax in Morocco
- Carbon Taxation in Mexico
- Differentiated electricity pricing in China

These country case studies are followed by an analysis of environmental taxes in low-income countries (LICs) and attempts to draw some general conclusions for these countries.

For each case, the report will consider whether or not an environmental tax was a successful policy within the specific policy context of the country in question, and on the basis of available data. As in Chapter I, the criteria used to evaluate whether or not an environmental tax can be considered to be an effective measure are:

1. Environmental effectiveness – did the tax bring about reductions in pollution (e.g. SO₂, NO_x, CO₂ or other greenhouse gas emissions) and / or result in reduced consumption of energy or other scarce resources?
2. Social impacts, including indirect impacts resulting from changing relative prices and impacts within the tax system as a result of increases in indirect taxes within the tax system, which tend to have regressive impacts.
3. Economic and fiscal impacts, including impacts on GDP growth and international competitiveness, employment, and government revenues.

It should be noted that it is not easy or straightforward to find robust data on the impacts of environmental taxes. Extrapolating which changes are due to the direct and indirect impacts of an environmental tax on pric-

es, behaviour and the macro-economy is not a simple matter. External factors, such as oil price fluctuations, the state of the economy prior to the introduction of the tax, the availability of substitutes to high-polluting substances and a plethora of additional variables also influence the behaviour of investors and consumers. Thus, effectively isolating and quantifying the impact of a tax alongside other complementary measures is quite difficult – particularly in low-income countries, where the capacity to carry out in-depth studies and develop appropriate econometric models is limited.

1.3 THE STRUCTURE OF THIS CHAPTER

This chapter examines the environmental, social and economic/fiscal impacts of four environmental tax instruments in the global South: Vietnam, Morocco, Mexico and China. It then goes on to look at some more general findings on LICs. The final sections draw some conclusions regarding the impact of environmental taxation on social equity and delineate possible ways to mitigate these; propose some possible ways forward; and highlight opportunities for further research.

PART TWO: ENVIRONMENTAL TAXATION IN PRACTICE

2.1 THE ENVIRONMENTAL PROTECTION TAX IN VIETNAM

2.1.1 The policy context

Vietnam implemented a broad-based package of environmental taxes in the Environmental Protection Tax Law in 2012 (Law 57/2010/QH12), which targets a range of pollutants, as shown in Table 2.1. Tax rates can be relatively easily adjusted within a given tax rate range by a standing committee in the National Assembly. Current tax rates have been in place since 2015, when tax rates were increased for gasoline, diesel and kerosene. As shown in Table 2.1, most rates are by now at the higher end of the rate range.

The introduction of taxation of environmental pollutants is one element within a broader process of greening the Vietnamese economy, as expressed in the 2012 Vietnam Green Growth Strategy (VGGS), which focusses on greening production, reducing greenhouse gas emissions, and greening lifestyles (Cottrell et al. 2016). Other green fiscal measures include a natural resource tax and an environmental protection fee. The impacts of these measures are less well documented and are not analysed here.

Alongside the VGGS, in recent years a greater focus on implementing the Sustainable Development Goals and fulfilling the commitments of the Paris Agreement have increased pressure within the country both

Table 2.1: The Environmental Protection Tax in Vietnam: Tax rate ranges and current rates

Tax base	Tax rate range	Tax rate 2018 (USD)
Gasoline	0.04-0.17 USD / litre	0.13 USD / litre
Aircraft fuel	0.04-0.13 USD / litre	0.13 USD / litre
Diesel	0.02-0.09 USD / litre	0.06 USD / litre
Mazut oil	0.01-0.09 USD / litre	0.29 USD / litre
Kerosene	0.01-0.09 USD / litre	0.05 USD / litre
Lubricating oil	0.01-0.09 USD / litre	0.09 USD / litre
Coal(brown/black/fat)	0.44-1.31 USD / tonne	0.65 USD / tonne
Coal (anthracite)	0.44-1.31 USD / tonne	1.31 USD / tonne
HCFCs	0.04-0.13 USD / kg	0.04 USD / tonne
Soft plastic bags	1.31-2.18 USD / kg	2.18 USD / kg
Restricted use herbicide	0.02-0.09 USD / litre	0.02 USD / litre
Restricted use chemicals	0.04-0.13 USD / kg	0.04 USD (kg

Source: Environmental Protection Law, Vietnam, 2012

to increase tax rates within the existing range in the law, and to increase the upper limit of the tax rate ranges. However, when the Ministry of Finance proposed a tax rate increase in 2018, this was rejected by the National Assembly and has been postponed.

Vietnam's Nationally Determined Contribution (NDC)¹², submitted to UNFCCC under the Paris Agreement, commits the country to reducing CO₂ emissions by 8% compared to business-as-usual (BAU) between 2021 and 2030. Given Vietnam's projected increase in emissions in its NDC – from 474.1 million tCO₂e in 2020 to 787.4 million tCO₂e by 2030 – a reduction of 8% on BAU still represents an absolute increase in emissions of 288 million tCO₂e (GoV 2015).¹³ With international support, the NDC proposes emissions reductions of up to 25% on BAU. Even this higher figure would result in a greenhouse gas (GHG) emissions increase of 235 million tCO₂e.

Although fulfilling these NDC pledges would not bring about absolute reductions in CO₂ emissions, it would slow the current rapid growth of GHG emissions in the country. Commitments such as these, and a large number of national policy documents – decrees, laws and circulars – all indicate a degree of commitment in Vietnam to start to integrate environmental policies with other measures to boost growth, restructure the economy, address energy security concerns, and access international finance (particularly climate finance). Environmental improvements in Vietnam have thus been integrated into many

aspects of policy making as a co-benefit of policies aiming to promote other goals (Zimmer, Jakob, & Steckel, 2015). Environmental taxes are part of this process and their implementation has inevitably had impacts on the environment, social equity and the broader economy. These impacts are examined below.

2.1.2 Environmental effectiveness

There is some evidence for positive behavioural responses and reduced pollution and emissions as a result of the EPT. In a BAU scenario, CO₂ emissions in Vietnam are predicted to increase from 247 million tonnes of CO₂e in 2010 to almost 800 million tonnes of CO₂e by 2030 (GoV 2015). However, stable tax revenues between 2012 and 2014 reflect the relative stability of transport fuel consumption – which accounts for at least 90% of total revenue – during the first implementation phase of the EPT, prior to tax rate increases in 2015. Subsequent increases in revenues are attributable – at least in part – to tax rate increases, and not only to increases in transport fuel emissions (see Table 2.2 for details of revenue raised). Thus, the EPT may have been a factor in slowing the rapid rise of transport fuel consumption and growth in emissions from the transport sector.

Modelling commissioned by the (GIZ) in 2014 suggests that the tax resulted in CO₂ emissions reductions of about 2 million tonnes in both 2012 and 2013, equivalent to an annual fall in emissions of roughly 1.7% (Huong 2014). Subsequent increases to the tax rate in 2015, and possible increases in the future, can be expected to have a greater impact on CO₂ emissions, with modelling indicating annual CO₂ emissions reductions of over 9 million tonnes, or 7.9%, under a high

12 Intended Nationally Determined Contributions (INDCs) are the commitments submitted to the Paris Agreement prior to its ratification. Once the Paris Agreement was ratified, these INDCs became NDCs – Nationally Determined Contributions – indicating the signatories' commitment to fulfilling their NDC.

13 The term CO₂e expresses GHG emissions in terms of CO₂ based on their relative global warming potential (GWP). CO₂ has a GWP of 1, while methane has a GWP of roughly 25: Meaning that emitting one tonne of methane is equivalent to emitting 25 tonnes of CO₂.

Table 2.2: Revenues from the environmental protection tax 2012-2016

Year	2012	2013	2014	2015	2016
Revenue as % of GDP	0.34	0.32	0.30	0.64	0.98
Revenue as % of total tax revenues	2.64	2.24	2.22	3.65	5.35
Total tax revenues (million USD)*	536	546	560	1,200	1,900

*Currency conversions on the basis of rate at the end of each accounting period

Source: GoV (Government of Vietnam) 2018

tax scenario, such as that of taxes on gasoline, diesel and coal at the top end of the rate ranges proposed (Willenboeckel 2011).

The full potential of environmental improvements from the EPT is yet to be realised. The initial introduction of the EPT in 2012 and subsequent tax rate increases in 2015 were accompanied by tax reductions elsewhere in the value chain. In 2012, the EPT was introduced in parallel to the abolition of the gasoline price surcharge and in 2015, increases to tax rates on gasoline, diesel and kerosene were introduced alongside import tariff reductions between members countries of ASEAN, the Association of Southeast Asian Nations. Tax rates were therefore partially motivated by the need to mobilise domestic revenue, rather than to a requirement to reduce pollution in the country. In addition, tax rates on poorer quality coal (not anthracite) and other pollutants, aside from road transport fuel, remain towards the lower end of the range of rates proposed. While robust data is limited, it is possible that the EPT has encouraged fuel shifting towards dirtier fuels for transport and power generation – diesel and coal – which would result in increasing pollutant emissions into the air (see Cottrell et al. 2016).

As the EPT is not indexed to inflation, tax rates have been falling in real terms since it

was introduced in 2012 – although inflation has been falling steadily since 2012, when it was at 9.1%, to 3.5% in 2017 (World Bank 2018d). Tax rate increases in 2015 may have compensated for this to some extent, but indexation to inflation would address this problem in a more systematic way.

2.1.3 Social impacts of the EPT

Concrete data on actual recorded impacts of the EPT on social equity are not available in the public domain. However, two modelling exercises have been undertaken in Vietnam to evaluate the environmental, social and economic impacts of the EPT. These results are looked at below.

Prior to the implementation of the EPT, modelling conducted as part of an impact assessment indicated that household welfare would decline slightly across all groups, but that these welfare impacts, particularly in a low tax scenario, would be relatively low and relatively equally distributed across all household categories (Willenboeckel 2011). The results of this ex ante modelling are shown in Table 2.3.

Table 2.3: Impact of the EPT as a percentage of household welfare by income quintile

	Low-tax scenario	High-tax scenario		Low-tax scenario	High-tax scenario
URBAN AREAS					
Non-farm 1	-0.16	-0.53	Farm 1	-0.20	-0.66
Non-farm 2	-0.21	-0.72	Farm 2	-0.26	-0.86
Non-farm 3	-0.30	-1.01	Farm 3	-0.27	-0.89
Non-farm 4	-0.36	-1.18	Farm 4	-0.27	-0.91
Non-farm 5	-0.25	-0.83	Farm 5	-0.24	-0.80
RURAL AREAS					
Non-farm 1	-0.13	-0.42	Farm 1	-0.17	-0.58
Non-farm 2	-0.21	-0.72	Farm 2	-0.21	-0.70
Non-farm 3	-0.29	-0.96	Farm 3	-0.26	-0.88
Non-farm 4	-0.34	-1.15	Farm 4	-0.27	-0.91
Non-farm 5	-0.26	-0.85	Farm 5	-0.23	-0.75

*1 is the lowest income quintile (poorest), 5 the highest income quintile (richest). In the table, welfare is measured by the Hicksian equivalent variation as a percentage of base income. This measure expressed the tax burden as a lump-sum reduction in real income with equivalent welfare impact.

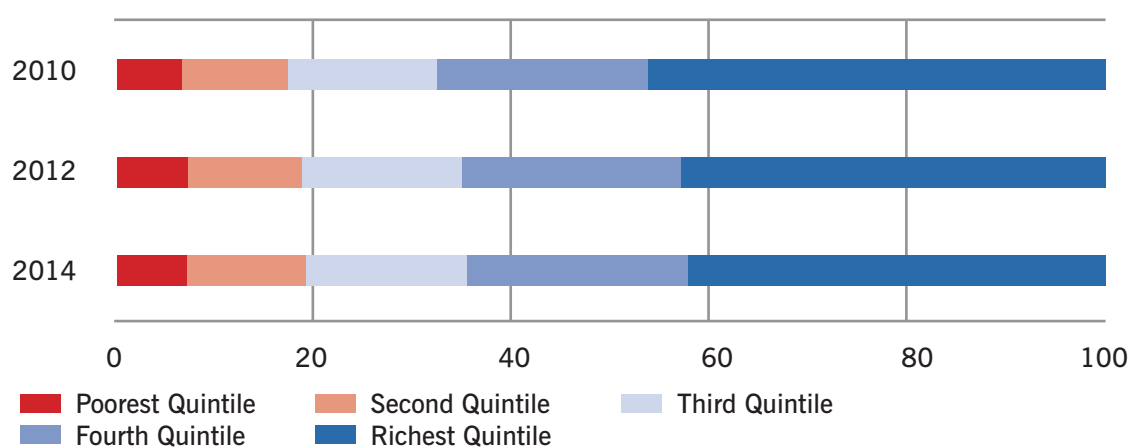
Source: Willenbockel 2011

As shown in Table 2.3, in the high-tax scenario, modelling indicated that the impact of the EPT would be progressive overall. The impact on welfare would be least significant for the poorest income quintile, whether rural or urban, farm or non-farm, and most significant for the fourth income quintile, with the highest predicted impact being a decline of 1.18% in the income of urban non-farm households (Willenboeckel 2011). Moreover, it should be noted that the figures in the table do not take into account potential welfare gains due to environmental improvements. Such improvements tend to benefit lower income quintiles more, because poor households are most adversely affected by high levels of pollution (see Chapter I for a discussion of the causes of the inequity of impacts of environmental degradation). This implies that envi-

ronmental improvements may have mitigated the impact of falling household income to some extent and that, with appropriate use of tax revenues to drive green economy transition, the EPT has the potential to have a neutral or indeed a positive social impact.

Despite the progressive impact of tax overall, the high tax scenario predicted a loss of half a percentage point of household income for the lowest income quintile. Vietnam achieved middle-income status in 2011. In 2012, when the EPT was implemented, 13.4% of the population were living under the lower middle-income poverty line of USD 3.20 a day (World Bank 2018b). For these households, even a 0.5% drop in income could have a potentially severe impact on welfare.

Given these findings, at the time of implementation, rates at the lower end of the tax

Figure 2.1: Distribution of income in Vietnam by income quintile

Source: World Bank 2018b

rate range were imposed on the pollutants listed in the EPT law. Vietnam's Vice Finance Minister stated that those affected negatively by the EPT would receive increased payments from local government and that there would thus be no social impact on the population. Whether such social protection measures were implemented in practice is unclear. However, social welfare is poorly targeted in Vietnam and until very recently, the poorest quintile received on average only USD 0.09 per day in government transfers, while the richest quintile received USD 1.60 (Halle-gatte et al. (eds) 2016).

Following the implementation of the EPT in 2012, GIZ and the Vietnamese Ministry of Finance commissioned Computable General Equilibrium (CGE) modelling in 2014 to gauge the impacts of the EPT against a BAU scenario (Huong 2014). This ex post modelling also indicates that the EPT had a slight negative social impact, but does not go into detail regarding the impact on income quintiles, focussing instead on poorer and wealthier regions of Vietnam and disaggregating the data in relation to urban and rural populations.

Table 2.4 shows the impact of the EPT on the poverty rate in Vietnam in 2012 and 2013. Overall, the poverty rate declined slightly more slowly as a result of the EPT than it would have done in a BAU scenario, from 11.1% to 9.8% between 2012 and 2013, a deviation of -0.2% in 2012 and -0.1% in 2013.

The data in the table shows that impacts on poverty tended to be slightly more pronounced in poorer regions – the North Central Coasts, the Central Highlands, and the Mekong River Delta. As noted above, for households living close to or below the poverty line, vulnerability to relatively small price increases tends to be higher.

However, even in the poorest regions, the deviation from BAU was relatively low, with the highest deviation -0.5% in 2012 in the North Central Coasts. Although prior to the implementation of the EPT policymakers committed to taking special care to target social welfare measures or compensation to vulnerable populations in poorer regions, there is no concrete data available in the public domain about how effective this has been in practice.

Table 2.4: Impacts of the EPT in 2012 and 2013 on the poverty rate (in %)

	2011	2012			2013		
		With EPT	BAU (no EPT)	Deviation of EPT from BAU	With EPT	BAU (no EPT)	Deviation of EPT from BAU
Vietnam	12.6	11.1	10.9	0.2	9.8	9.7	0.1
By urban/rural							
Urban	5.1	4.3	4.2	0.15	3.7	3.7	0.04
Rural	15.9	14.1	13.9	0.17	12.7	12.6	0.13
By region							
Red River Delta	7.1	6.0	6.0	0.0	4.9	4.9	0.0
North Mountain Region	26.7	23.8	23.7	0.1	21.9	21.8	0.1
North Central Coasts	24.5	21.3	20.7	0.5	18.3	18.1	0.3
South Central Coasts	10.9	9.5	9.4	0.1	8.1	7.9	0.2
Central Highlands	20.3	17.8	17.5	0.3	20.3	16.0	0.2
South-East Region	1.7	1.3	1.3	0.0	1.7	1.1	0.0
Mekong River Delta	11.6	10.1	9.8	0.3	11.6	9.1	0.1

Source: Huong 2014

Modelling also indicated a small drop in household consumption of just under -0.6% on average in comparison to BAU as a result of the EPT in 2012 and 2013 – presumably due to higher fossil fuel prices, which reduced real household incomes (Huong, 2014).

On the other hand, income distribution as measured by the Gini coefficient¹⁴ improved very slightly in comparison to BAU in 2012 and 2013 in Vietnam – from 42.10 rather than 42.11 in 2012, and by the same margin in 2013 – presumably because the real incomes of poorer households deteriorated to a lesser extent than the real incomes of wealthier households. This is probably because fossil fuels, especially petroleum, are a smaller item in the

consumption basket of poorer households than in richer households (Huong, 2014). This is in line with the findings of Morris and Sterner (2013) that taxes on transport fuels in developing countries can be regarded as “luxury taxes” which tend to have progressive impacts on household income (for details of this discussion, see Chapter I).

On the whole, the social impacts of the EPT are likely to have been relatively insignificant. This is reiterated by anecdotal evidence collected from interviews in March 2016 with policy experts from the Central Institute of Economic Management (CIEM), a governmental policy think tank linked to the Ministry of Planning and Investment. Experts from CIEM suggested that the negative social impacts of the EPT had been minimal, due to falling oil prices, the low tax rates applied, and parallel tax reductions since the introduction

¹⁴ The Gini coefficient is a statistical measure of distribution used as a gauge of economic inequality, measuring income distribution (or less commonly, wealth distribution) among a population. A Gini coefficient of 0% expresses perfect equality in a society, while a value of 100% expresses perfect inequality. Thus, the lower the Gini coefficient, the more equal a society.

of the tax in 2012. This may change in the future if the tax rates applied are increased – as was proposed in 2018. In this case, policy-makers must implement social compensation measures in parallel to address possible negative social impacts on low-income quintiles.

2.1.4 Economic and fiscal impacts

Modelling prior to the implementation of the EPT suggested there would be an increase in production prices as a result of energy price increases, which could in turn lead to reduced competitiveness of exports and so negatively impact GDP growth (Willenboeckel 2011). This finding was corroborated by ex post modelling conducted in 2014, which indicated a decline of 0.2% in GDP growth in comparison to a BAU scenario in both 2012 and 2013 (Huong 2014). This impact is quite large relative to the magnitude of the low tax rates applied and is attributable to fossil fuels being an important sector in the economy, and an important input for most sectors of the economy. On the other hand, these reductions should be seen in the context of high GDP growth rates in the country of 5.2% in 2012, 5.4% in 2013 and 6% in 2014 (World Bank 2018e).

Employment also fell by a similar magnitude in comparison to the BAU scenario, while there was a 0.7% drop in investment in both 2012 and 2013, presumably attributable to higher production costs as a result of higher energy prices, resulting in lower rates of return on investment (Huong, 2014).

These impacts on GDP growth and investment have been compensated for to some extent by the substantial contribution of the EPT to domestic revenue mobilisation in Vietnam. Indeed, as a result of the introduction of the EPT, government revenues increased

by 1.6% in 2012 and 1.2% in 2013 (Huong, 2014). Revenues from the EPT accounted for more than 5% of total tax revenues in 2016, as shown in Table 2.2.

These revenues have flowed into the general budget and have not been earmarked for social compensation or to fund environmental improvement. It is not desirable from a fiscal governance perspective to earmark environmental tax revenues for environmental purposes, as earmarking can result in a mismatch between revenues raised and the cost of achieving particular environmental policy goals. However, using a proportion of revenues from environmental taxation to achieve environmental goals can reduce the overall cost of green economy transition and generate co-benefits for low income quintiles most adversely affected by environmental degradation and pollution (see Chapter I).

2.1.5 Conclusions

The EPT in Vietnam is often held up as a best practice example of environmental taxation in the context of non-OECD countries, because the environmental tax law is quite comprehensive and covers a wide range of environmental pollutants, and the design of the tax facilitates easy adjustment.

Modelling indicates that the EPT may have had a small negative impact on GDP growth and employment in comparison to BAU. However, given that overall GDP growth increased on average by 5.5% annually between 2012-14 and employment increased by 1% in the same period, these minor impacts were compensated for by positive developments in the economy as a whole.

The EPT appears to have had a positive impact on social equity, with a large proportion of EPT revenues being raised through transport

taxes, which tend to be progressive. Equality of income improved in the time since the raft of environmental taxes was implemented. Nonetheless, for households living on or below the poverty line, even a small decrease in household income can impact quality of life and ability to pay for essential goods and services. While there is no data available to indicate the extent of such impacts, higher tax rates in future will require policymakers to pay more attention to equity impacts and to ensure that targeted social compensation measures are in place.

2.2 THE PLASTICS TAX IN MOROCCO

2.2.1 The political context

In the past, no formal separation systems for household waste existed in Morocco. In the year 2000, the World Bank estimated that environmental and health costs associated with substandard municipal solid waste practices amounted to roughly 0.5% of GDP (World Bank 2016b). At this time, few materials were recycled, resulting in large volumes of waste to landfill and as a consequence, high levels of air, soil and water pollution. Nonetheless, the waste sector was economically significant during this period, generating over USD 17 million annually and employing roughly 10,000 economically vulnerable waste pickers, up to 10% of them children, in the informal recycling sector in unsanitary and dangerous conditions.

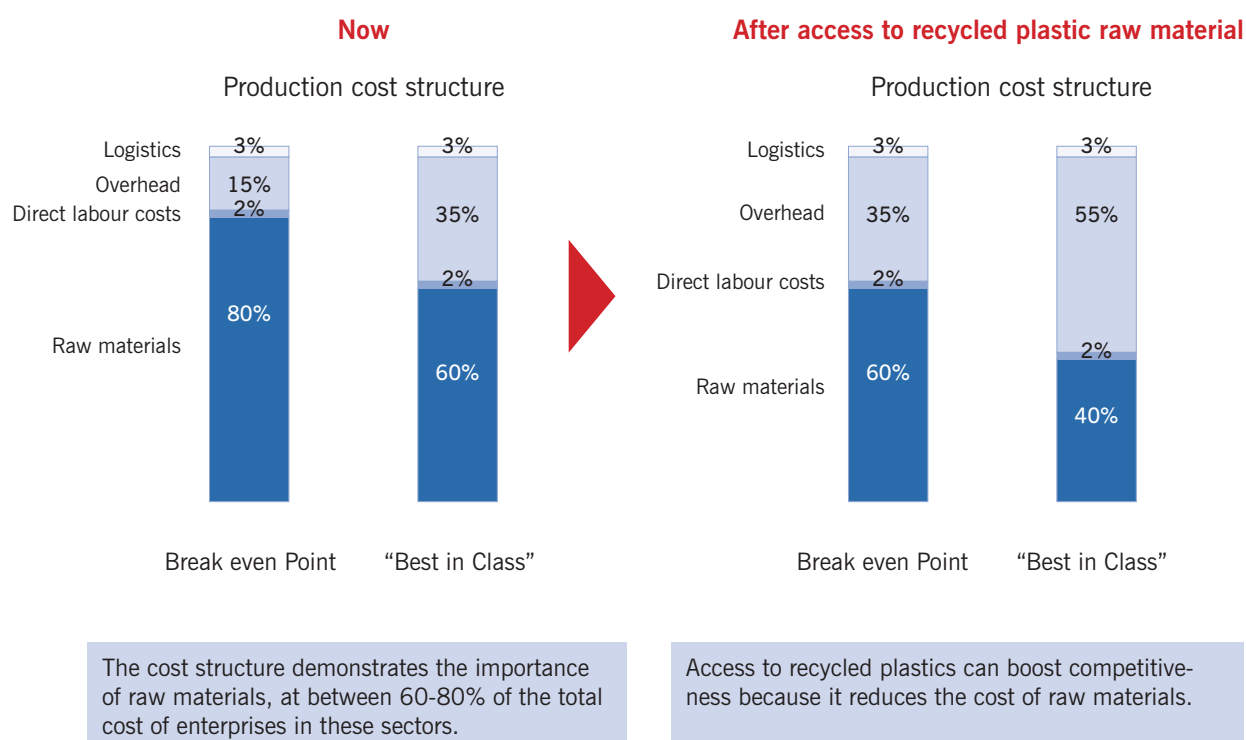
In response, in 2008 the Moroccan government developed a 15-year, 3-phase package of measures known as the National Waste Management Programme (Programme National des Déchets Ménagers, PNDM). This programme included a number of ambitious objectives for the year 2020: collect 90% of

all household waste; set up sanitary landfill sites for all urban centres and to rehabilitate or close all existing landfill sites; recycle 20% of all waste; professionalise the waste sector; and to raise awareness of all economic actors about the waste problem (GoM 2018b).

The package of measures included in its second phase a new environmental tax on plastics, which came into force in January 2014. The objective of the tax, and other measures, was ambitious – namely, to incentivise an increase in the rate of material collected and recycled from 5% in 2016 to 20% by 2020. Initially, a plastics tax of 1.5% was imposed on primary materials and products for the domestic plastics industry and on sales of plastics and ex-factory plastics, as well as on the total value of plastics imports. Subsequently, the list of goods to which the tax applied was broadened, while the tax rate was reduced to 1%.

Tax revenues are directed to the National Environment Fund (Fond National pour l'Environnement – FNE) and are used to finance activities to promote the recycling and recovery of plastic waste, which represents a significant proportion of household and industrial waste in the country, and to create a formalised waste separation sector. A strategic committee for recycling value chains with the participation of key actors – local governments, plastics tax payers, the recycling industry and civil society organizations – was set up to oversee fund distribution. Allocation rules specify that a minimum of 20% of total tax revenues are to be allocated to informal waste collectors, with particular attention paid to gender issues in fund distribution (Ghariani 2015). All applications for funding from the FNE must integrate the environmental and social dimension in their proposals and have

Figure 2.2: Production costs for Moroccan firms with / without recycled plastics as raw materials



Source: GoM 2017

conducted a thorough policy impact assessment to that end (GoM 2018b).

In the sections below, the impact of expenditure from the FNE is examined in parallel to the impacts of the plastics tax. Particularly in the case of social impacts, revenue expenditure is an integral part of the tax itself, as all tax revenues are earmarked for the FNE, and expenditure has played a crucial role in reducing the economic vulnerability of waste pickers.

2.2.2 Environmental effectiveness

The tax has had a positive environmental impact by creating an incentive for manufacturers to use recycled plastics, rather than new raw materials, as inputs into their manufacturing processes. Although no data is available in the public domain on the extent of the shift,

the Government of Morocco reports that the tax has boosted resource efficiency and has had a positive impact on resource consumption within the country (GoM 2018a). The private sector responded quickly to the plastics tax and was keen to set up new recycling facilities, which were financed using revenues from the plastics tax. In this way, the plastics tax has boosted investment in new sectors and fostered economic development.

Although the tax levied on individual products is rather low, manufacturers can make significant savings by using recycled plastics as inputs to manufacturing, as they cost significantly less. This acts as a strong incentive for manufacturers to shift to using recycled plastics as an input to the production process, as shown in Figure 2.2.

The impact of the tax yield that was spent on solid waste management has been substantial. Revenues have been used to increase the number and size of sanitary landfills in the country. There were 22 sanitary landfills operating in Morocco at the end of 2016, which received about 53% of all municipal solid waste collected in the country, up from 32% in 2012. Once all five landfill sites currently under construction are completed, about 80% of all municipal solid waste will be collected in sanitary landfill sites (2016b). The new system reduces pollution at landfill sites, pressure on natural resources and volumes of waste to landfill, while improving water and air quality (due to reduced methane emissions) and resource efficiency. The government is on course to fulfil its target of closing or rehabilitating all informal and unsanitary open dumps by 2020, and the vast majority of landfill sites are now operating to much higher environmental and social protection standards (World Bank 2016b).

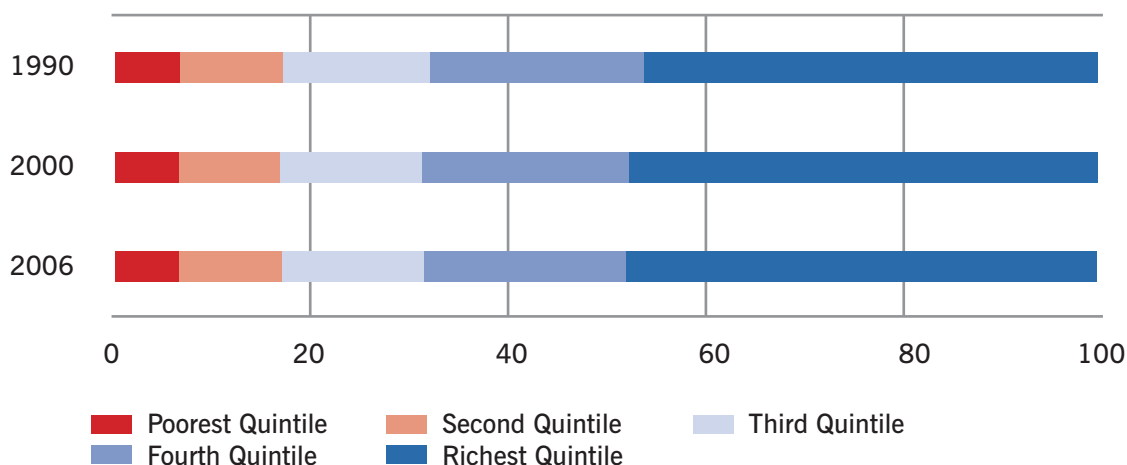
Some landfill sites are installing facilities to tap biogas from organic waste. In 2016, the Fez landfill site had already converted biogas into more than 1MW of electricity and was

providing electricity for 30% of street lighting for the city (World Bank 2016b). The site at Oum Azza is planning to sell biogas to a local cement factory and to use biogas to produce electricity to sell to the national grid. The site is the first project in Morocco to sell Certified Emission Reductions through the Clean Development Mechanism and will in its lifetime generate around 0.5 million tonnes of CO₂ emission reductions (World Bank 2016c). The successful experience at the Oum Azza site is serving as a model for the eighteen recycling projects being funded by plastics tax revenues distributed by the FNE.

2.2.3 Social impacts

For Morocco, data is available on the World Bank’s Poverty And Equity Data Portal. It shows the distribution of income or consumption by quintile in 2006, as shown in Figure 3 (World Bank 2018b). In that year, 17% of the population were living under the lower-middle-income poverty line of USD 3.20 a day and the Gini coefficient for the country was 40.7 (World Bank 2018b). More up-to-

Figure 2.3: Distribution of income in Morocco by income quintile



Source: World Bank 2018b

date figures are not available on the World Bank database, but a 2018 report indicates that inequality appears to have been relatively stable in Morocco since the 1990s, and estimates an average Gini coefficient of 41.2 in 2010-2015 (AUC/OECD 2018). Regional inequality is also an issue in the country, with higher poverty rates in poorer and remote areas relative to cities and coastal areas. In view of this, it seems reasonable to assume that the poorest income quintiles in Morocco were relatively vulnerable to price changes when the plastics tax was introduced.

In spite of this potential vulnerability to price changes, given the low value of many plastics, including PET used in plastic bottles and domestically produced goods, it is unlikely that the tax had more than a minimal impact on household welfare. The tax resulted in a price increase on an imported 1.5 litre PET plastic bottle of 0.08 Euro cents per bottle, and for domestic bottles, 0.04 Euro cents – a barely perceptible price change, even for households on extremely low incomes (GoM 2013).

It is possible that any impacts that may have been felt had a greater impact on women, as women tend to be responsible for spending on basic household requirements, such as water, foodstuffs and electricity (see Chapter I). Households in poorer and more remote regions, with on average lower incomes, may also have been affected by these minor price increases. However, there are no data available to corroborate this proposition and it seems reasonable to accept the Moroccan government's suggestion that the price changes were barely perceptible, even for households in poverty.

By January 2016, i.e. after the first two years of the tax, a total of USD 44 million had been allocated to the FNE. One the central aims

of expenditure is to integrate informal waste pickers within the formal waste sector. At least 20% of total tax revenues are directly allocated to support recycling activities targeting waste pickers. These high levels of expenditure have generated a number of positive social benefits. By 2016, 18 recycling projects had been approved and awarded funding through the FNE, which are expected to generate around 1,050 waste picker jobs in the formal sector (World Bank 2016b).

FNE funds are used to encourage the formation of waste picker cooperatives, thus creating new economic opportunities for waste pickers at regularly inspected and sanitary landfill sites. Formalising the system enables informal waste pickers to become the owners and employees of waste sorting facilities. It has thus improved working and sanitary conditions and provided a more stable source of income, including social insurance provision, and easier access to banking services.

Although concrete data does not appear to be available, substantial environmental improvements in and close to landfill sites, and the resulting improvement of municipal waste collection rates of 80% – double those of 2007 – can reasonably be expected to benefit almost all income groups. It is also reasonable to assume that there have been positive effects on the health of waste pickers, populations living close to landfill sites, and urban populations in general – particularly those previously unserved by waste collection, or suffering from low waste collection rates. This is corroborated by the World Bank, which has estimated that the damage costs associated with inappropriate municipal waste management halved between 2000 and 2014, from EUR 7 per capita to EUR 3.5 per capita (World Bank 2016b).

2.2.4 Economic and fiscal impacts

The plastics tax has had positive fiscal and economic impacts. Because the tax was imposed on plastic materials used in domestic production at the point of manufacture, but on the entire value chain of imported plastics products, the tax has had a greater impact on the price of imported products in comparison to domestic products. The government also consulted a range of stakeholders in the industry to ensure that any negative impacts on competitiveness could be quickly mitigated. As a result, the competitiveness of domestic industries in Morocco was not adversely affected – indeed, as shown in Figure 2.2, companies have improved their competitiveness as a result.

Revenues have been considerably higher than predicted, with revenues of about EUR 40 million in 2014-2015. In 2018, the government estimated that plastics tax revenues amount to roughly EUR 14 million annually (GoM 2018a). These revenues have been used to create new MSMEs in the waste sector by subsidising capital investments in sorting schemes and bringing together informal waste-pickers into formalised cooperatives to recycle waste. Increased recycling rates will reduce plastics imports, thereby also generating foreign currency savings.

Furthermore, use of recycled plastic waste as an input to manufacturing will enhance resource efficiency and reduce raw material costs for domestic industries. As shown in Figure 2.2, these savings can be substantial and thus have measurable positive impacts on competitiveness. These efficiency gains far outweigh any cost increases resulting from the tax.

Finally, there is also evidence that such approaches are being taken up in other value chains, such as batteries, used tyres, and waste

oils, which may further boost competitiveness across the economy in the future (World Bank 2016b).

2.2.5 Conclusions

There is no evidence that the plastics tax in Morocco had a direct negative impact on poorer households. Because the tax was introduced as part of a package of measures to bring about improvements in the waste sector, which included measures to improve social inclusion and enhance social equity, the overall impact of the tax and expenditure of plastics tax revenue has been positive, both environmentally and socially.

Recent estimates indicate that as much as 60% of all employment is in the informal sector in Morocco: an informal sector that accounts for between 11-33% of GDP (AUC/OECD 2018). Hence, measures to integrate workers and micro, small and medium sized enterprises (MSMEs) from the informal sector within the formal economy and enhance access to social welfare are extremely important and may serve as a model for further measures in the future.

2.3 CARBON TAXATION IN MEXICO

2.3.1 The political context

The carbon tax was introduced as part of a range of measures to reduce GHG emissions in Mexico. The 2012 General Law on Climate Change was passed to make voluntary commitments binding which were made by Mexico in 2010 during the UNFCCC negotiations in Cancun. The law stipulates that Mexico should cut GHG emissions by 30% by 2020 and 50% by 2050, compared to 2000 levels. The law highlights the high level of political will

Table 2.5: Carbon-energy tax reforms in Mexico 2014-2018

Year	Measure	Further information
2014	Carbon-energy tax on fossil fuels produced in Mexico and fossil fuel imports	See Table 2.6 for rates and exemptions.
2014-2017	Gradual phase-out of fossil fuel subsidies	Gasoline and diesel prices fully deregulated in 2017
2015	Ad quantum fuel taxes on transport fuels introduced to replace Mexico's fuel price stabilization mechanisms	Effective rate: roughly EUR 140/tCO ₂ , which applies to roughly one third of all CO ₂ emissions in Mexico
2018-2021	Three-year pilot for a voluntary emissions trading scheme	60 domestic and international businesses, mandatory participation envisaged in future.

Source: OECD 2017b and EDF et al. (2015)

in the country to reduce GHG emissions substantially, and has led to the introduction of additional measures to reduce emissions, including the creation of a climate change fund, the implementation of a 2014-2018 climate change programme, and constitutional energy sector reform. Between 2018-2021, Mexico will pilot voluntary emissions trading with over 100 companies, with a view to introducing a mandatory scheme in the future.

The country made a commitment in its Nationally Determined Contribution (NDC) under the Paris Agreement to reduce GHG emissions by 22% and black carbon emissions¹⁵ by 51% between 2020-2030. These reductions are equivalent to a reduction in carbon intensity, i.e. CO₂ emissions per unit of GDP, of almost 40% between 2013-2030 (GoMex 2015).

The introduction of the carbon tax in Mexico was also internationally significant, because Mexico was one of the first industrialising countries to have introduced carbon taxes in the run-up to the 21st session of the conference of the parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris in 2015. But it was also important due to the Mexican economic context: Before the introduction of the energy sector reform that phased out fossil fuel subsidies, liberalised the oil industry, and implemented a carbon tax, the country had a traditionally strong reliance on income from oil sales.

When the carbon tax was introduced, it was one element within a broad fiscal reform in Mexico, covering personal, corporate, consumption and energy taxes (see Table 2.5).

The carbon tax in Mexico covers around 40% of total greenhouse gas emissions in the country and entered into force on 1 January 2014. The first proposal for the tax was sent to the Mexican Congress in 2013. However, rates

¹⁵ Black carbon – or soot – is a short-lived climate pollutant. It is a light absorbing constituent of particulate matter formed by the incomplete combustion of fossil fuels, biomass and biofuels. Major sources include vehicles (particularly diesel driven road vehicles), non-road mobile machinery (e.g. forest machines), ships, residential heating (e.g. coal or wood burning stoves) and open biomass burning (e.g. burning of agricultural waste). There is significant uncertainty regarding the warming potential of black carbon, but in the short term, it is assumed to be high. Source: EEA (2013) GoMex (2015).

Table 2.6: The carbon tax: Proposed and enacted rates per tCO₂

Product	Proposed tax rate EUR / tCO ₂ *	Enacted tax rate EUR / tCO ₂	Revenues raised in 2014 (million EUR)
Natural gas	2.68	0	0
Propane	3.17	1.78	47 (total for LPG)
Butane	3.88	2.31	
Gasoline	3.42	2.19	223.1
Kerosene	3.55	2.25	22.8
Diesel	3.50	2.30	136.5
Fuel oil	3.43	2.22	47.0
Petroleum coke	0.29	0.24	24.9
Coal coke	0.42	0.80	0.5 (total for coal)
Mineral coal	0.46	0.72	
TOTAL REVENUES			501.8 million EUR

*Currency conversion at average EUR-MXN exchange rate 2016

From: Arlinghaus and van Dender 2017, GoMex 2015, EDF et al. 2015

proposed were substantially higher than those ultimately implemented and natural gas was ultimately zero-rated, which undermines the environmental effectiveness of the tax – natural gas combustion generates roughly 45% of total emissions from the power sector.

The carbon tax rate varies as shown in Table 2.6, and is capped at 3% of the sales price of the fuel. The tax rate is linked to the consumer price index, and thus will not lose real value over time as a result of inflation. As a result of this so-called indexation to the consumer price index, the carbon tax rate has increased by roughly 10% between 2014 and 2017.

Outside road transport, the carbon tax is the only tax imposed on fuel use. In the road transport sector, the impact of the carbon tax is very modest, accounting for less than 1% of the final retail price of gasoline (Arlinghaus and van Dender 2017). The tax covers fossil

fuel sales and imports by manufacturers, producers, and importers.

Companies liable to pay the tax may choose to pay 20% of their total carbon tax with Certified Emission Reduction certificates (CERs) from Clean Development Mechanism (CDM) projects developed in Mexico. This 20% payment could be made using CERs worth the equivalent value of the tax outstanding at the time of paying the tax. The rules for paying carbon taxation with CERs were published in December 2017, and limited data is available regarding the success of the scheme. CDM projects in Mexico have struggled to find sufficient demand internationally, since the European Union (EU) ruled that only CDM from so-called “Least Developed Countries” would be eligible within the EU Emissions Trading System (EU ETS) in 2013 (MexiCO₂/EDF/IETA 2018). Hence,

this scheme may go some way to creating new demand.

2.3.2 Environmental effectiveness

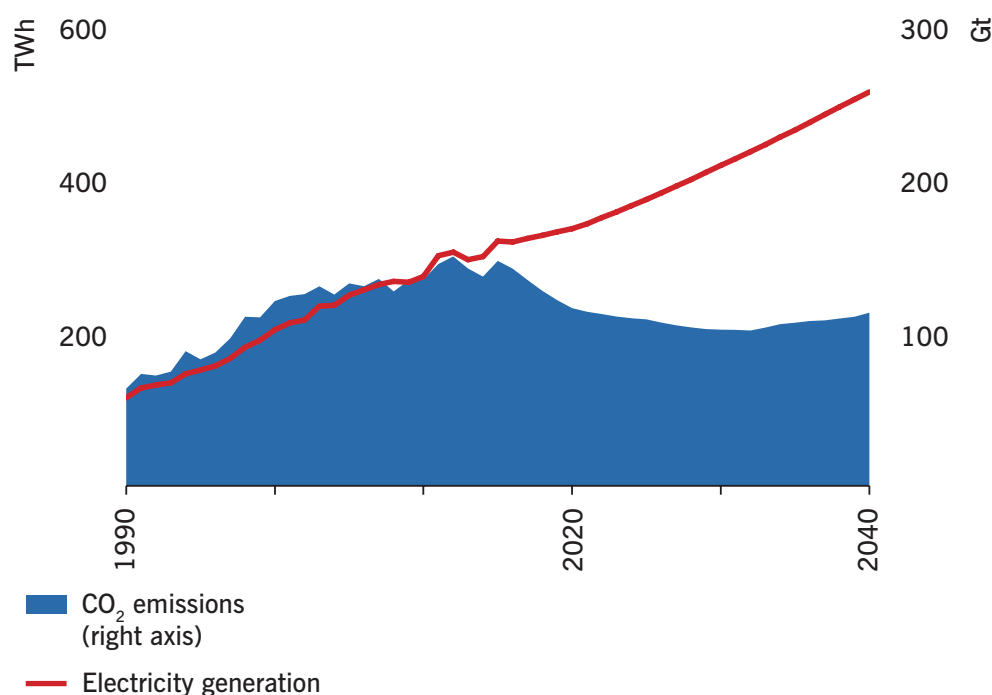
The original legislative proposal for the carbon tax was watered down substantially in the Mexican Congress and, in its current form, acts as a relatively minor incentive to reduce emissions. The Mexican Ministry of Environment, SEMARNAT, has estimated that the carbon tax leads to the abatement of 1.8 million tCO₂ annually, or 0.38% of total CO₂ emissions in the country in 2014 (MexiCO₂/EDF/IETA 2018; World Bank 2018a). These low reductions are in part because the enacted rates are about one third lower than those proposed. Nonetheless, the tax rate is important due to its signalling effect and represents an important political step in the transition

from the subsidisation of fossil fuels to their taxation.

Natural gas is the main fuel for power generation in Mexico and accounted for about 45% of carbon emissions from energy use in 2012 (IEA 2016a). However, natural gas is currently zero-rated. This boosted political acceptance for the measure when it was proposed in the National Congress, but reduces the potential incentive effect of the tax to shift investment away from coal or other high-carbon fossil fuels.

Some critics of the tax in Mexico have noted that there has not been sufficient investment in low-carbon alternatives to fossil fuels, such as renewable energy and public mobility, to foster CO₂ emission reductions (Cespedes 2015). In spite of this and the low carbon tax rate, Mexico is expected to decouple electricity generation from carbon emis-

Figure 2.4: Electricity generation and energy-related CO₂ emissions, 1990-2040 under the New Policies Scenario, World Energy Outlook



Source: © OECD/IEA 2017 World Energy Outlook, IEA Publishing. Licence: www.iea.org/t&c

sions if existing policies and measures and announced policy intentions are implemented, according to IEA projections, as shown in Figure 4 (2016b).

However, while the current low carbon tax rate cannot be expected to bring about reduced CO₂ emissions in power generation, the incentive effect of the tax and its impact on CO₂ emissions and low-carbon investment may change significantly in the future if the tax rate is increased and the tax base broadened to include natural gas.

2.3.3 Social impacts

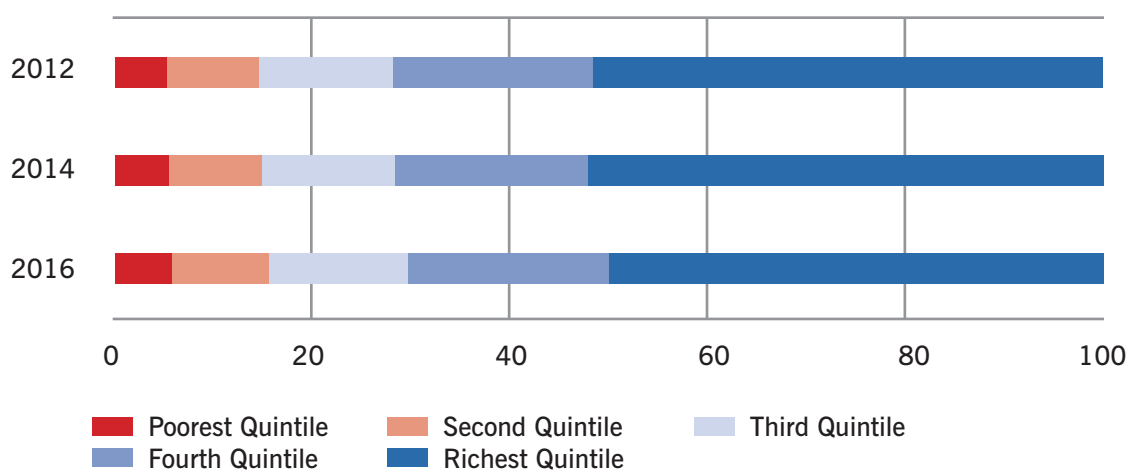
In Mexico in 2016, 34.8% of the population were living under the upper-middle income poverty line of USD 5.50 a day and the Gini coefficient was estimated at 43.4 (World Bank 2018b). An analysis of income or consumption by income quintile reveals an extremely unequal distribution, with the richest quintile accounting for over 50% of total income, and the poorest just 5.7% in 2016, as shown in Figure 2.5.

It is difficult to find robust impact analysis of the carbon tax on the energy sector. In

countries with comparatively unequal income distribution, such as Mexico, transport fuel taxes are often in effect luxury taxes (see Chapter I). Hence, given the unequal income distribution in Mexico, it is likely that the direct impact of the carbon tax on transport fuels would be that of a “luxury tax”, affecting high-income households far more than the poorest quintiles. This conclusion is backed up by at least one report, which indicates that carbon taxation and fuel excises on gasoline have had a progressive effect, with 52% of the tax being paid by the richest income quintile (Cespedes 2015). This is also in line with well-established findings that transport fuel taxes tend to be progressive in almost all countries.

On the other hand, given the high incidence of poverty and income inequality in the country, relatively minor adjustments in domestic energy prices and transport fuel prices in Mexico have the potential to have a significant impact on household spending in the two lowest income quintiles. Nonetheless, potential negative impacts from the carbon tax can be expected to be relatively limited on the whole – first, because the carbon tax

Figure 2.5: Distribution of income or consumption by quintile in Mexico



Source: World Bank 2018b

makes up less than 1% of the price of transport fuel and second, due to the zero-rating for natural gas, which means that the carbon tax also has a very limited impact on domestic energy prices (Arlinghaus and van Dender 2017). In 2016, 59% of non-road energy use was not taxed at all (natural gas and kerosene), while a further 37% was subject to an effective carbon tax rate of between 0-5 EUR per tCO₂ (Arlinghaus and van Dender 2017). Thus, the carbon tax is not likely to have had negative impacts on domestic household income, or to have had a significant negative effect on the poorest households.

Energy sector reforms did result in the “Gasolinazo” protests in January 2017. However, they appear not to have been linked to the carbon tax, which was set at too low a rate to provoke mass protest. At first, when fossil fuel subsidies were phased out in 2014, the impact on household incomes was minimal, as falling crude oil prices and ongoing price regulation ensured that fuel prices did not rise. Fluctuating oil prices, a falling exchange rate, inflation and continuing deregulation resulted in sudden fuel price increases of 14-20% within the space of a month in January 2017. In response, protests broke out.

It is notable that the revenues from the carbon tax are not used to compensate poorer households, nor to create employment or invest in other measures to drive inclusive growth. As a result, the equity impacts of the carbon tax appear to have been broadly neutral, while energy sector reforms had a negative impact on social equity and household incomes by early 2017. Had the negative equity impacts of energy sector reform been mitigated with additional welfare measures, the Gasolinazo protests might well have been prevented.

2.3.4 Economic and fiscal impacts

No detailed analysis of the macro-economic impacts of the carbon tax has been undertaken. Industry organisations opposed the tax, but provided little robust analysis to support their claims that competitiveness would be reduced (see e.g. Cespedes 2015).

The tax has also been criticised due to concerns that the low rate would not drive investment in renewable energy. However, energy sector reforms have introduced several market instruments which aim to create long-term certainty for investors. They included the introduction of clean energy certificates, providing a source of income for clean energy producers, and long-term contracts for power producers, specifying fixed prices per unit of electricity for clean energy generation to make up for the low carbon tax rate, which has not incentivised investment in low-carbon energy (IEA 2016b). While not the most economically efficient approach, introducing additional measures alongside a carbon price is common in many countries to guarantee the price of renewable electricity, and thereby guarantee a return on investment, which can reduce the overall costs of transition and mitigate opposition.

The carbon tax in Mexico raises revenues worth about USD 1 billion per year – equivalent to less than 0.1% of Mexico’s GDP, or about 0.3% of total tax income (Arlinghaus and van Dender 2017). Revenues could be boosted by broadening the tax base to include natural gas, and by increasing the tax rate. Revenues are not earmarked, but flow into the general budget and are not used to improve social welfare.

2.3.5 Conclusions

In Mexico, the carbon tax was too low to have a significant impact on climate mitigation, or on social equity. Nonetheless, the tax and associated reform in the energy sector represent an important shift away from subsidising of fossil fuels towards their taxation. Reform of fossil fuel subsidies in the energy sector was implemented without sufficient attention to the need for social compensation to protect the poor from the direct and indirect impacts of price increases. This failure resulted in protests in January 2017 and may jeopardize the sustainability of the reform in the future.

2.4 ENVIRONMENTAL TAXES TO REDUCE SO₂ EMISSIONS IN CHINA

2.4.1 The political context

In the 2000s, reducing air pollution in general and SO₂ pollution in particular was becoming a matter of increasing political urgency in China, as the serious impacts of atmospheric SO₂ and other pollutants on air quality and the role of SO₂ as a contributor to particulate matter (PM) became more widely known and understood. In 2008, PM concentrations in 111 Chinese cities contributed to more than 280,000 premature deaths and 680,000 cases of chronic bronchitis, at a cost of more than USD 29 billion annually (Zhang et al. 2008). In the mid-2000s, the Ministry of Environmental Protection estimated that the economic cost of acid rain resulting from SO₂ emissions amounted to USD 13 billion annually (quoted in Schreifels et al. 2012).

The necessity to respond to the severe impacts of air pollution was reflected in China's 10th five-year plan from 2001-2005, in which the central government set national targets to

reduce SO₂ emissions to 10% below average emissions in 2000. Part of these efforts included the reform of the pollution levy on SO₂.

There had been pollution levies in place in China since the 1970s and in the 1987 Law on the Prevention and Control of Atmospheric Pollution, local governments became responsible for air pollution control within their jurisdiction, including the enforcement and collection of pollution levies. However, when these were introduced, they were only payable on "excessive discharge" of pollution, were poorly administered and had thus proven to be ineffective instruments for pollution control. In view of the ambitious targets of the 10th five-year plan, in 2003, pollution levies were reformed and subsequently applied to all pollution discharge. However, even under this system, the levy on SO₂ remained ineffective, as the tax rate of CNY 0.63 / kg SO₂ was lower than the average abatement cost, making it cheaper for enterprises to pay the fee than take action to abate SO₂ emissions (Jin et al. 2016).

A further step was taken to drive SO₂ emissions reductions in 2003: Preferential grid prices for desulphurised electricity worth RMB 0.015 per kWh – roughly 0.2 Euro cents – were introduced to help fund technological improvements and incentivise the installation of flue gas desulphurisation (FGD) technology. However, neither the pollution levy nor the differentiated grid price for desulphurised electricity was sufficient to drive emissions reductions. Efforts to tackle air pollution were unsuccessful and in the 5-year period from 2000-2005, SO₂ emissions increased by about 28%.

Higher levels of political commitment at central government during the 11th five-year plan to address this deficit resulted in increased pressure on local government to take

action and enforce environmental taxes and regulations and so bring about SO₂ emissions reductions (Jin et al. 2016). The 11th five-year plan – from 2006-2010 – also proposed a 10% reduction, this time on 2005 levels, but introduced a number of additional measures to bring about emissions reductions, including a higher pollution levy, penalties for low operating rates for FGD technology, improved environmental policy governance, and better monitoring and enforcement (Schreifels et al. 2012).

In 2007, a number of changes to environmental taxes on SO₂ emissions were introduced. First, the preferential grid prices introduced in 2003 were complemented by the introduction of penalties of RMB 0.015/kWh for plants operating FGD technology only 80-90% of the time, and a higher penalty of RMB 0.75/kWh for plants operating FGDs less than 80% of the time (Schreifels et al. 2012). This modification was enabled by the introduction of continuous emissions monitoring systems, which meant that the actual performance of power plants could be monitored, whereas before the green premium for desulphurised electricity had been paid if an FGD was installed.

Second, the pollution levy on SO₂ emissions was doubled to RMB 1.26 / kg SO₂, equivalent to EUR 0.16 / kg SO₂. Prior to this rate increase in 2007, the levy was lower than the average cost of abating SO₂ emissions (RMB 1.2 / kg) – making it cheaper to pay the levy than take steps to reduce SO₂ pollution. Prior to 2007, the 80% of revenues from the pollution levy recycled to firms, theoretically to abate SO₂ emissions, were often used for other purposes.

These two environmental taxes made it economical for power stations to install desulphurising technologies (it was cheaper to

install the technology than pay the levy) and thus created an incentive for power producers reduce SO₂ emissions.

In 2007, steps were also taken to improve the enforcement and monitoring of emissions – including shifting responsibility from local Environmental Protection Bureaus to the national level, at the Ministry of Finance; installing better infrastructure for emissions measurement; and making transfer of real-time data monitoring emissions to government mandatory (Schreifels et al. 2012). The agencies responsible for monitoring emissions and improved monitoring systems were also restructured. Pressure on provincial governments to enforce emissions reductions were increased, and Environmental Impact Assessments submitted by provinces or firms were rejected if interim SO₂ reduction targets had not been met. Lower electricity prices paid to small installations created incentives for them to close. Between them, these measures resulted in significant SO₂ emissions reductions.

2.4.2 Environmental effectiveness

The SO₂ emissions reduction target of the 11th five-year plan – 10% on 2005 levels by 2010 – was overreached as a result of the measures implemented. In 2010, SO₂ emissions had fallen by 14.3% overall and by 23% in the power sector. Economy-wide emissions fell by 2.8% annually, while SO₂ intensity and emissions rates of coal-fired power plants fell by 10%. Iron and steel production and metal smelting were the only sectors that saw SO₂ emissions increases in 2005-2010. By 2010, after investments worth more than USD 2 billion, 86% of coal power stations had installed FGD technology, on average in use just under 80% of the time, whereas in 2005 only 14%

of coal power plants had FGDs. Overall, savings due to reduced environmental damage from SO₂ emissions are estimated to be worth about USD 5 billion annually (all data quoted in Schreifels et al. 2012).

This success was in part attributable to the fact that abatement capacity for SO₂ emissions in the power sector was very large, prior to the reforms. FGD technology could easily be installed in larger power plants and their performance improved over time with the co-operation of just five large state-owned enterprises (Jin et al. 2016).

At the same time, however, air pollution problems have remained serious in the country. The environmental measures examined here were successful in addressing SO₂ emissions in the power sector – which compensated for SO₂ emissions increasing in the iron and steel and metal smelting sectors. From 2006-2010, at the same time as SO₂ emissions were reduced, coal consumption increased by 40%. While the objective of the measures targeting SO₂ in the power sector was achieved, other environmental and climate problems were not addressed.

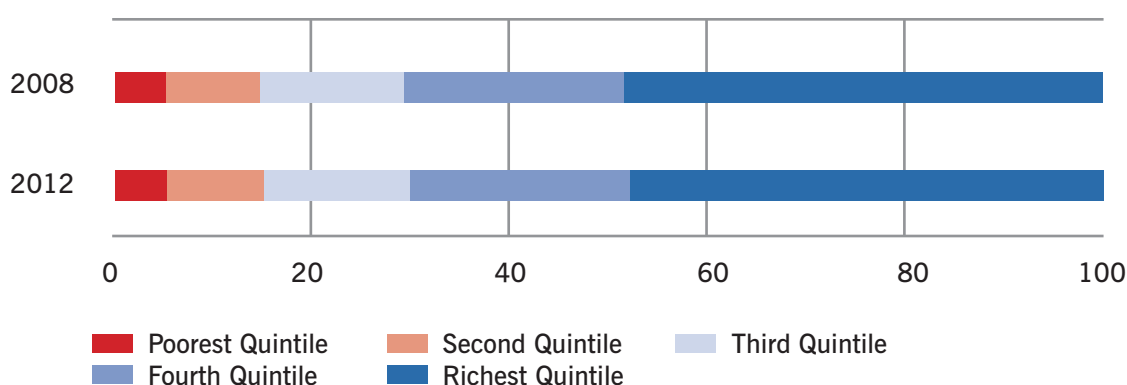
Since 2010, the Chinese government has become increasingly committed to improving environmental quality. In 2013, in response to severe air pollution in many cities, the government published a National Action Plan on Air Pollution Prevention and Control. In its 2015 NDC, China pledged that CO₂ emissions will peak by 2030, while making its best efforts to peak earlier, and to lower CO₂ emissions by unit of GDP by 60-65% from 2005 levels by 2030 (GoC 2015). In 2017, China was the single largest investor in renewable energy and accounted for 45% of global spending (Frankfurt School, UNEP, BNEF 2018). Moreover, many of the measures being implemented in the country to achieve these objectives are

market-based instruments, including taxes on vehicles, transport fuels, resource extraction, energy and pollutants. Since 2014-2015, China has piloted emissions trading systems in 7 provinces and will create the world's largest carbon market when a national system is launched, following a pilot phase in the power sector (Carbon Brief 2018). The country also launched an Environmental Protection Tax in January 2018 on noise, air and water pollution and solid waste, targeting public institutions and business, expected to raise USD 7.7 billion annually (GoC 2018).

2.4.3 Social impacts

In China, the power system is highly regulated, meaning that electricity prices at the generation, transmission, dispatch and end-use retail are set and controlled by central government. Electricity prices are regarded as a way of achieving policy goals, rather than as a mechanism to link demand and supply (Zhang and Qin 2015). Hence, the cost of the penalties paid by power plant operators due to the production of sulphurised electricity, and the cost of pollution levy payments, both of which resulted in an increase in the production cost of electricity, were not reflected in the end-use pricing regime and thus not passed through to electricity consumers in China (Zhang and Qin 2015). For this reason, there were no direct social equity impacts resulting from the pollution levy and the SO₂ premium / penalty system between 2005 and 2010.

However, subsidy benefits in the electricity sector were captured far more by wealthier households than by poorer households, with the wealthiest 10% consuming 25% of total electricity on average in the 2000s (Zhang and Qin 2015). In 2012, China had a Gini co-

Figure 2.6: Distribution of income by quintile in China

Source: World Bank 2018b

efficient of 40.2, a reflection of the inequitable income distribution shown in Figure 2.6. Such figures highlight the potential for policy amendments to enhance social equity in the country by introducing fairer electricity prices and targeting subsidies or social protection measures to those in need. A tiered electricity pricing system piloted in almost all regions in 2012, may, in time, address this issue, if implemented alongside effective compensation and / or welfare mechanisms for the poorest households.

2.4.4 Economic and fiscal impacts

Given the strict regulation of electricity prices at government level, there were no direct impacts on GDP growth as a result of the premium/penalty system or the pollution levy on SO₂ in the electricity sector. Between 2006 and 2010, electricity generation increased by 80% and GDP growth by 115% (Schreifels et al. 2012). At the same time, however, the pricing premium and pollution levy failed to take advantage of the heterogeneity of abatement costs between different sectors and different regions in China and thus, op-

portunities to cut SO₂ at the lowest possible cost were missed (Jin et al. 2016).

In terms of fiscal impact, the Ministry of Finance normally submits proposals to the National People's Congress on how to spend revenue from the pollution levy on environmental protection. The price premium paid for desulphurised electricity is in effect a green subsidy, which may have been compensated for by the payment of penalties for SO₂ emissions attributable to the limited functioning of FGD devices following reforms in 2007.

2.4.5 Conclusions

The political commitment expressed by the government in relation to the reduction of SO₂ emissions, along with the creation of a binding target for emissions reductions, ensured that provincial governments and the managers of state-owned power plants took the targets of the 11th five-year plan seriously. Targeting SO₂ specifically was also a factor in the success of the environmental taxes examined here.

The package of measures implemented addressed the various barriers to SO₂ emissions reductions with concrete policy actions, such

as improved governance, enforcement and monitoring, a focus on actual performance rather than the installation of FGD technology, and the creation of meaningful price incentives in favour of reduced SO₂ emissions. Getting the price right for SO₂ emissions was crucial: The increase in the pollution levy rate meant that it was cheaper for power plants to install FGD technology than not.

In economies where prices are regulated, an upstream tax on a pollutant associated with energy production – such as SO₂ or CO₂ emissions – will not necessarily have any impact on downstream end users. In such countries, the impact on poorer households of an environmental tax is less of a concern than in economies where energy prices are totally unregulated and all price changes can be passed through to domestic consumers.

2.5 ENVIRONMENTAL TAXES IN LOW-INCOME COUNTRIES

There is insufficient literature and data available on the impacts of environmental taxation in low-income countries (LICs) to analyse one specific environmental tax instrument as a specific case for this report. Therefore, this section examines a number of cases for which limited data exists to extrapolate some general conclusions on the application of environmental taxation in LICs.

The sections below examine the impacts of both environmental taxes – which have an environmental objective and also an environmental effect – and environmentally related taxes, levied on a tax base that is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment (see Chapter I). This approach has been taken for two reasons. First, because LICs tend to implement environmentally related taxes, rath-

er than taxes with an explicit environmental objective – although this does not mean that these instruments have not had an environmental impact. Second, there is a lack of research and robust data available on both types of instruments in LICs and their impacts on the environment, social equity and the economy. Thus, this approach broadens the number of cases available for the analysis.

2.5.1 Low tax to GDP ratios and institution building

On average, tax revenues and social insurance contributions amounted to 13.4% of GDP in 27 LICs in 2016 (ICTD 2018). This average masks some relatively high outliers, with tax-to-GDP ratios of over 20% – Mozambique, Senegal, Tajikistan and Zimbabwe – and a total of six countries with tax-to-GDP ratios of less than 10%, including 5.67% in Chad and 1.29% in Somalia, as well as seven countries with no available data on tax-to-GDP ratios.

This is in stark contrast to high-income countries (HICs), which have an average tax-to-GDP ratio of 28.0%, including social insurance contributions. The highest tax-to-GDP ratios amongst HICs are in France (45.3%), Belgium (44.2%) and Sweden (44.1%). This average again masks outliers in the Middle East: Bahrain, Kuwait, Oman, Qatar and Saudi Arabia all have tax-to-GDP-ratios of less than 5% (ICTD 2018).

There are several underlying reasons for these lower tax-to-GDP ratios in LICs. Weak institutions and poor governance limit the capacity of governments in LICs to implement taxation, while perceived corruption and lack of transparency may undermine willingness to pay tax. The political will to build capacity and improve fiscal governance are often

lacking. In addition, dependence on overseas development aid may reduce incentives to make unpopular policy choices, such as the implementation of tax increases (Besley and Persson 2014). A large shadow economy often prevents the collection of direct personal income taxes (PITs) in LICs – indeed, in some countries PITs are largely absent, due to lack of administrative capacity. On average, less than 5% of the population in so-called developing countries pays PIT, generating 1-2% of GDP (Carnahan 2015).

Due to low revenue collection from PITs, corporate income taxes (CITs) tend to be correspondingly of greater importance in developing countries and LICs, with CIT revenues typically amounting to between 1.5-3% of GDP in developing countries (Carnahan 2015). At the same time, multinational corporations often evade taxes by shifting their profits to countries with low taxation regimes (so-called tax havens), thus eroding the tax base in other jurisdictions where they do business (base erosion profit shifting, BEPS). LICs are often least able to respond to such problems, as they have weak revenue administrations and poor processes of fiscal governance, but at the same time, are amongst those countries which can least afford to have their corporate tax base eroded.

Lower tax-to-GDP ratios in LICs severely restrict the capacity of governments to tackle these shortfalls in fiscal governance and to invest in measures for poverty reduction, infrastructure, healthcare, education, or green economy transition. Thus, poor fiscal governance has significant implications for policy making.

However, low tax-to-GDP ratios also indicate that there may be potential in LICs for environmental taxes to boost fiscal space and improve fiscal governance. Revenues

from environmental taxes can facilitate higher levels of spending for the achievement of Sustainable Development Goals (SDGs) – an important commitment made by all signatories to the Addis Ababa Action Agenda (see Chapter I). In addition, a stronger focus on taxation and domestic revenue mobilisation could contribute to state building processes and generate a ‘governance dividend’ in LICs, by fostering the citizen-state relationship and creating a shared interest in it (see e.g. Carnahan 2015). The degree to which environmental taxes has met these potentials is discussed below.

2.5.2 Environmentally-related taxes in Low Income Countries

There is little data available on environmental taxation in LICs. Daniel Slunge and Thomas Sterner published research in 2010, which provides an overview of the implementation of Environmental Fiscal Reform in East and Southern Africa, particularly in relation to equity impacts (Slunge and Sterner 2010). While LICs were not a particular focus of this research, many of the countries in the region remain LICs in 2018, and the findings remain relevant to LICs in the region.

Slunge and Sterner found that nearly all countries in East and Southern Africa levy environmentally related fuel taxes on petroleum products. These are typically higher for gasoline and lower for diesel, used for public transport and in agriculture, and kerosene, which is often used as a cooking fuel. They also impose vehicle taxes and annual circulation charges, often related to cylinder capacity, e.g. in Ethiopia and Tanzania.

Taxes and fees on natural resource use are common, although the latter tend to be purely revenue-raising instruments, rather than tax-

es with an environmental objective. Natural resource taxes and royalties levied on mineral extraction are frequently implemented, e.g. in Malawi and the Democratic Republic of Congo. Artisanal miners tend to be unlicensed and thus are not taxed. Taxes on plastics are also prevalent, e.g. plastic bag taxes in Tanzania and Uganda.

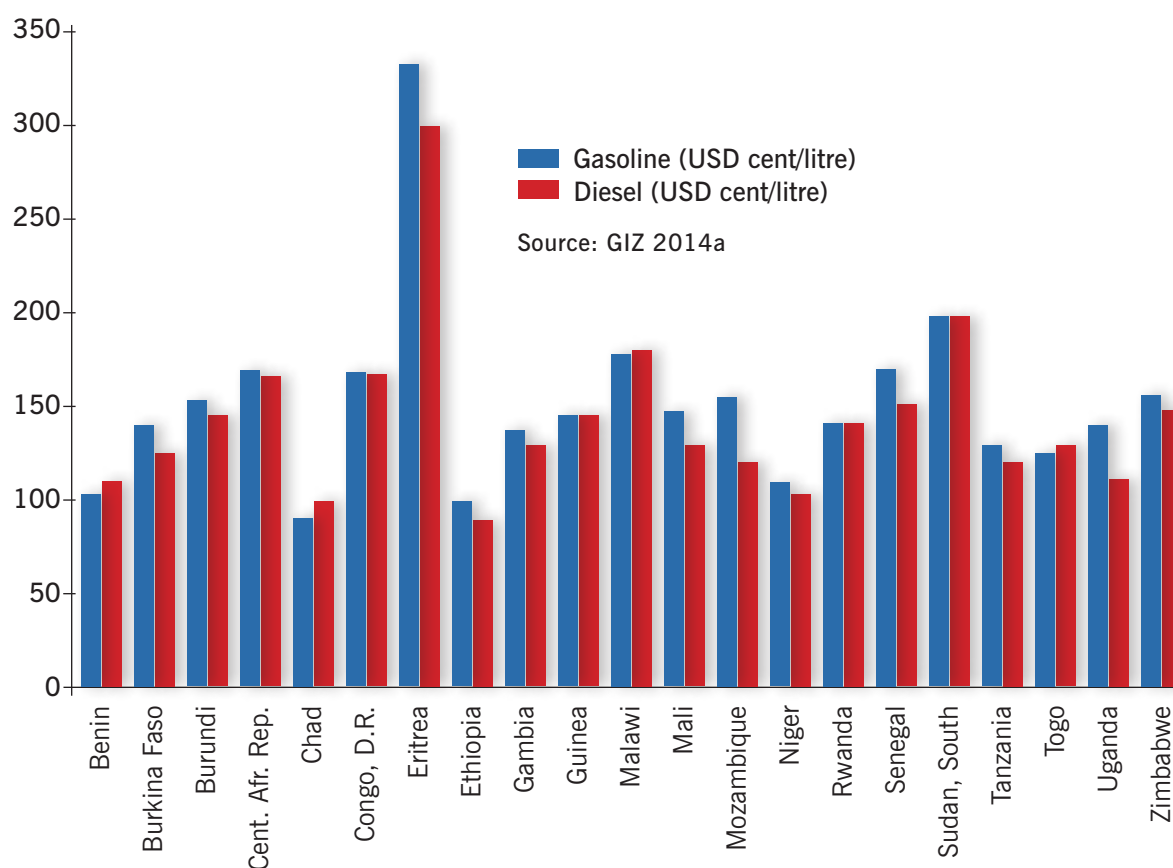
Fisheries are also subject to fiscal measures, e.g. by means of fishing vessel permits, sales taxes levied on fish sales, and taxes on fish exports. Royalties are levied on timber extraction, and taxes on timber volumes. User fees on electricity and water services are common, although these usually also include a lifeline tariff for low-income households or progressive tariffs based on the amount of electricity or water consumed. Finally, some

LICs levy wastewater fees targeting pollutant emissions (for details of these measures, see Slunge and Sterner 2010).

2.5.3 Environmental tax revenues in LICs

As in OECD countries, the highest proportion of environmentally related tax revenues in LICs tends to be attributable to transport fuel taxes. In Tanzania, for example, motor vehicle taxes, excise on petroleum and fuel levies accounted for 18.5% of total tax revenue in 2009. This is far higher than is typical in OECD countries. However, on a per capita basis revenues from environmentally related taxes are low in comparison to OECD (GIZ 2014b). The GIZ survey of international fuel

Figure 2.7: Fuel prices in selected Low-Income Countries in 2014 in USD per litre



prices reveals that 11 LICs tax gasoline and 9 LICs tax diesel at a rate commensurate to using taxes to generate revenues and encourage efficiency in the transport sector. These taxes generate a final consumer price of more than USD 1.42 for gasoline and USD 1.39 for diesel, as shown in Figure 2.7 (GIZ 2014a).

At the same time, some LICs have high taxes on vehicles. In Uganda, for example, an environmental levy on imported vehicles which are over 8 years old, has proved to be an important source of revenue, raising USD 8.6 million in 2006 and 2007, and USD 13 million in 2008, when the rate of the tax was doubled (UNDP/UNEP n.d.).

Fisheries taxation generated 4% of total tax revenues in Mozambique in 2003, but just 1% in Tanzania in the same year (Slunge and Sterner 2010). Uganda's Sustainable Fisheries User Levy on domestic fishers generated USD 2.46 million in 2005, or 0.03% of GDP (GIZ 2014b).

In many LICs, a large proportion of fisheries revenue stems from licenses, fees, fines and compensation funds from the European Union or other distant water fleets, rather than from domestic fishers. In some countries, these revenues make up a significant proportion of the total, e.g. 30% in 2001 in Guinea Bissau (OECD 2005b). However, LICs face a number of challenges in negotiating access rights and monitoring distant water fleets, from e.g. the EU or China, in their waters. Thus, although many African LICs depend on fisheries revenues, it is by no means obvious that the quotas allocated and the level of financial compensation secured by these countries is appropriate.

With regards to environmental taxes in the forestry sector, governments in both low- and middle-income countries face substantial challenges in enforcement and monitor-

ing. For example, a Public Environmental Expenditure Review in Tanzania in 2004 revealed that USD 58 million were lost annually due to under-collection of forest product royalties (GTZ 2008).

A 2005 World Bank study of Mozambique estimated that revenues from fisheries, forests, mining and agricultural land could be increased from 5% in 2003 to 19% of total tax revenues by 2015, if appropriate environmental taxes were introduced (World Bank 2005b). Environmental tax revenues have not increased in the meantime, however, and the 2005-2010 Public Environmental Expenditure Review highlights ongoing weaknesses in revenue collection, lack of targeted tax instruments, and poor allocation to environmental policy priorities (MCEA 2012).

In general, LICs struggle to raise tax revenues on natural resource extraction. This is in part due to poor governance and lack of fiscal capacity on the part of LIC governments and the negative impacts of tax competition, tax avoidance, trade mispricing and VAT evasion on the part of multinational enterprises (MNEs). Recent estimates suggest that the African continent loses at least USD 50 billion annually in illicit financial flows (UNECA n.d.).

Environmental taxes may be part of the solution to these challenges, as they are comparatively difficult to evade (for details see Chapter I and Liu 2012). Possible ways for resource-rich LICs to boost revenues from natural resource taxes include increasing royalties levied on mining and resource extraction to compensate for lost CIT revenues, because royalties are harder to evade than CITs and may be used to finance environmental rehabilitation following mining operations. In such cases, royalties should be balanced with other sources of revenue to avoid dependen-

cy on revenues from natural resource extraction, which renders countries vulnerable to global resource price volatility and has a relatively poor record in enhancing prosperity and fostering sustainable development.

2.5.4 Environmental impacts

Impacts of transport fuel taxes and vehicle taxes

Many of the instruments listed above were implemented with the objective of raising revenue, rather than bringing about environmental improvement. In Tanzania, for example, transport taxes are not imposed with the objective of bringing about environmental improvement. None of the revenues from these taxes are earmarked for environmental protection or conservation, with just 0.17% of the total budget spent on the environment in 2009-2010 (GIZ 2014b). Nonetheless, due to high tax rates, these instruments create a real incentive to improve efficiency and reduce fuel consumption. Similarly, the impact of high fuel taxes in LICs shown in Figure 2.7 are very likely to have had impacts on efficiency and fuel consumption, although little reliable data is available to quantify these impacts.

The efficacy of vehicle taxes may be limited in LICs, due to the inability of the majority of potential vehicle purchasers to cover the upfront cost of cleaner alternatives, even if such vehicles are taxed at a lower rate. For example, in Uganda, a 10% environmental levy on the value of used vehicles more than 8 years old was introduced in the 2005/6 budget, and increased to 20% in 2008. Nevertheless, this did not reduce purchases of older vehicles, as the price of newer, less polluting vehicles remained too high for many and thus, substitutions were very limited (Mabasi 2009). In this

case there was a clear trade-off between environmental effectiveness and fiscal impact – the limited environmental impact of the levy resulted in it raising USD 8.6 million in 2006 and 2007, and USD 13 million the following year (UNDP/UNEP n.d.).

Impacts of natural resources, fishing and forestry taxes

In the case of fisheries, there is evidence that revenues from Uganda's Sustainable Fisheries User Levy have been used to initiate a long-term shift towards sustainable fishing by improving management practices and covering management costs (GIZ 2014b). This levy is complemented by a permit system for fishers, which also raises revenues through user fees. The Sustainable Fisheries User Levy takes the form of a royalty of 2% charged on the value of all fish exports. Roughly USD 2.5 million is collected annually, of which 20% flows into the general budget. The remainder is used to improve management practices and cover management costs, such as research, monitoring, surveillance and enforcement (Mabasi 2009).

On the other hand, despite significant amounts of environmental tax or levy revenues raised in some LICs in West Africa, it has been estimated that 50% of all marine fisheries in the region are overfished. Thus, in LICs the environmental impacts of environmentally related taxes are unclear. Overfishing is not attributable to a single factor, however. Overfishing is likely due to the unfavourable nature of the Fisheries Partnership Agreements, which e.g. give the EU fishing rights in African, Pacific or Caribbean waters in exchange for technical and financial support. In 2011, the EU fleet caught 400,000 tonnes of fish in foreign waters through such agreements, of

which 240,000 tonnes were supplied to West African countries. The 160,000 tonnes supplied to the EU in the same year have been valued at EUR 320 million (Worrell and Mendez-Parra 2017). Thus, such agreements result in substantially reduced fisheries revenues in signatory countries and considerably less foreign exchange than if African, Caribbean or countries exported the fish themselves. Such agreements are also problematic as there is a risk that they export the problem of over-fishing from the EU to elsewhere (Worrell and Mendez-Parra 2017). As low-income and indeed middle-income countries may have poorer enforcement and monitoring than EU countries, there is also a greater risk that they fail to prevent large-scale illegal, unreported and unregulated fishing in deep waters (Worrell and Mendez-Parra 2017).

It has been estimated that ‘taking back control’ of fisheries from foreign investors and preventing illegal, unreported and unregulated fishing in West African waters could create over 300,000 jobs, equivalent to a 10% increase in the local workforce, and thus potentially raise additional tax revenues, boost sustainability of fisheries, and have a positive impact on nutrition in the region (Worrell and Mendez-Parra 2017). In some LICs, partnership agreements earmark a certain proportion of revenues for enhanced control and surveillance – for example, in Senegal, revenues have been earmarked to support conservation of fish stocks (OECD 2005b). These can reasonably be expected to have a positive environmental impact.

As a general rule, taxes on natural resource extraction tend not to be levied for environmental purposes in LICs and do not have positive environmental impacts. LICs struggle to raise tax revenues on natural resource extraction commensurate to the external costs of

environmental degradation and / or human health impacts.

Although there is a wide body of evidence that environmental taxes can enhance sustainable forest management, there has been little research conducted to look at these impacts in any detail in LICs. Environmental taxes in the forestry sector tend to be rather complicated in LICs and consist of several instruments – stumpage fees, felling taxes, charges on extraction of specific species, taxes by area or volume of timber, and export taxes by volume and species. Taxes may remain in place for long periods of time without adjustment or review, e.g. the tax rate on timber extraction by volume – the *permis de coupe* – in Benin, which was not adjusted for more than 30 years between 1974 and 2005, and thus devalued over time as a result of inflation (GTZ 2005). Enforcement is often weak, due to poor fiscal governance, lack of capacity, and corruption.

LIC governments face additional challenges when implementing environmental taxation in the forestry sector due to lack of available capital in the economy. Hence, if environmental taxes are levied on forestry products upstream, i.e. at the start of the value chain, this can increase the price of forestry products further down the value chain and result in smaller businesses and private households turning to the informal sector. Hence, in many cases, the environmental effectiveness of environmental taxes in the forestry sector is uncertain.

2.5.5 Social impacts

Tax on transport fuels and vehicle taxes

In terms of revenue raised, the most important environmental tax measures in LICs in

the region tend to be transport taxes. As discussed in Chapter I, particularly in countries with comparatively unequal income distribution, transport fuel taxes are often in effect luxury taxes and thus, it is by no means obvious that they will have negative equity impacts. Indeed, transport fuel taxes have been shown to be strongly progressive in African and large Asian countries, as well as in Turkey, Chile, Mexico, Costa Rica and Brazil (Morris and Sterner 2013).

In LICs, it is relatively obvious that higher income quintiles consume higher volumes of transport fuels, as only they have sufficient financial means to own private vehicles. Poorer quintiles cannot afford such luxury goods. Thus, any negative impacts on poorer income quintiles tend to be as a result of indirect effects on the price of public transport and food. In Ethiopia, an LIC for which an in-depth analysis of the impact of environmental taxation of transport fuels has been conducted, the richest income decile spends around 2% of income on kerosene, while the poorest decile spends just over 1% (Slunge and Sterner 2010). At the same time, there is evidence from an analysis conducted in the 2000s in Kenya – a low-income country – that fuel taxes were broadly progressive in the country, even taking both the cost of public transport and fuel tax increases into account (Slunge and Sterner 2010).

Similar studies elsewhere have demonstrated that even when both direct and indirect uses of fuels are taken into account, fuel taxes in LDCs remain progressive, although the progressive impact is weakened as a result. If kerosene is taxed at the same time as diesel and gasoline – to prevent fuel adulteration – this also weakens the progressivity of the tax, but does not reverse it (Slunge and Sterner 2010).

The impacts of taxes on natural resources, fishing and forestry

There is little data available on the social impacts of environmental taxes in these sectors. Very often, taxes are not introduced at a sufficiently high rate to have a negative impact on social equity. The general comments made in Chapter I on the social equity impacts of these environmental taxes also apply to LICs. In any case, assessing the equity impacts of environmental taxes has to take place on an instrument- and country-specific basis. Such analyses have been conducted in the transport sector in LICs, but similar data is not readily available for other sectors. This is certainly an important area for further research in the future.

2.5.6 Economic and fiscal impacts

There is very little data on the economic and fiscal impacts of environmental taxes specifically in LICs in the public domain. Isolating the impact of environmental taxation in a complex policy environment is challenging, even in countries with higher regulatory capacity. Thus, definitive statements on the economic and fiscal impacts of environmental taxes in LDCs cannot be made. In other countries, there is evidence that environmental taxes have at best a positive impact on GDP growth in comparison to a business as usual scenario, and at worst, have a less negative impact than other direct and indirect taxes (Vivid Economics 2012). The fiscal impacts and revenue-raising potential of environmental taxes are discussed in Chapter I.

2.5.7 Conclusions for low-income countries

While inventories of environmental taxes do exist, there is little robust data available on the environmental, social and economic impacts of environmental taxes in LICs.

An obvious concern in LICs in particular is the extent to which environmental effectiveness may be compromised due to low ability to pay for alternative goods or services. Sound policy design can address this problem by providing low-cost loans or grants to enable substitutions. However, if complementary measures are not implemented, consumers may have no option but to pay the higher price. Thus, in LICs in particular it is essential that policymakers take social equity impacts into account and introduce compensation packages to mitigate the possible negative impacts of higher prices.

There is potential for the environmental taxation and tax justice agendas to exploit synergies in LICs, if environmental taxes are used to mobilise additional domestic revenues to invest in public services and improve fiscal governance. Alongside the implementation of anti-tax avoidance and anti-tax evasion measures and the strengthening of tax administrations, introducing hard-to-evade environmental taxes might be a good policy response to raise revenues.

This is particularly relevant to low-income countries because environmental taxes tend to be difficult to evade, as they are generally levied on immobile tax bases, such as energy consumption, agricultural inputs, carbon emissions and waste, and on goods and services which tend to have prices which are relatively transparent (Cottrell et al. 2016; Fay et al. 2015; Liu 2013). In countries with high rates of tax evasion, carbon-energy taxes more than pay for themselves as a result

of improvements in the efficiency of the tax system (Liu 2013). Moreover, recycling mechanisms for environmental tax revenues may reduce the gap between the tax burden in the formal and informal sectors and thus encourage MSMEs to enter the formal sector (Fay et al. 2015). However, this thesis merits further research before any conclusions can be drawn.

Robust data and strong evidence demonstrating the positive environmental impact of environmental and environmentally related taxes in LICs is relatively scarce. Nonetheless, experience in both developed and developing countries has shown that environmental taxes can deliver environmental improvement and halt degradation (Cottrell et al. 2016).

Environmental degradation and its impact on populations in terms of both health and prosperity is a very significant challenge faced by LICs. A large proportion of the population are typically dependent on natural resources, such as forestry and fisheries, for their livelihoods. Hence, improving environmental quality and reducing degradation can have a positive impact on social well-being and foster sustainable pro-poor development.

Environmental and resource taxation requires the allocation of property rights and can thus serve to clarify previously incomplete rights regimes. It could deliver higher levels of protection against environmental externalities and overuse of resources, while harvesting rents from natural resource use (Slunge and Sterner 2010).

In LICs, poor collection rates due to a lack of monitoring and enforcement, combined with low tax rates, have kept environmental and natural resource taxes far below optimum levels. Considerable potential exists to increase tax revenue by implementing such taxes effectively and increasing environmental tax rates. While acknowledging that LICs

face significant challenges in the implementation of effective taxation policies, environmental tax revenues could play a role in increasing domestic revenue mobilization. Indeed, it may be possible for LIC governments to exploit win-win opportunities by imple-

menting environmental taxes – reducing environmental degradation while improving governance and increasing the tax take at the same time. Ways in which this can be done are investigated in more depth in the concluding chapter of the report.

PART THREE: CONCLUSIONS

3.1 LESSONS LEARNED

Lack of robust data and in-depth research and analysis is a major challenge when undertaking a desk study of environmental taxation in developing countries. Although information is available in relation to the design of instruments that have been implemented, and their tax rates, policy impact assessments are not often available in the public domain. Understanding the environmental, social and economic policy impacts of environmental taxes in developing countries necessitates further in-depth research, analysis, and ex post econometric modelling to better understand which of these impacts are directly related to environmental taxation, and which are the result of other factors.

Given the inequality of contributions to pollution – the wealthiest 10% of the global population are estimated to be responsible for 40-51% of total global CO₂ emissions, while the poorest 50% account for just 11-15% – it is reasonable to anticipate that implementing the polluter pays principle or the user pays principle will ultimately hit the wealthy harder than the poor (Chancel and Piketty 2015). Nonetheless, even small changes in household income can have a negative

impact on poorer households living in poverty, or relatively close to the poverty line and it is important that governments make efforts to protect such households from both direct and indirect price increases.

In the countries covered in this report, environmental taxes did not result in price increases of a magnitude that could have had a significant impact on social equity or household income. Many environmental taxes are levied upstream – at the start of the value chain – and as a result, may not have impacted consumer prices to a great extent. The plastics tax in Morocco is a case in point in this regard, where plastics taxes are levied on plastics upon import, or at the point of manufacture. In countries with planned economies, such as China, electricity prices are regulated in such a way that upstream taxes do not impact households. This is not the case in Vietnam, where energy taxes are imposed downstream, much later in the value chain, on the consumption of transport fuels. In other cases, taxes were levied at too low a rate to have a significant impact on prices, as was the case for the carbon tax in Mexico.

Nonetheless, environmentally related taxes, most notably fuel excise duties, have been

levied at a higher rate in many countries, requiring careful examination of possible equity impacts, or impacts on poor households, on the part of policymakers. For this reason, environmental taxes at higher rates and tax rate increases should also be implemented with care and steps taken to prevent negative social impacts. In such cases, targeted compensation measures or improved social welfare – such as investment in health or education – are likely to be necessary. Although the plastics tax in Morocco did not have any direct negative equity impacts, the case of Morocco highlights the positive impact environmental tax revenues can have when invested in socially inclusive policies.

The Vietnam case exemplified how a sound design of environmental taxes can enable easy policy review and tax rate revision. This in turn ensured the incentive effect of environmental taxes in the medium term, as economic actors modified their behaviour and investment decisions. While tax rate increases were politically comparatively easy to implement in 2015, attempts in 2018 to increase the tax rates, and the tax rate range, were rejected by the National Assembly. Ultimately, improved communication on environmental taxes is necessary in most jurisdictions to enhance acceptance amongst policymakers and state institutions, as well as amongst industrial stakeholders and the general public.

Revenue expenditure can play a very important role in ensuring that environmental taxes are environmentally, socially and economically effective. The plastics tax in Morocco is a case in point – the tax itself was not sufficient to drive the changes seen in the country, but targeted revenue use, with prioritisation of social equity issues, ensured that the package of measures will succeed in achieving the objective of recycling 20% of waste by 2020

and delivered a number of co-benefits at the same time. In Mexico, which did not implement such measures, the carbon tax appears to have been neutral in relation to social equity, whereas if compensation or other measures had been implemented, positive equity impacts may have been the result.

3.2 ENVIRONMENTAL TAXATION AND SOCIAL EQUITY

3.2.1 Four dimensions of inequality

There are many dimensions of inequality associated with environmental policy and environmental taxation. Four of the most important, as identified by Lucas Chancel and Thomas Piketty (2015), are examined in detail in relation to environmental taxation in developing countries in Chapter I. The four dimensions are listed below:

1. Inequality of exposure to environmental degradation
2. Inequality of contributions to pollution
3. Inequality of outcomes resulting from environmental taxation
4. Inequality of representation in policymaking

All four dimensions of inequity correspond to a greater or lesser extent with income inequality. The poorest tend to be more exposed to pollution and are less likely to emit pollution in large quantities – due to lack of access to pollutants and resources as a result of limited income and thus limited capacity to consume. Poorer households are also less likely to be well represented in environmental policy-making processes.

In this study, the focus has been on the third dimension – inequality of outcomes resulting from environmental taxation. In actual fact,

there is little clear evidence of severe negative impacts resulting from price increases associated with environmental taxation in the cases examined in this report. In the Morocco case, this may have been because price changes were per plastic item rather small, and were absorbed higher up in the value chain, rather than influencing the price paid by the consumer. In Vietnam and in Mexico, there was some evidence of a progressive direct impact as a result of the environmental taxes implemented, as they were levied on products that remain for many poor households “luxury” goods, e.g. gasoline. In China, no impacts on household income resulted from taxes on SO₂, due to the regulation of electricity prices. This trend is also evident in the case of LICs. Indirect impacts in particular are difficult to measure, however, and policymakers should take care to monitor not only direct impacts but also the pass through effects of price increases on basic commodities.

These minimal social impacts may be in part attributable to governments in countries with a significant proportion of the population close to the poverty line being (rightly) cautious when it comes to implementing any measure that will lead to increases in energy prices, or in the price of basic household commodities, such as food or water. Lack of capacity to target social welfare measures effectively also feeds into this concern, as in many low-income and lower-middle-income countries, coverage of social compensation schemes does not exceed 50% of the population. As demonstrated in the case of Vietnam, transfers may also be inequitable and poorly targeted, benefitting the wealthy more than the poor. If state resources are limited, the middle classes tend to be better and more able to demand and obtain support from governments at the expense of poor households

(Hallegatte et al. 2016). How this problem can be addressed is discussed below.

3.2.2 Social compensation to address possible negative impacts

Given these challenges, alongside a lack of capacity to collect robust data to measure policy impacts to feed into evidence-based policymaking, how can developing governments increase environmental taxation while protecting the vulnerable?

Clearly, the most preferable solution is to improve capacity to implement and target social welfare schemes accurately. Environmental tax revenues can be used to finance these institutional improvements. Alongside improvements to fiscal governance, introduction of an automatic tax rate escalator, or laws which enable regular tax increases to be introduced relatively easily following review of policy impacts, can help governments to implement higher tax rates over time. While low rates are in place, governments can take steps to develop social protection mechanisms and ensure that they are functioning. Later, when tax rates are increased, poorer households will already be protected by a pre-existing and targeted social safety net.

In the interim, a further possible solution might be to overcompensate. For example, in response to challenges in identifying the most vulnerable, in Iran when fossil fuel subsidies were reformed in 2010, the government provided compensation to 80% of all households. For the poor who had benefitted little from cheap fossil fuels, the compensation represented a large share of their income. While such a broad-brush approach is not recommended, compensation in Iran distributed approximately USD 30 billion directly to the population and so lifted virtually the entire

population out of poverty, leading to widespread acceptance for the reforms (Guillaume et al. 2011). Similarly, if policymakers are ambitious in their implementation of environmental taxation, revenues raised should be sufficient to overcompensate poor households and deliver on other policy goals at the same time.

A further option for countries where there are serious concerns that compensation will not reach the most vulnerable might be to focus on luxury tax bases – those which per se tend to be progressive – such as (carefully selected) transport taxes or taxes on air travel. Identifying which taxes have the potential to be most progressive can be helpful in all developing countries to introduce redistributive taxation, while raising revenues to fund investment in social welfare, institution building and improved financial governance. The cases examined here Vietnam, Morocco and LICs have highlighted the progressive impact of transport fuel taxes and their potential to be introduced as a “luxury tax”.

The design of social welfare mechanisms is also important in terms of social equity impacts, and the efficiency and effectiveness of policy, particularly in relation to the extent to which policy fosters a transition to an inclusive green economy. The International Institute for Environment and Development (IIED) has proposed a hierarchy of possible policy options to better integrate social and environmental policymaking (Raworth et al., 2014):

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.

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.

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.

IIED suggests that the former two options are preferable, as they are most likely to bring about lasting improvements to social equity and welfare. Use of revenues from the plastics tax in Morocco is an example of a social transformation policy looked at in detail here, which allocated new rights to previously informal waste pickers and deepened their participation in the full economy. In Vietnam, social compensation appears to have been minimal, with any measures to protect poorer households taking the form of cash transfers at a communal level. In China, social compensation was not necessary due to price regulation. In many LICs, targeted social compensation is a challenge, and many countries resort to less preferable policy measures as a result, such as subsidisation of fossil fuels.

One interesting case in this regard is that of Indonesia, which took steps to invest in health and improve access to health services following fossil fuel subsidy reform. This is a clear example of a co-benefits policy, albeit associated with fossil fuel subsidy reform – in essence a policy which removes a negative price for CO₂ emissions – rather than environmental taxation.

Environmental revenues for social investment – the case of Indonesia

In 2014, prior to reform in Indonesia, fuel and electricity subsidies accounted for 24% of the state budget and tax revenues were worth less than 11% of GDP – one of the lowest tax-to-GDP ratios in the world. In 2014 the oil price halved, creating a window of opportunity for fossil fuel subsidy reform. In response, the government effectively eliminated subsidies for gasoline, while subsidies per litre of diesel were capped at USD 0.08 below the market price and phased out one year later. Subsidies for Liquid Petroleum Gas (LPG) were reduced shortly afterwards, followed by subsidies for electricity for all but the poorest electricity consumers in 2017.

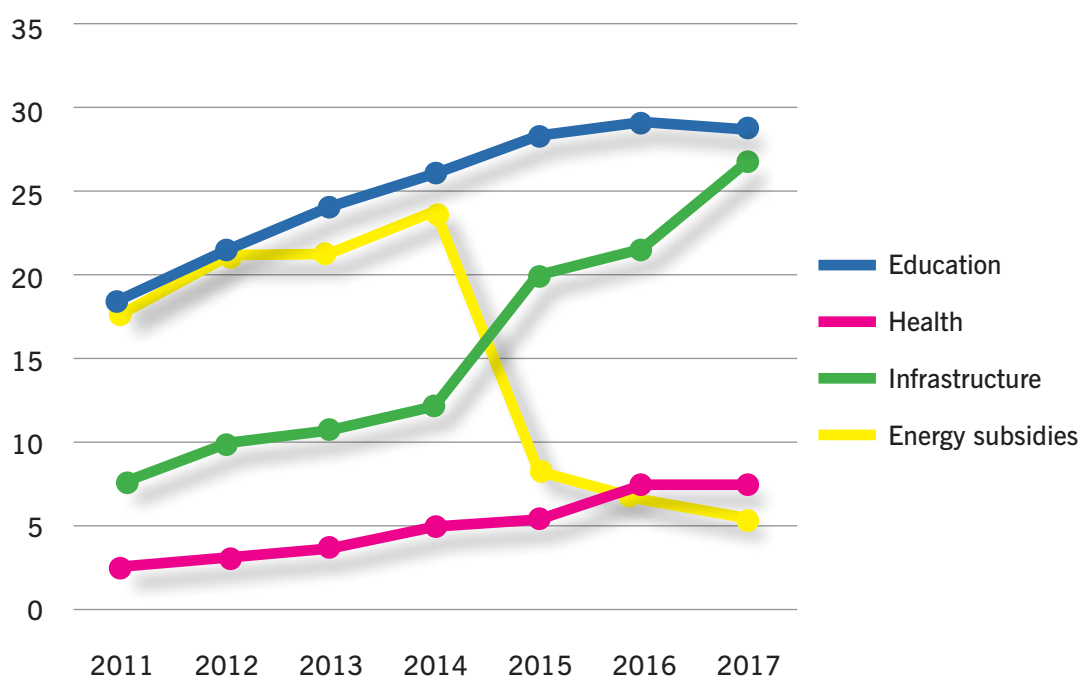
Clearly, reforming fossil fuel subsidies to such an extent is a concern in terms of impacts on the poor. Prior to reform, almost 40% of Indonesia's population lived at or 1.5 times below the poverty line (ADB 2015). Results of modelling conducted by the Asian Development Bank prior to reform to evaluate possible impacts in the short and medium term varied in both intensity of projected impacts on the poor, the effects of reallocation, and macroeconomic indicators (ADB 2015). What is certain is that a phase out of subsidies of this magnitude causes price inflation for goods consumed by the poor, due to both direct and indirect impacts of higher energy prices. If welfare investments and compensation are not effective and targeted, price pressure could see vulnerable groups clustered just above the poverty line pushed into poverty.

The Indonesian government decided to counter these effects by pro-poor investment. As shown in Figure 8, expenditure previously devoted to fossil fuel subsidies were diverted to a 119% increase in spending on infrastruc-

ture between 2014 and 2017, a 53% increase in spending on health and an 11% increase in spending on education. Previously, expenditure on fossil fuel subsidy reforms exceeded all its social assistance programmes combined by a factor of 10 – with the equivalent of 4.1% of GDP spent on fossil fuel subsidies in 2012, and just 0.4% of GDP on social assistance (ADB 2015). Given that the vast majority of total investment needs for the achievement of the SDGs relate to infrastructure – water supply and sanitation, transport, power and telecommunications – fossil fuel subsidy reform has proven to be an important source of domestic revenue in Indonesia, being mobilised for the achievement of the SDGs (SDSN 2015).

While the long-term social and environmental impacts of these changing investment patterns are not yet clear, shifts in expenditure of such magnitude can reasonably be expected to have a positive impact on social welfare and on the achievement of a number of SDGs, most notably those relating to poverty elimination (SDG 1), health (SDG 3), education (SDG 4), clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), sustainable infrastructure (SDG 9) and strengthening means of implementation (SDG 17).

This approach in Indonesia has also been applied to some extent in the countries examined in this study – although there is potential for higher amounts of revenue to be raised. Vietnam is exploring the potential to use environmental tax revenues to mobilise a significant proportion of domestic revenue for deficit reduction and other purposes, while Morocco has used revenues to promote social inclusion and integrate the informal sector within social welfare programmes. In China, the newly introduced Environmental Protection Tax is expected to mobilise USD 7.7 bil-

Figure 2.8: Expenditure in Indonesia 2011-2017 in million USD

Source: Gol (2017)

lion annually. In Mexico, as in Indonesia, fossil fuel subsidy reform from 2014 has freed up a large amount of revenue, but the process of redirecting this revenue has been less transparent – possibly an underlying catalyst for the Gasolinazo protests in 2017. In LICs, environmental taxes on “luxury” goods damaging to the environment, such as air and road transport fuel, have considerable potential to mobilise domestic revenue and to deliver welfare gains due to reduced tax evasion.

3.3 ENVIRONMENTAL TAXATION AND TAX JUSTICE

This chapter set out to look at actual cases of environmental taxation in developing countries, to see whether there was a potential to bring together the tax justice and environmental taxation agendas.

The Global Alliance for Tax Justice vision of tax justice is a world where progressive tax policies support people to share in local and global prosperity, access public services and social protections, and benefit from an economy that acts in the interest of people and the environment. The aims of the Global Alliance for Tax Justice are to affirm the roles of governments to implement such policies, mobilise domestic resources for public services and other government functions, strengthen state accountability, reduce state dependence on aid and debt financing, and correct the power imbalance between citizens and multinational corporations (Global Alliance for Tax Justice 2018).

This report examined the potential for environmental taxes to fulfill this vision and meet these objectives. First, in relation to boosting people’s share in prosperity and thus redistri-

bution of wealth, the report highlighted the injustice of existing policies of social compensation relating to low pricing of pollutants. Such measures – such as fossil fuel subsidies or electricity pricing regimes – are often not targeted, but reduce the price of energy or transport fuels for all consumers, in spite of a clear ability to pay considerably higher prices on the part of wealthier income quintiles. Implementing environmental taxes and so reforming the unfair distribution of prosperity may be a route towards improving outcomes for poorer households. Indeed, several cases revealed possible progressive impacts resulting from taxation of those pollutants often regarded as luxuries in low- and lower middle income countries. In this way, environmental taxes have the potential to enable poorer households to access a greater share of national wealth, while benefitting from improved environmental quality and fairer outcomes, as polluters pay for the damage they do through environmental taxation.

The report also looked at ways in which environmental taxes might be able to act to improve public services and social protection. In the Moroccan case, revenues from the plastics tax were directly used to this end. In Indonesia, removal of a negative carbon price – fossil fuel subsidy – and investment of revenues freed up as a result in increased investment in health, education and infrastructure can be considered to have improved access to public services.

Aside from direct improved access, environmental taxes can also improve access to public services indirectly, through domestic revenue mobilisation. For example, Vietnam's EPT accounted for over 5% of total tax revenue in 2016, and the EPT in China is expected to raise roughly USD 7.7 billion or 1% of total tax revenue in 2018 (GoV 2018; GoC 2018).

Environmentally related transport fuel excise duties have been known to account for almost 20% of total tax revenues in some LICs in sub-Saharan Africa (Slunge and Sterner 2010). Although some of the cases herein exemplify the benefits of “thinking big” and implementing ambitious policy reforms, the potential for environmental taxes to mobilise higher volumes of domestic revenue is as yet relatively underexplored. Nonetheless, it seems likely that in many developing countries increasing the amount of revenues raised through environmental taxation has the potential to reduce state dependence on aid and debt financing, and to facilitate the mobilisation of domestic resources for public services.

Moreover, because environmental taxes are harder to evade than CITs or PITs, they also have the potential to strengthen state accountability, improve tax morale and enhance fiscal governance. In countries with high levels of tax evasion, the benefits of a tax on carbon emissions – aside from any climate or environmental benefits – outweigh the costs, simply as a result of welfare gains resulting from reduced tax evasion (Liu 2013). Although there is broad agreement that direct taxation is more strongly associated with reducing inequality than indirect taxation in theory, in practice, as we have seen in this report, the distributional effects of environmental taxes vary widely, both between countries and within countries, and between types of environmental tax (Clifton 2017; Sterner 2012). Due to these differentiations, country-specific analysis of tax impacts is essential for conclusions on the distributive impacts of individual tax measures to be drawn.

3.3.1 Justice, the climate crisis and environmental taxation

The impacts of climate change will not be felt equally across the globe. All economic predictions indicate that climate change will hit developing countries hardest (see e.g. Hallegatte et al. 2016). The poorest in developing countries suffer disproportionately from pollution and are most dependent on natural resources for their livelihoods. Severe environmental degradation and climate change represent an obstacle to poverty alleviation. The poorest will be the most vulnerable to the impacts of climate change due to lack of opportunities to protect themselves, respond or adapt (Cottrell et al. 2016; Hallegatte et al. 2016; OECD 2005b).

The current rate of CO₂ emission reductions will not deliver on the Paris target of keeping the average increase in global temperature to well below 2°C above pre-industrial levels. Total reductions pledged in all NDCs under the Paris Agreement are not sufficient (UNEP 2017). In addition, an October 2018 Intergovernmental Panel on Climate Change (IPCC) report has highlighted the significant difference in terms of climate impact between keeping the temperature 2°C above pre-industrial levels or 1.5°C. The report suggests that “limiting global warming to 1.5°C, compared with 2°C, could reduce the number of people both exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050 (...)” (emphasis added, IPCC 2018b, paragraph B.5.1).

To prevent these impacts on the poor and achieve climate justice, all countries must step up and commit to more ambitious GHG emissions reductions. The most cost-effective and thus politically feasible way of achieving these reductions is the introduction of a carbon price, alongside additional measures to

facilitate the transition to a low-carbon economy. A carbon tax, including a tax escalator to ratchet up tax rates on a regular basis, could help all countries meet their CO₂ emission reductions obligations under the Paris Agreement while raising revenues to help meet the targets of the Agenda 2030 / the SDGs.

The predicted outcomes of the climate crisis are just one of several dimensions of inequality when it comes to environmental policy. This report has shown that there could be a role for environmental taxation in addressing these inequalities, and that the vision and objectives of the tax justice movement and the implementation of environmental taxation can indeed be compatible in theory and in practice.

3.4 FURTHER RESEARCH

We are right at the beginning of understanding the equity impacts of environmental taxation in developing countries. Capacity to collect robust data is relatively limited in many middle- and low-income countries, constraining governments in their ability to practice evidence-based policymaking. Further research into the equity impacts of environmental taxation in these countries will enable policymakers in the future to implement the measures necessary to improve environmental quality, slow environmental degradation and meet the targets of the Paris Agreement, while understanding the impacts of such taxes on poorer households and how they can be addressed.

BIBLIOGRAPHY

- ADB (2015). *Fossil Fuel Subsidies in Indonesia. Trends, Impacts and Reforms*. Asian Development Bank, Manila. Retrieved from <https://www.adb.org/sites/default/files/publication/175444/fossil-fuel-subsidies-indonesia.pdf>
- Anastasio, M. and Nix, J. (2017). *Plastic bag levy in Ireland*. IEEP new suite of cases on environmental fiscal reform. Retrieved from <https://ieep.eu/uploads/articles/attachments/0817a609-f2ed-4db0-8ae0-05f1d-75fbaa4/IE%20Plastic%20Bag%20Levy%20final.pdf?v=63680923242>
- Arlinghaus, J. and van Dender, K. (2017), *The environmental tax and subsidy reform in Mexico*, OECD Taxation Working Papers, No. 31, OECD Publishing, Paris. Retrieved from <http://dx.doi.org/10.1787/a9204f40-en>
- AUC/OECD (2018). *Africa's Development Dynamics 2018: Growth, Jobs and Inequalities*. African Union Commission, Addis Ababa; OECD Publishing, Paris. Retrieved from https://read.oecd-ilibrary.org/development/africa-s-development-dynamics-2018_9789264302501-en#page1
- Bass, S., Euler, A., Grieg-Gran, M., Viana, C., & Viana, V. (2014). *Green economy in Amapá State, Brazil: Progress and perspectives*. IIED Country Report. International Institute for Environment and Development, London.
- Baumol, J. and Oates, W. (1988). *The theory of environmental policy*. Cambridge University Press. Second edition. Cambridge, UK.
- Beaton, C., Gerasimchuk, I., Laan, T., Lang, K., Vis-Dunbar, D., & Wooders, P. (2013). *A guide to fossil fuel subsidy reform for policy-makers in South East Asia*. International Institute for Sustainable Development/Global Subsidies Initiative, Geneva. Retrieved from https://www.iisd.org/gsi/sites/default/files/ffs_guidebook.pdf
- Besley, T. and Persson, T. (2013). *Taxation and development*. London School of Economics and Political Science (LSE), London. Retrieved from <http://econ.lse.ac.uk/staff/tbesley/papers/TaxationAndDevelopment.pdf>
- Besley, T. and Persson, T. (2014). *Why do developing countries tax so little?* *Journal of Economic Perspectives*, 28(4), pp. 99-120.
- Bräutigam, D., Fjeldstad, O., Moore, M. (eds) (2008). *Taxation and state-building in developing countries: Capacity and consent*. Cambridge University Press, Cambridge.
- Caney, S. (2016). *Climate change, equity, and stranded assets*. Oxfam America Research Backgrounder series 2016. Oxfam America, Boston. Retrieved from https://www.oxfamamerica.org/static/media/files/climate_change_equity_and_stranded_assets_backgrounder.pdf
- Carbon Brief (2018). *How will China's new carbon trading scheme work?* Retrieved from <https://www.carbonbrief.org/qa-how-will-chinas-new-carbon-trading-scheme-work>
- Carbon Pricing Leadership Coalition (2017). *Report of the High Level Commission on Carbon Prices*. Retrieved from https://static1.squarespace.com/static/54ff9c5ce4b0a53deccfb4c/t/59b-7f2409f8dce5316811916/1505227332748/CarbonPricing_FullReport.pdf
- Carnahan, M. (2015). *Tax Challenges in Developing Countries*. Asia and the Pacific policy studies, Volume 2, issue 1, pp. 169-182. Retrieved from <https://doi.org/10.1002/app5.70>

- Casale, D. (2012). *Indirect Taxation and Gender Equity: Evidence from South Africa*. *Feminist Economics*. 18 (3), July 2012, pp. 25-54.
- Cespedes (2015). *Propuesta de impuesto al carbono: notas para el posicionamiento de cespedes*. Retrieved from <http://www.cespedes.org.mx/wp-content/uploads/2015/03/Impuesto-al-carbono-extenso.pdf>
- Chalifour, N. (2010). *A feminist perspective on carbon taxes*. *Canadian Journal of Women and the Law*, Vol. 21, No. 2., pp. 171 ff.
- Chancel and Piketty (2015). *Carbon and inequality: from Kyoto to Paris*. Paris School of Economics. Retrieved from <http://piketty.pse.ens.fr/files/ChancelPiketty2015.pdf>
- Clifton J., Díaz-Fuentes D., Revuelta J. (2017) *Fiscal Policy and Inequality in Latin America, 1960–2012*. In: Bértola L., Williamson J. (eds). *Has Latin American Inequality Changed Direction?* Springer. Retrieved from https://link.springer.com/chapter/10.1007/978-3-319-44621-9_16
- Climate Home (2016). *Will doubling India's Coal Tax Boost the Clean Energy Sector?* Climate Home News. Retrieved from <http://www.climatechangenews.com/2016/04/01/will-doubling-indias-coal-tax-boost-the-clean-energy-sector/>
- Coady, D., Flamini, V. and Sears, L. (2015). *The unequal benefits of fuel subsidies revisited: Evidence for developing countries*. IMF Working Paper 15/250. International Monetary Fund, Washington DC. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2015/wp15250.pdf>
- Coady, D., Parry, I., Sears, L., & Shang, B. (2015). *How large are global energy subsidies?* IMF Working Paper 15/105. International Monetary Fund, Washington DC. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2015/wp15105.pdf>
- COMETR (2007): *Competitiveness Effects of Environmental Tax Reforms*. Retrieved from <http://cordis.europa.eu/documents/documentlibrary/124729471EN6.pdf>
- Cottrell, J., et al. (2013). *Clean revenues for clean energy*. IISD / China National Renewable Energy Centre.
- Cottrell, J. et al. (2016). *Environmental tax reform in developing, emerging and transition economies*. Studies 93. Deutsches Institut für Entwicklungspolitik, Bonn.
- Cottrell, J., Ludewig, D., Runkel, M., Schlegelmilch, K. and Zerwawy, F. (2018). *Environmental taxation in Asia and the Pacific*. In tax policy for sustainable development in Asia and the Pacific. ESCAP financing for development series, no.2. UNESCAP, Bangkok. Retrieved from <http://www.unescap.org/sites/default/files/publications/Tax%20Policy%20for%20Sustainable%20Development.pdf>
- Davies, J., Lluberias, R. and Shorrocks, A. (2017). *Credit Suisse Global Wealth Databook 2017*. Retrieved from <http://publications.credit-suisse.com/tasks/render/file/index.cfm?file-id=12DFFD63-07D1-EC63-A3D5F67356880EF3>
- del Granado, J. A., Coady, D., & Gillingham, R. (2010). *The unequal benefits of fuel subsidies: A review of evidence for developing countries*. IMF Working Paper 10/202. Retrieved from <https://www.imf.org/external/pubs/cat/longres.aspx?sk=24184.0>
- Department for Business, Energy and Industrial Strategy (2016). *Energy Trends September 2016*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/559574/Energy_Trends_September_2016.pdf

- Dikgang, J., Leiman, A. and Visser, M. (2010). *Analysis of the plastic bag levy in South Africa*. Policy paper no.18, University of Capetown. Retrieved from https://econrsa.org/papers/p_papers/pp18.pdf
- Eckardt, S. (2017). *Low VAT rates in Vietnam benefit the rich more than the poor*. Vietnam Investment Review, 04.09.2017. Retrieved from <http://www.vir.com.vn/low-vat-rates-in-vietnam-benefit-the-rich-more-than-the-poor-wb-51948.html>
- EDF, CDC, IETA (2015). *Mexico: An Emissions Trading Case Study*. Retrieved from <https://www.edf.org/sites/default/files/mexico-case-study-may2015.pdf>
- EEA. (2011). *Environmental tax reform in Europe: Implications for income distribution*. EEA Technical report No. 16/2011. European Environmental Agency, Copenhagen. Retrieved from <http://www.eea.europa.eu/publications/environmental-tax-reform-in-europe>
- EEA (2013). *Status of black carbon monitoring in ambient air in Europe*. Technical Report no.18/2013. European Environment Agency, Copenhagen. Retrieved from <https://www.eea.europa.eu/publications/status-of-black-carbon-monitoring>
- Ekins, P. (2009). *Resource Productivity, Environmental Tax Reform and Sustainable Growth in Europe*. Anglo-German Foundation, London. Retrieved from <http://www.petre.org.uk/pdf/FinRep-Fin.pdf>
- Falcão, T. (2013). *Providing Environmental Taxes with an Environmental Purpose*. In: Larry Kreiser et al. (2013). *Critical Issues of Environmental Taxation (Volume XIII), Market Based Instruments – National experiences in Environmental Sustainability*. Edward Elgar publishing.
- Falcão, T. (2015). *Is a Carbon Tax Compatible with the WTO Treaties?* Intertax, Volume 43, Issue 10, 2015.
- Falcão, T. (2016). *A proposition for a multilateral carbon tax treaty*. Doctoral dissertation, Vienna University of Business and Economics, 2016 (IBFD publication, forthcoming). Retrieved from <http://permalink.obvsg.at/wuw/AC13710313>
- Falcão, T. (2017). *BEPS and the Paris Agreement: Unthinkable Bonds*. Intertax, Volume 45, Issue 11, 2017.
- Falcão, T. (2018a). *Taxing the Digital Economy – Policy Considerations and How to Advance the Debate*. Tax Notes International, February 12, 2018.
- Falcão, T. (2018b). *Taking the Environmental Tax Agenda Forward: How the U.N. Committee of Experts Can Lead the Way*. Tax Notes International, Emerging Economies Issue, March 5, 2018.
- Falcão, T. and Chowla, P. (2016). *Illicit Financial Flows: Concepts and Scope*. Inter-Agency Task Force on Financing for Development Working Paper Series, 5 December 2016. UN publications, New York. Retrieved from http://www.un.org/esa/ffd/wp-content/uploads/2017/02/Illicit-financial-flows-conceptual-paper_FfDO-working-paper.pdf
- Fay, M., Hallegatte, S., Vogt-Schilb, A., Rozenberg, J., Narloch, U., Kerr, T. M. (2015). *Decarbonizing development: Three steps to a zero-carbon future*. World Bank, Washington DC. Retrieved from: <http://www.worldbank.org/content/dam/Worldbank/document/Climate/dd/decarbonizing-development-report.pdf>
- Femnet (2017). *What are the gender dimensions of illicit financial flows? Strengthening African women's engagement and contribution*. Retrieved from <http://femnet.org/wp-content/up->

- loads/2017/07/FEMNET.-Full-Research-paper-on-Gender-Dimensions-of-IF-Fs-21.7.2017.pdf
- Flues, F. and Thomas, A. (2015). *The distributional effects of energy taxes*. OECD Taxation Working Papers No. 23. OECD, Paris. Retrieved from <http://d.doi.org/10.1787/5js1qwkqqrqv-en>
- Flues, F. and K. van Dender (2017). *The impact of energy taxes on the affordability of domestic energy*. OECD Taxation Working Papers, No. 30. OECD Publishing, Paris. Retrieved from <http://dx.doi.org/10.1787/08705547-en>
- Frankfurt School, UNEP, BNEF (2018). *Global trends in renewable energy investment 2018*. Frankfurt School, United Nations Environment Programme Centre, Bloomberg New Energy Finance, Frankfurt am Main. Retrieved from <http://fs-unep-centre.org/sites/default/files/publications/gtr2018v2.pdf>
- Ghariani, F (2015). *Manuel opérationnel d'utilisation des revenus de l'écotaxe*. World Bank, Washington DC.
- GIZ (2014a). *International Fuel Prices 2014: Data Preview*. GIZ GmbH, Bonn. Retrieved from <https://www.giz.de/expertise/downloads/giz-2015-en-ifp2014.pdf>
- GIZ (2014b). *Environmental Fiscal Reform: Case Studies*. GIZ GmbH, Bonn. Retrieved from <https://www.giz.de/fachexpertise/downloads/giz2014-en-environmental-fiscal-reform-case-studies.pdf>
- GIZ (2015). *Synergies and trade-offs between green growth policies and Inclusiveness*. Discussion Paper. Retrieved from <http://www.pegnet.ifw-kiel.de/about-pegnet/newsletter/giz-sector-project>
- Global Alliance for Tax Justice (2018). *Vision and objectives*. Retrieved from <https://www.globaltax-justice.org/en/about>
- GoC (2015). *Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions*. Government of China. Retrieved from <http://www4.unfccc.int/ndcregistry/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf>
- GoC (2018). *China starts collecting environmental tax*. Government of China, State Administration of Taxation of the People's Republic of China. Retrieved from <http://www.chinatax.gov.cn/eng/n2367751/c3021312/content.html>
- GoFin (2013) *National Energy and Climate Strategy – Government Report to Parliament*. Finnish Government, 20 March 2013.
- GoI (2016). *India's Intended Nationally Determined Contribution: Working Towards Climate Justice*. Government of India. Retrieved from <http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>
- GoI (2017). *Indonesia NDC and Fiscal Policy*. Government of Indonesia. Powerpoint presentation in the possession of Jacqueline Cottrell.
- GoM (2013). *Projet Ecotaxe*. Government of Morocco, Ministère délégué auprès du Ministre de l'Énergie, des Mines, de l'Eau et de l'Environnement, chargé de l'Environnement. Powerpoint presentation in possession of Jacqueline Cottrell.
- GoM (2017). *L'écotaxe au service du développement de la filière de recyclage du plastique*. Government of Morocco. Retrieved from <http://www.environnement.gov.ma/fr/component/content/>

- article/134-actualites/633-l-ecotaxe-au-service-du-developpement-de-la-filiere-de-recyclage-du-plastique
- GoM (2018a). *L'écotaxe au service du développement de la filière de recyclage du plastique*. Government of Morocco. Retrieved from <http://www.environnement.gov.ma/fr/component/content/article?id=633:l-ecotaxe-au-service-du-developpement-de-la-filiere-de-recyclage-du-plastique>
- GoM (2018b). *Programme National des Déchets Ménagers*. Government of Morocco. Retrieved from <http://www.environnement.gov.ma/fr/dechets?id=226>
- GoMex (2015). *Intended Nationally Determined Contribution: Mexico*. Government of Mexico. Retrieved from https://www.gob.mx/cms/uploads/attachment/file/162973/2015_indc_ing.pdf
- GoSwe (n.d.). *Sweden's Carbon Tax*. Government Offices of Sweden. Retrieved from <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/>
- GoUK (2016). *Landfill tax: Increase in rates*. UK Government. Retrieved from <https://www.gov.uk/government/publications/landfill-tax-increase-in-rates/landfill-tax-increase-in-rates>
- Goulder, L. and Parry, I. (2008). *Instrument choice in environmental policy*. *Review of Environmental Economics and Policy*, 2(2), pp. 152-174.
- GoV (2015). *Intended Nationally Determined Contribution*. Government of Vietnam. Retrieved from <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Viet%20Nam%20First/VIETNAM%27S%20INDC.pdf>
- GoV (2018). *Online information on tax rates for the environmental protection tax*. Government of Vietnam, Ministry of Finance. Retrieved from http://duthaonline.quochoi.vn/DuThao/Lists/DT_DUTHAO_LUAT/View_Detail.aspx?ItemID=1310&TabIndex=2&TaiLieuID=2763
- Green Budget Europe and Danish Ecological Council (n.d.). *Successful Environmental Taxes in Denmark*. Retrieved from https://green-budget.eu/wp-content/uploads/The-most-successful-environmental-taxes-in-Denmark-2_FINAL.pdf
- Green Fiscal Commission (2010). *Competitiveness and environmental tax reform*. Retrieved from http://www.greenfiscalcommission.org.uk/images/uploads/gfcBriefing7_PDF_isbn_v8.pdf
- Grown, C. and Valodia, I. (eds.) (2010). *Taxation and Gender Equity: A Comparative Analysis of Direct and Indirect Taxes in Developing and Developed Countries*. Routledge, London. Retrieved from https://www.idrc.ca/sites/default/files/openebooks/469-7/index.html#page_1
- GTZ (2008). *Environmental Fiscal Reform in Developing, Emerging and Transition Economies: Progress and Prospects*. GTZ GmbH, Bonn. July 2008. Retrieved from http://www.worlddecotax.org/downloads/info/documentation_gtz-Workshop.pdf
- GTZ/BMZ (n.d.). *Gender and Taxation: Why care about taxation and gender equality?* GTZ GmbH, Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung. Retrieved from <https://www.oecd.org/dac/gender-development/44896295.pdf>
- Guillaume, D., Zytek, R. and Farzin, R. (2011). *Iran – The chronicles of the subsidy reform*. IMF Working Paper 11/167. International Monetary Fund, Washington DC. Retrieved from <http://>

- www.greenfiscalspolicy.org/wp-content/uploads/2013/08/Iran-The-Chronicles-of-the-Subsidy-Reform1.pdf
- Hallegatte, S., Bangalore, M., Bonzanigo, L., Fay, M., Kane, T., Narloch, U., Rozenberg, J., Treguer, D. and Vogt-Schilb, A. (2016). *Shock waves: Managing the impacts of climate change on poverty*. World Bank Climate Change and Development Series. World Bank, Washington DC.
- Herd, R., Courneade, B. and Sutherland, D. (2004). *Sustainable development in OECD countries: Getting the policies right*. OECD, Paris.
- Hewett, C. and Ekins, P. (2014). *Environmental Fiscal Reform in Europe. An overview of policy and politics of implementing environmental fiscal reform in Europe between 1990 and 2013*. Report commissioned by Green Budget Europe, Brussels. Retrieved from: <http://green-budget.eu/wp-content/uploads/UCL-no-edits-Feb-2016.pdf>
- Huong, P. L. (2014). *Evaluating the economic and environmental impacts of the law on environment taxes in Vietnam (mimeo)*. GIZ Macroeconomic Reforms Programme, Vietnam Ministry of Finance, Hanoi.
- ICC (2012). *ICC Environmental Taxation Principles: Fiscal Instruments and Environmental Policy Making*. ICC Commissions on Environment and Energy Taxation. International Chamber of Commerce.
- ICTD (2018). *Government Revenue Dataset*. International Centre for Tax and Development. Retrieved from <https://www.wider.unu.edu/project/government-revenue-dataset>
- IEA (2016a). *Fossil Fuel Subsidy Reform in Mexico and Indonesia*. International Energy Agency, Paris.
- IEA (2016b). *Mexico Energy Outlook: World Energy Outlook Special Report*. International Energy Agency, Paris. Retrieved from <https://www.iea.org/publications/freepublications/publication/MexicoEnergyOutlook.pdf>
- IISD (2016a). *Gender and Fossil Fuel Subsidy Reform: Current status of research*. International Institute for Sustainable Development, Geneva. Retrieved from: <https://www.iisd.org/sites/default/files/publications/gender-fossil-fuel-subsidy-reform-current-status-research.pdf>
- IISD (2016b). *Financing Development with Fossil Fuel Subsidies: The Reallocation of Indonesia's Gasoline and Diesel Subsidies in 2015*. International Institute for Sustainable Development, Geneva.
- IMF (2012). *Fiscal policy to mitigate climate change: A guide for policymakers*. International Monetary Fund, Washington DC. Retrieved from http://www.greenfiscalspolicy.org/wp-content/uploads/2013/08/Fiscal_Policy_to_Mitigate_Climate_Change_IMF2012_Summary.pdf
- IPCC (2007). *Fourth Assessment Report – Climate Change 2007: Working Group III: Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, (item 4.3.1)* B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds.), Cambridge University Press, Cambridge.
- IPCC (2018a). *Global Warming 1.5 °C – an IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Retrieved from: <https://www.ipcc.ch/>
- IPCC (2018b). *Global warming of 1.5°C: Summary for policymakers*. IPCC, Geneva. Retrieved from http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

- IRENA (2017). *Renewable Energy and Jobs. Annual Review 2017*. International Renewable Energy Agency, Abu Dhabi. Retrieved from http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/May/IRENA_RE_Jobs_Annual_Review_2017.pdf
- Israngkura, A. (2014). *An analysis of economic instruments for GHG mitigation in Thailand*. (paper commissioned by GIZ) (mimeo).
- Jin, Y., Andersson, H. and Zhang, S. (2016). *Air Pollution Control Policies in China: A Retrospective and Prospects*. In: *International Journal of Environmental Research and Public Health*, December 13(12) 1219. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5201360/>
- Joshi, A. (2015). *Tax and gender in developing countries: What are the issues?* ICTD Summary Brief no.6. Retrieved from https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/13066/ICTD_SumBrief%236_OnlineNew2.pdf?sequence=1&isAllowed=y
- Jun, J. (2018). *Tax incentives and tax base protection in developing countries*. Tax policy for sustainable development in Asia and the Pacific. ESCAP financing for development series, no.2. UN-ESCAP, Bangkok. Retrieved from <http://www.unescap.org/sites/default/files/publications/Tax%20Policy%20for%20Sustainable%20Development.pdf>
- Keen, M. (2013). *Targeting, Cascading, and Indirect Tax Design*. IMF Working Paper No. 13/57. International Monetary Fund, Washington DC. Retrieved from <https://ssrn.com/abstract=2233760>
- Khadaroo, A. J., and Sultan, R. (2012). *Economic Growth and Carbon Emission in Mauritius: An Econometric Analysis in the context of the Maurice Ile Durable (MID) project*. Retrieved from <http://web.uom.ac.mu/Staffdirectory1/FT001370/Research/Publications/Economic%20Growth%20and%20Carbon%20Emission%20in%20Mauritius.pdf>
- Kosonen et al. (2012). *Regressivity in environmental taxation: myth or reality?* In: Milne, J. and Andersen, M.S. (eds). *Handbook of Research on Environmental Taxation*. Edward Elgar Publishing, Cheltenham, pp. 61 ff.
- Kruyshaar, K. (2017). *Lifeline Electricity Tariff: Benefits & Who qualifies*. Gaia – green audits into action. Retrieved from <http://greenaudits.co.za/lifeline-electricity-tariff-benefits-who-qualifies/>
- Lange, G., Wodon, Q. and Carey, K. (eds) (2018). *The changing wealth of nations 2018: Building a sustainable future*. World Bank, Washington DC.
- Levinson, A. (2018). *Energy Efficiency Standards Are More Regressive Than Energy Taxes: Theory and Evidence*. Retrieved from <http://faculty.georgetown.edu/aml6/pdfs&zips/RegressiveMandates.pdf>
- Liu, A. A. (2013). *Tax evasion and optimal environmental taxes*. *Journal of Environmental Economics and Management*, 66(3), pp. 656-670.
- Lovei, M. (1998). *Phasing out lead from gasoline: worldwide experience and policy implications*. World Bank Technical Paper No.397. World Bank, Washington DC. Retrieved from <http://sitresources.worldbank.org/INTURBANTRANSPORT/Resources/b09phasing.pdf>
- Määttä, K. and K. Hakkinen (2006). *Environmental Taxes Compared with Environmental Penalties*. In: Milne, J. et al (eds.) (2006). *Critical Issues of Environmental Taxation*, Vol. 3, Oxford University Press, London.

- Mabasi, T. (2009). *The efficacy of environmental taxation as a mechanism for pollution control in Kampala city*. In Lin-Heng, L. et al. (eds) (2009). *Critical Issues in Environmental Taxation*, Vol. III. Oxford University Press, Oxford.
- MCEA (2012). *Public Environmental Expenditure Review*. Ministry for the Coordination of Environment Action, Mozambique. Retrieved from http://unpei.org/sites/default/files/e_library_documents/Mozambique_PEER_Full_English_0.pdf
- MexiCO₂/EDF/IETA (2018). *Mexico: A market-based climate policy case study*. Plataforma Mexicana de Carbono, Environmental Defense Fund, International Emissions Trading Association. Retrieved from https://www.ieta.org/resources/Resources/Case_Studies_Worlds_Carbon_Markets/2018/Mexico-Case-Study-Jan2018.pdf
- Mirrlees, J. et al. (2011). *Mirrlees Review: Tax by design*. Oxford University Press, London. Retrieved from <http://www.ifs.org.uk/publications/5353>
- Moreno-Dodson, B. (ed) (2013). *Is Fiscal Policy the Answer? A Developing Country Perspective*. World Bank. Washington.
- Morris, D. F. and Sterner, T. (2013). *Defying conventional wisdom: Distributional impacts of fuel taxes*. Mistra Indigo Policy Paper. Mistra Indigo, Gothenburg. Retrieved from <http://indigo.ivl.se/download/18.1acdfdc8146d949da6d4b9a/1414743602551/Defying+Conventional+Wisdom+policy+paper+3.pdf>
- Murphy, L. and Nagel, T. (2002). *The myth of ownership: Taxes and justice*. Oxford University Press, London.
- Murphy, R. (2015). *The Joy of Tax: How a fair tax system can create a better society*. Bantam Press.
- OECD (2001a). *Glossary of statistical terms: Value Added Tax (VAT) – ESA*. OECD, Paris. Retrieved from <https://stats.oecd.org/glossary/detail.asp?ID=2847>
- OECD (2001b). *Glossary of statistical terms: Taxes*. OECD, Paris. Retrieved from <https://stats.oecd.org/glossary/detail.asp?ID=2847>
- OECD (2003). *Glossary of statistical terms: Surcharge*. OECD, Paris. Retrieved from <https://stats.oecd.org/glossary/detail.asp?ID=5699>
- OECD (2004). *Glossary of statistical terms: Environmentally related taxes*. OECD, Paris. Retrieved from <http://stats.oecd.org/glossary/detail.asp?ID=6270>
- OECD (2005a). *Glossary of statistical terms: Environmental taxes*. OECD, Paris. Retrieved from <https://stats.oecd.org/glossary/detail.asp?ID=6437>
- OECD (2005b). *Environmental fiscal reform for poverty reduction*. DAC Guidelines and Reference Series. OECD Publishing, Paris.
- OECD (2008). *Costs of Inaction on Environmental Policy Challenges: Summary Report*. OECD Publishing, Paris. Retrieved from <https://www.oecd.org/env/40501169.pdf>
- OECD (2010). *Taxation, innovation and the environment*. OECD Publishing, Paris.
- OECD (2014). *Addressing social implications of Green Growth. Energy sector reform and its impacts on households*. Issue Note for 2014 Green Growth and Sustainable Development Forum. OECD Publishing, Paris.
- OECD (2016a). *Revenue Statistics 2016. Tax Revenue Trends in the OECD*. OECD, Paris. Retrieved from <https://www.oecd.org/tax/tax-policy/revenue-statistics-2016-highlights.pdf>

- OECD (2016b). *Revenue Statistics 2016 – Mexico*. OECD, Paris. Retrieved from <https://www.oecd.org/tax/revenue-statistics-mexico.pdf>
- OECD (2017a). *Environmental fiscal reform. Progress, prospects and pitfalls*. OECD report for the G7 environment ministers. OECD Publishing, Paris.
- OECD (2017b). *The environmental tax and subsidy reform in Mexico*. OECD Taxation Working Papers, No. 31. OECD Publishing, Paris. Retrieved from <http://dx.doi.org/10.1787/a9204f40-en>
- OECD (2017c). *OECD Economic Surveys: Mexico 2017*. OECD Publishing, Paris. Retrieved from http://dx.doi.org/10.1787/eco_surveys-mex-2017-en
- OECD (n.d.). *Glossary of Tax Terms*. Retrieved from <http://www.oecd.org/ctp/glossaryoftaxterms.htm>
- OECD (2018). *Effective Carbon Rates 2018: Pricing carbon emissions through taxes and emissions trading*. OECD, Paris. Retrieved from https://read.oecd-ilibrary.org/taxation/effective-carbon-rates-2018_9789264305304-en#page1
- OECD, European Commission, Eurostat (2001). *Environmental Taxes, a Statistical Guide*, 2001 edition. Office for Official Publications of the European Communities, Luxemburg.
- OECD and IMF (2015). *Fiscal Policy and Growth: Why, what and how. Joint OECD and IMF report for the G20 2015*. Retrieved from <https://www.oecd.org/g20/topics/framework-strong-sustainable-balanced-growth/G20-2015-Ankara-Fiscal-policy-and-long-term-growth-OECD-IMF-September.pdf>
- Oxfam America (2016a). *Who should sell the last of the fossil fuels: Stranded assets, equity and climate change. The politics of poverty: Ideas and analysis from Oxfam America's policy experts*. Oxfam America, Boston. Retrieved from <http://politicsofpoverty.oxfamamerica.org/2016/05/who-should-sell-the-last-of-the-fossil-fuels-stranded-assets-equity-and-climate-change/>
- Oxfam America (2016b). *Associated explanation and calculations for "Who should sell the last of the fossil fuels: Stranded assets, equity and climate change"*. Oxfam America, Boston. Retrieved from https://www.oxfamamerica.org/static/media/files/Calculations_for_Stranded_Assets_blog_-_April_2016_y0x6RmD.pdf
- Parry, I. (2011). *Reforming the Tax System to Promote Environmental Objectives: An Application to Mauritius*. IMF working paper 11/124. International Monetary Fund, Washington DC. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2011/wp11124.pdf>
- Pigou, A. (1932). *The Economics of Welfare*. 4th edition, McMilland and Co., London.
- Pizer, W. and Sexton, S. (2017). *Distributional Impacts Of Energy Taxes*. National Bureau of Economic Research, Working Paper 23318. Retrieved from <http://www.nber.org/papers/w23318>
- Preston, I., White, V., Brown, J., Dresner, S., Ekins, P. and Hamilton, I. (2013). *Designing carbon taxation to protect low-income households*. Joseph Rowntree Foundation. Retrieved from <https://www.jrf.org.uk/report/designing-carbon-taxation-protect-low-income-households>
- Raworth, K., Wykes, S. and Bass, S. (2014). *Securing social justice in green economies*. Issues Paper. International Institute for Environmental Development, London. Retrieved from <http://pubs.iied.org/pdfs/16578IIED.pdf>
- Sampson, G. (2001). *Effective Multilateral Environment Agreements and Why the WTO Needs Them*. Blackwell Publishers, Oxford.

- Schlegelmilch, K. and Joas, A. (2015). *Fiscal considerations in the design of green tax reforms*. Scoping paper presented at the Green Growth Knowledge Platform's Third Annual Conference in Venice, Italy, 29-30 January. Forum Ökologisch-Soziale Marktwirtschaft (FÖS), Berlin. Retrieved from http://www.greengrowthknowledge.org/sites/default/files/Schlegelmilch_Fiscal_considerations_in_the_design_of_green_tax_reforms.pdf
- Schreifels, J. et al. (2012). *Sulphur dioxide control in China: Policy evolution during the 10th and 11th five-year plans and lessons for the future*. *Energy Policy* 48 (2012), pp. 779-789.
- SDSN (2015). *Investment Needs to Achieve the Sustainable Development Goals*. UN Sustainable Development Solutions Network. Retrieved from <http://unsdsn.org/wp-content/uploads/2015/09/151112-SDG-Financing-Needs-Summary-for-Policymakers.pdf>
- Sheng, F. (2017). *Public Environmental Expenditures: A Conceptual Framework*. Retrieved from <https://www.researchgate.net/publication/238623329>.
- Shenoy, B. (2010). *Lessons learned from attempts to reform India's kerosene subsidy*. International Institute for Sustainable Development, Geneva.
- Silwal, A. and McKay, A. (2014). *The impact of cooking with firewood on respiratory health: Evidence from Indonesia*. University of Sussex Working Paper Series 72-2014. Retrieved from <https://www.sussex.ac.uk/webteam/gateway/file.php?name=wps-72-2014.pdf&site=24>
- Slunge, D. and Sterner, T. (2010). *Environmental fiscal reform in East and Southern Africa and its Effects on Income Distribution*. *Rivista di Politica Economica*, July-October 2009.
- Statistics Mauritius (2016). *Environment Statistics – 2016*. Retrieved from http://statsmauritius.govmu.org/English/Publications/Documents/EI1331/Env_Stats_Yr2016.pdf
- Statistics Norway (2009). *Pricing of CO₂ emissions in Norway*. Retrieved from https://www.ssb.no/a/english/publikasjoner/pdf/doc_200916_en/doc_200916_en.pdf
- Stern, N. (2007). *Stern Review: The Economics of Climate Change*. Cambridge UK: Cambridge University Press. Retrieved from http://webarchive.nationalarchives.gov.uk/20100407172811/http://www.hm-treasury.gov.uk/stern_review_report.htm
- Sterner, T. (2012). *Distributional effects of taxing transport fuel*. *Energy Policy* 41(2012), pp. 75-83.
- Subhanij, T., Banerjee, S. and Jian, Z. (eds.) (2018). *Tax policy for sustainable development in Asia and the Pacific*. United Nations Publication ST/ESCAP/2806. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Bangkok.
- The Economist (2012). *Green growth: Shoots, greens and leaves*. Retrieved from <https://www.economist.com/international/2012/06/16/shoots-greens-and-leaves>
- The Hindu Business Line (2017). *From cess to environmental mess*. 31 August 2017. Retrieved from <https://www.thehindubusinessline.com/opinion/from-cess-to-environmental-mess/article9838688.ece>
- Trabacchi, C., Micale, V. and Frisari, G. (2012). *San Giorgio Group case study: PROSOL Tunisia*. CPI Report 2012. Climate Policy Initiative, Jakarta. Retrieved from <http://climatepolicyinitiative.org/wp-content/uploads/2012/08/PROSOL-Tunisia-SGG-Case-Study.pdf>
- UNDP/UNEP (n.d.). *Making a difference for the poor: Using economic instruments to promote sustainable natural resources use, environmental sustainability and responses to climate change*. UNDP/UNEP Poverty-Environment Initiative. Retrieved from https://www.unpei.org/sites/default/files/e_library_documents/Uganda-Policy-brief-EconomicInstruments.pdf

- UNECA (n.d.). *Illicit Financial Flows: Report of the High-Level Panel on Illicit Financial Flows from Africa*. United Nations Economic Commission for Africa. Retrieved from <https://www.uneca.org/iff>
- UNEP (2011). *Towards a green economy: Pathways to sustainable development and poverty eradication*. United Nations Environment Programme, Nairobi.
- UNEP (2014). *Fiscal Policy Scoping Study: Mauritius*. United Nations Environment Programme, Nairobi.
- UNEP (2017). *The Emissions Gap Report 2017. A UN Environment Synthesis Report*. United Nations Environment Programme, Nairobi. Retrieved from https://wedocs.unep.org/bitstream/handle/20.500.11822/22070/EGR_2017.pdf?isAllowed=y&sequence=1
- United Nations (2017). *Financing for Development: Progress and Prospects 2017*. Report of the Inter-agency Task Force on Financing for Development. United Nations, New York.
- United Nations (2018). *Sixteenth Session of the Committee of Experts on International Cooperation in Tax Matters*. 14 – 17 May 2018. Retrieved from <http://www.un.org/esa/ffd/events/event/sixteenth-session-tax.html>
- Vivid Economics (2012). *Carbon taxation and fiscal consolidation: The potential of carbon pricing to reduce Europe's fiscal deficits*. Vivid Economics, London. Retrieved from http://www.foes.de/pdf/2012-05_CETRiE_Carbon_Pricing_Report_web.pdf
- Waty, E. (2015). *Is Mexico the emerging leader of Latin America in post-carbon politics?* Pepperdine Policy Review, 8(2015), Article 6. Retrieved from <http://digitalcommons.pepperdine.edu/cgi/viewcontent.cgi?article=1113&context=ppr>
- Willenbockel, D. (2011). *Environmental Tax Reform in Vietnam: An ex ante general equilibrium assessment*. Institute of Development Studies at the University of Sussex. A Munich Personal RePec Archive MPRA paper no.44411. Retrieved from <http://mpa.ub.uni-muenchen.de/44411/>
- Withana, S., ten Brink, P., Illes, A., Nanni, S. and Watkins, E. (2014). *Environmental tax reform in Europe: Opportunities for the future*. IEEP Report for the Netherlands Ministry of Infrastructure and Environment. Institute for European Environmental Policy (IEEP), Brussels. Retrieved from http://www.ieep.eu/assets/1397/ETR_in_Europe_-_Final_report_of_IEEP_study_-_30_May_2014.pdf
- World Bank (2005a). *What to be done and how to achieve it*. World Bank, Washington DC.
- World Bank (2005b). *Mozambique Country Economic Memorandum. Sustaining Growth and Reducing Poverty*. Report, no. 32615-MZ, 2005. World Bank, Washington DC. Retrieved from <http://documents.worldbank.org/curated/en/773351468279908360/pdf/326150MZ.pdf>
- World Bank (2016a). *Data: GINI Index*. World Bank, Washington DC. Retrieved from <http://data.worldbank.org/indicator/SI.POV.GINI>
- World Bank (2016b). *Implementation, Completion and Results Report: Municipal Solid Waste Sector Development Policy Loans*. World Bank, Washington DC. Retrieved from <http://documents.worldbank.org/curated/en/563061482164575195/text/ICR-Main-Document-P127955-2016-12-12-16-29-12142016.txt>

- World Bank (2016c). *Morocco lets nothing go to waste*. World Bank, Washington DC. Retrieved from <http://www.worldbank.org/en/news/feature/2016/02/16/morocco-lets-nothing-go-to-waste>
- World Bank (2017a). *Carbon Tax Guide: A Handbook for Policy Makers*. March 2017. World Bank, Washington DC.
- World Bank (2017b). *Mauritius: Addressing inequality through more equitable labour markets*. World Bank, Washington DC. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/29034/122040.pdf?sequence=5&isAllowed=y>
- World Bank (2018a). *State and Trends of Carbon Pricing 2018*. May 2018. World Bank, Ecofys. World Bank, Washington DC. Retrieved from <https://openknowledge.worldbank.org/handle/10986/29687>
- World Bank (2018b). *Poverty and equity data portal*. World Bank, Washington DC. Retrieved from <http://povertydata.worldbank.org/poverty/home>
- World Bank (2018c). *Databank: World Development Indicators*. World Bank, Washington DC. Retrieved from <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>
- World Bank (2018d). *Databank: Inflation and consumer prices*. World Bank, Washington DC. Retrieved from <https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=VN>
- World Bank (2018e). *Databank: Economy and Growth*. World Bank, Washington DC. Retrieved from <https://data.worldbank.org/topic/economy-and-growth?view=chart>
- Worrell, L. and Mendez-Parra, M. (2017). *Fisheries: The implications of current WTO negotiations for economic transformation in developing countries*. SET: Supporting Economic Transformation. Overseas Development Institute ODI. Retrieved from <https://set.odi.org/wp-content/uploads/2017/12/SET-WTO-Negotiations-Fisheries.pdf>
- WTO (2011a). *Understanding the WTO*. World Trade Organisation Publications, Geneva.
- WTO (2011b). *Trade and Environment at the WTO*. World Trade Organisation Publications, Geneva.
- WTO (2018). *Climate change and the potential relevance of WTO rules*. World Trade Organisation, Geneva. Retrieved from http://www.wto.org/english/tratop_e/envir_e/climate_measures_e.htm,
- Zhang, Minsi, Song, Yu, Cai, Xuhui, Zhou, Jun (2008). *Economic assessment of the health effects related to particulate matter pollution in 111 Chinese cities by using economic burden of disease analysis*. Journal of Environmental Management 88 (4), pp. 947–954.
- Zhang, S. and Qin, X. (2015). *Lessons Learned from China's Residential Tiered Electricity Pricing Reform*. International Institute of Sustainable Development, Sussex. May 2015. Retrieved from https://www.iisd.org/gsi/sites/default/files/ffsr_china_lessons_learned_may_2015.pdf
- Zheng, J. and Lee, D.J. (2018). *Prospects for Progressive Tax Policies in Asia and the Pacific*. Tax policy for sustainable development in Asia and the Pacific. ESCAP financing for development series, no.2. UNESCAP, Bangkok. Retrieved from <http://www.unescap.org/sites/default/files/publications/Tax%20Policy%20for%20Sustainable%20Development.pdf>

Zimmer, A., Jakob, M. and Steckel, J. C. (2015). *What motivates Vietnam to strive for a low-carbon economy? – On the drivers of climate policy in a developing country*. *Energy for Sustainable Development*, 24(2015), pp. 19-32.

INTERNATIONAL AGREEMENTS, RESOLUTIONS AND REGIONAL DIRECTIVES

Addis Tax Initiative, available at <https://www.addistaxinitiative.net/>.

European Union (2003). Consolidated version of EC Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L 275. Oct. 25, 2003.

United Nations (1992). *Framework Convention on Climate Change*. Doc.FCCC/INFORMAL/84. June 4, 1992.

United Nations (1997). *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. December 11, 1997.

United Nations (1997). *Rio Declaration on Environment and Development: application and implementation*. Report of the Secretary General, Fifth Session, 7-25 April 1997. Doc. E/CN.17/1997/8. UN Economic and Social Council, Commission on Sustainable Development.

United Nations (2015a). *Adoption of the Paris Agreement*, Doc. FCCC/CP/2015/L.9/Rev.1 (12 December 2015). Retrieved from <https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>

United Nations (2015b). *Transforming our world: the 2030 Agenda for Sustainable Development*. ECOSOC Resolution A/RES/70/1, Resolution adopted by the General Assembly on 25 September 2015. Retrieved from http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E.

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

WTO (2001). *Doha WTO Ministerial – Ministerial Declaration*. WT/MIN(01)/DEC/1. Retrieved from https://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm

WTO (2011c). *The Legal Texts – The Results of the Uruguay Round of Multilateral Trade Negotiations in Marrakesh*. Agreement 4. Cambridge University Press, Cambridge.

WTO CASE LAW:

WTO, United States – taxes in Petroleum and Certain Imported Substances (US-Superfunds case), Panel Report, L/6175 – 34S/136, 17 June 1987.

WTO, US-Gasoline, Panel Report, WT/DS2/R, 29 January 1996.

WTO, US-Shrimp, Appellate Body Report, WT/DS58, 6 November 1998.

WTO, European Communities – Measures affecting Asbestos and Asbestos-containing Products (EC-Asbestos), Appellate Body report, DS135, 12 March 2001.



www.vidc.org