Tax as a force for good

Aligning tax systems with the SDGs and the inclusive circular economy

CASE STUDY BANGLADESH

The Ex'tax Project
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Abstract

This study analyses opportunities to align tax systems with the goals of the SDGs and the inclusive circular economy, by putting a price on natural resource use and pollution and using the revenues to lower the tax burden on labour and increase (social) spending.

The case study focusses on Bangladesh. Bangladesh has one of the largest gaps between tax revenue and GDP. The country is highly prone to climate disruption. Pollution levels are high and renewable energy sources provide only a fraction of energy needs. Bangladesh has a large, growing and resilient population. The country has a proven track record of effectively addressing poverty and other challenges. Sustainable inclusive growth is a major national priority.

Cambridge Econometrics has modelled some of the impacts of two preliminary scenarios, which include introducing a price on carbon emissions and phasing out certain fossil fuel subsidies, while using the revenues to invest in clean technologies, infrastructure and income support. The modelling suggests that by 2025, such tax reforms could lead to higher GDP and employment levels, while reducing carbon emissions and energy imports. The transition can be highly progressive when revenues are mainly used to increase social spending.

The findings suggest that tax reform can be a viable strategy to reach the dual goal of socio-economic development and environmental protection.

Executive Summary

Bridging the SDG finance gap

This is the era of the Sustainable Development Goals (SDGs); an era of unprecedented global social and environmental challenges. The most daunting task will be to adapt the metabolism of our economies to match the carrying capacity of the earth and stay well below 2°C global warming. We face equally important social challenges in our societies, including enabling a growing population to develop to their full potential and find decent work. According to the United Nations, achieving the SDGs is going to cost US$5-6 trillion a year. Developing countries alone face an annual financing gap of $2.5 trillion. Official development assistance (ODA) is just $150 billion per year, and on a downward trend. Private flows of investment are also considerably below the level of SDG investment needs. This means there is a massive financing gap.

Tax and the circular economy

Aligning economic growth with the goals of the SDGs will be key. Therefore, a shift is needed from the linear 'take-make-waste' economy, towards an inclusive circular economy, which is regenerative, carbon neutral and distributive. Such circular economies require labour- and knowledge-intensive activities (e.g. repair and maintenance services, recycling, refurbishment and R&D), which could significantly contribute to job creation. Currently, however, governments tend to increase the tax burden on human labour, which incentivises businesses to reduce labour input. At the same time, governments put low or no taxes on natural resource use (such as carbon emissions, fossil fuels and water), thereby leaving resource use unrestrained, causing overconsumption, pollution and waste.

Leapfrogging tax systems to the SDG era

Given the high unemployment rates in low- and middle-income countries, increasing the tax burden on labour may not necessarily be the best option to raise revenues sustainably. Could taxing pollution rather than people, as advocated by UN Secretary-General António Guterres, be a way of 'leapfrogging' tax systems to the SDG era? Studies indicate that such tax reform (also known as Environmental Tax Reform) can indeed have positive economic, social and environmental impacts. A World Bank study, for example, demonstrated that a domestic carbon tax of $30 per tonne of CO_2 would provide the resources to more than double current levels of social assistance in 60 countries. Over the years, many researchers and international organisations have called for tax reform; putting a price on pollution and resources and using the revenues to lower the tax burden on labour and increase (social) spending.

Opportunities and risks of tax reform

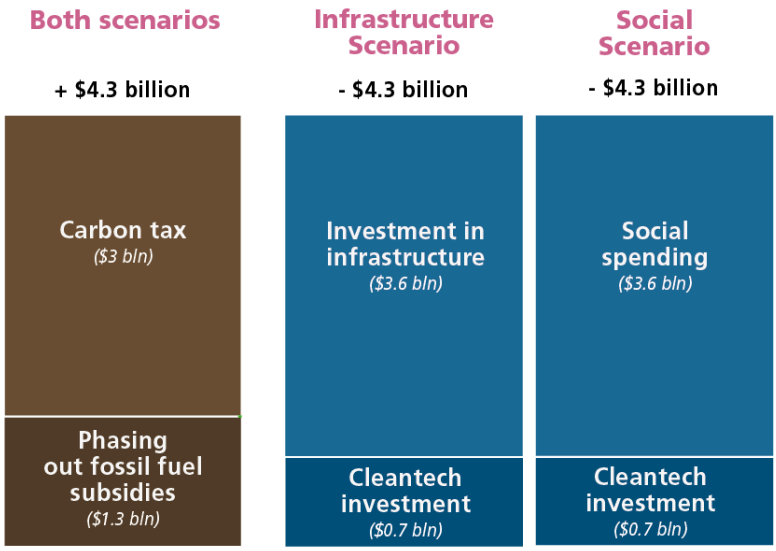
The goal of this study is to analyse opportunities and risks of aligning tax policy with the goals of the inclusive circular economy in low- and middle-income countries, focussing on Bangladesh as the first case study. Bangladesh has one of the largest gaps between tax revenue and GDP. Green taxes (including restructuring of fossil fuel subsidies), could help raise much-needed tax revenues. The country is highly prone to climate disruption, pollution levels are high and renewable energy sources provide only a fraction of energy needs. It has a large, growing and resilient population of 165 million, with 2 million youths entering the job market every year. The country has a proven track record of effectively addressing poverty and other challenges. Sustainable inclusive growth is a major national priority.

Cambridge Econometrics has modelled some of the impacts of two preliminary scenarios, which include putting a price on carbon emissions and abolishing fossil fuel subsidies, while using the revenues to invest in clean technologies, infrastructure and social spending. The modelling suggests that by 2025, such tax reforms could lead to higher GDP and employment levels, while reducing carbon emissions and energy imports. The transition can be highly progressive when revenues are mainly used to increase social spending.

Two preliminary scenarios

For the purpose of this study, Cambridge Econometrics developed the 'FRAMES: Bangladesh' model, to estimate potential green tax revenues and macro-economic impacts of tax reform scenarios. The Ex'tax Toolkit and Methodology were used to develop two preliminary scenarios (see Figure A). Leading factors in this process were, amongst others, the national priorities of Bangladesh, data availability and the scope of the FRAMES model. The measures are assumed to be introduced gradually from 2020, to reach to reach the full measures by 2024. In the year 2025, both scenarios are expected to raise $4.3 billion in revenues by 1) introducing a carbon tax of $30 per tonne of CO_2 emitted by industries and the power sector, and 2) phasing out oil and natural gas subsidies for industries and power generation. In the modelling, every year, the revenues are fully recycled. In the *Infrastructure Scenario*, all revenues are recycled through investments in clean technology and infrastructure. In the *Social Spending Scenario* (or *Social Scenario*), all revenues are recycled through investments in clean technology and social spending targeted towards the lowest two income quintiles. In both scenarios, the cleantech investments are targeted towards the textiles sector (Bangladesh's most important export sector).

Figure A: The Infrastructure Scenario and the Social Scenario (in 2025, Bangladesh)



Source: Model projections, Cambridge Econometrics 2019.

Figure B provides some key results over the 2020-2025 period, demonstrating decoupling effects in the scenario, as GDP is higher, and emissions are lower. An increase in employment is observed in each scenario.

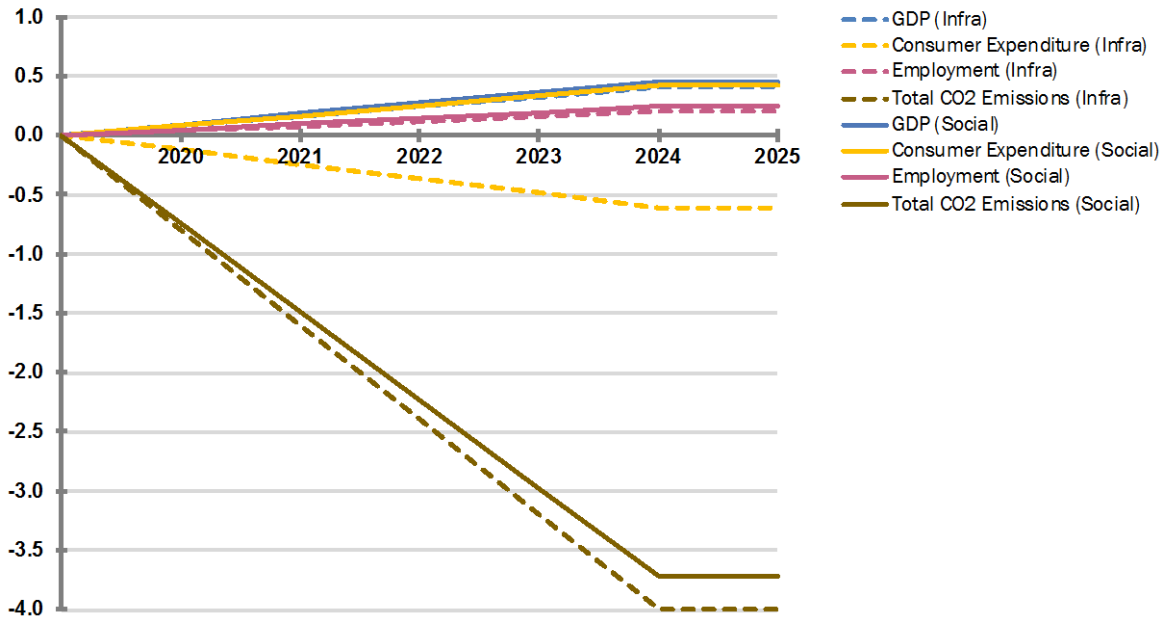
Cumulative results

Over the 2020-2025 period, the scenarios add $6.9 billion (in the *Infrastructure Scenario*) and $7.8 billion (in the *Social Scenario*) to GDP, compared to business as usual. Additional results over the six-year period are:

- **Resource mobilisation.** Phasing out fossil fuel subsidies could potentially raise $4.7 billion in domestic resources, while a carbon tax could add another $10.6 billion in domestic resources.
- **Job creation.** Both scenarios show increases in employment (540,000 and 670,000 years of employment respectively).
- **Carbon emission reductions.** Both scenarios demonstrate a significant reduction in carbon emissions (saving 19.9 and 18.5 megatonnes of carbon respectively).

- **Savings on energy imports.** In both scenarios, Bangladesh saves significant amounts on energy imports ($429 million and $405 million respectively).
- **Public investments.** In the *Infrastructure Scenario* $12.8 billion is invested in infrastructure. In the *Social Scenario*, $12.9 billion is invested in social protection. Cleantech investments in both scenarios are to $2.6 and $2.5 billion respectively over the 2020-2025 period.

Figure B: Overall result: decoupling (2020–2025, % difference from baseline, Bangladesh)



Source: Model projections, Cambridge Econometrics 2019.

Distribution of benefits and costs

As with any reform, the benefits and costs will not be spread evenly. The modelling results suggest that a progressive impact with higher benefits (in relative terms) for lower income households is possible, particularly in the *Social Scenario*. For businesses, in the *Infrastructure Scenario*, the largest increases in output, both in relative and absolute terms, are in the construction, manufacturing (excluding textiles), mining and quarrying sectors. These sectors benefit from the investments in infrastructure. Some of the manufacturing companies in the supply chain also benefit. Output falls marginally in sectors which are supplying consumer final demands, such as retail. In the *Social Scenario,* most sectors demonstrate an increase in output as they benefit from higher local consumer spending. Manufacturing and construction also have relatively high increases, because of the investment in cleantech for textiles.

Results for the textiles sector

In both scenarios, the textiles sector shows a slight negative result in terms of gross output (0.24% and 0.15% respectively) by 2025, but overall, the Bangladesh economy would be stronger and more competitive in terms of carbon intensity and energy import dependency. Also, it's important to note that the competitiveness impacts of the cleantech investments (totalling more than $2.5 billion) are not yet captured in the model. Bangladesh is the world's second-largest exporter of clothing, and the sector represents 80 percent of foreign earnings. As one of the most polluting industries, operation in a fast-changing global market, the global textiles industry is at a crossroads; continuing the linear model (while imposing external costs to society and future generations), or shifting to circular models, and adapting to changing circumstances. In light of global trends, tax reform could be a way to reduce risks and future-proof the sector.

The key message from the results is that it is possible to design policy measures that reduce harmful emissions and final energy consumption, while at the same time stimulating the economy of Bangladesh, creating jobs and (in the *Social Scenario*) increasing income for the lowest income groups. These results demonstrate that Bangladesh doesn't need to choose between development and environment.

Balancing the interests of stakeholders

The scenarios presented in this study do not claim to be a blueprint or short-term solution, but are a medium- to long-term pathway, to assist in the process of balancing the interests of different stakeholders. Any implementation pathway should be researched and then monitored by the designated national institutions with full access to national statistics. This study is meant to set an example for similar analyses in other countries—particularly those with low- and middle-incomes, facing similar challenges.

Prosperity based on human capital

The foundations of modern tax systems were laid down in the era of the industrial revolution; before globalisation and mass consumption, before the emergence of climate disruption and water supply risks, and before digitisation and automation. In the SDG era it is vital for governments to serve the interests of the people and business at the same time, and to fairly distribute risks and opportunities. Smart tax policies could help countries to 'leapfrog' into the SDG era. Stakeholders, businesses, governments and NGOs should work together to turn tax into a 'force for good' and help build modern tax systems that enable prosperity based less on natural resource use and more on the abundance of human capacities and talents. For this is growth that can be sustained by generations to come.

Introduction

Bridging the SDG finance gap

This is the era of the Sustainable Development Goals (SDGs); an era of unprecedented global social and environmental challenges. The most daunting task will be to adapt the metabolism of our economies to match the carrying capacity of the earth and stay well below 2°C global warming. We face equally important social challenges in our societies, including enabling a growing population to develop to their full potential and find decent work. According to the United Nations, achieving the SDGs is going to cost US$5-6 trillion a year. Developing countries alone face an annual financing gap of $2.5 trillion while Official Development Assistance (ODA) is just $150 billion per year, and on a downward trend. Private flows of investment are also considerably below the level of SDG investment needs. This means there is a massive financing gap.

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Aligning economic growth with the goals of the SDGs will be key. Therefore, a shift is needed from the linear 'take-make-waste' economy, towards an inclusive circular economy, which is regenerative, carbon neutral and distributive. Such circular economies require labour- and knowledge-intensive activities (e.g. repair and maintenance services, recycling, refurbishment and R&D), which could significantly contribute to job creation. Currently, however, governments tend to increase the tax burden on human labour, which incentivises businesses to reduce labour input. At the same time, governments put low or no taxes on natural resource use (such as carbon emissions, fossil fuels and water), thereby leaving resource use unrestrained, causing overconsumption, pollution and waste.

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Given the high unemployment rates in low- and middle-income countries, increasing the tax burden on labour may not necessarily be the best option to raise revenues sustainably. Could taxing pollution rather than people, as advocated by UN Secretary-General António Guterres, be a way of 'leapfrogging' tax systems to the SDG era? Studies indicate that such tax reform (also known as Environmental Tax Reform (ETR)) can indeed have a positive economic, social and environmental impact.

Opportunities and risks of tax reform

The goal of this study is to analyse opportunities and risks of aligning tax policy with the goals of the inclusive circular economy in low- and middle-income countries, focussing on Bangladesh as the first case study. Bangladesh has one of the largest gaps between tax revenue and GDP. The country is highly prone to climate disruption, pollution levels are high and renewable energy sources provide only a fraction of energy needs. It has a large, growing and resilient population and the country has a proven track record of effectively addressing poverty and other challenges. Sustainable inclusive growth is a major national priority. This study is meant to be a steppingstone for similar analyses in other countries, facing similar challenges.

Prosperity based on human capital

Turning tax into a 'force for good' should mean building modern tax systems that enable prosperity based less on natural resource use and more on the abundance of human capacities and talents. This is not a simple task, especially in countries with low- and middle-incomes, which face the multiple challenge of developing the economy and social systems while at the same time preserving natural resources. This study confirms that countries may not need to choose between those goals.

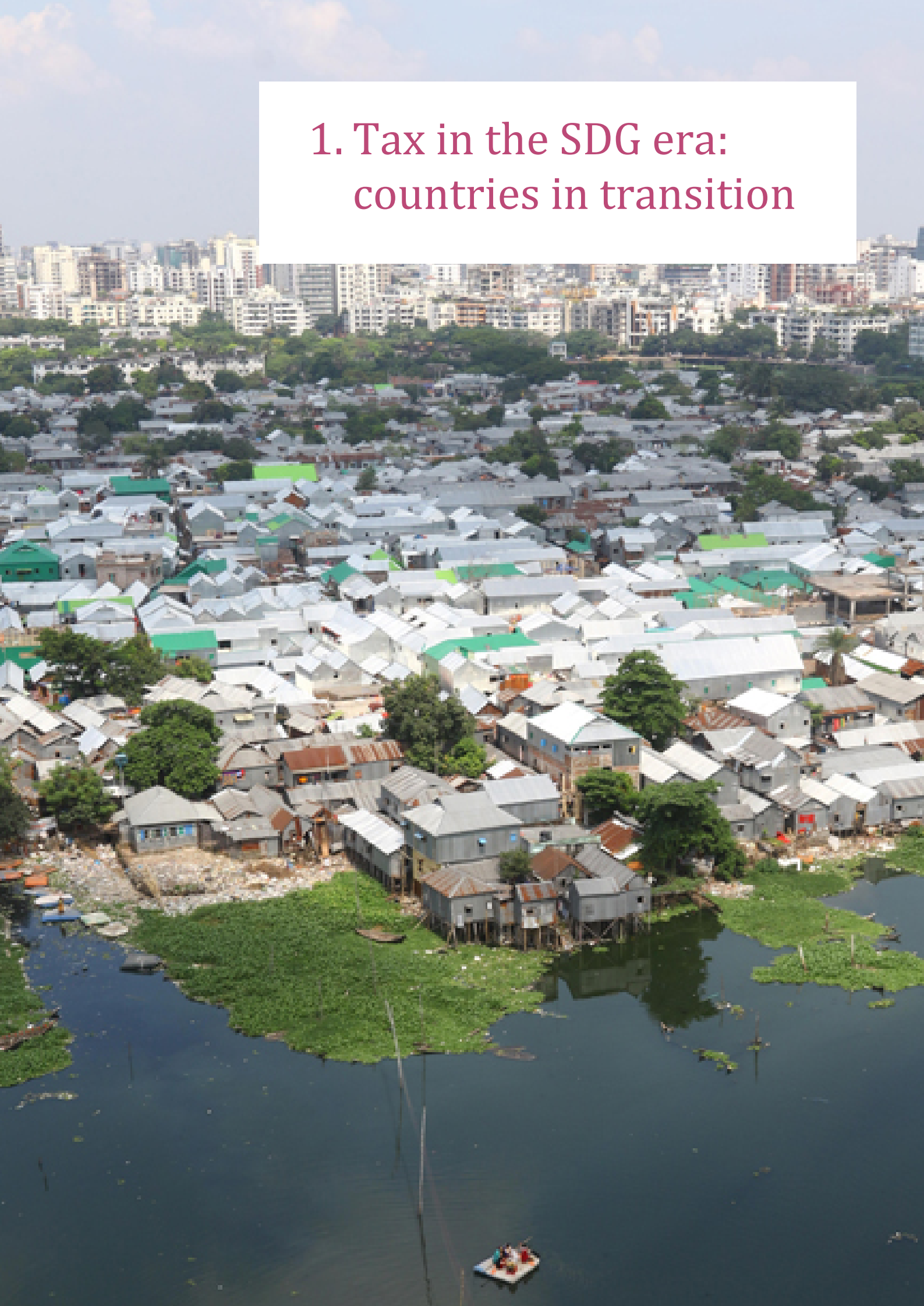
The structure of this report

Chapter 1 looks into the challenges in the 'SDGs era', the role of tax systems in achieving the SDGs and the shift from the current linear economic systems towards circular and inclusive economies. Chapter 2 provides an overview of the geographic, socio-economic, environmental and fiscal context in Bangladesh. Chapter 3 introduces the Ex'tax approach, and how two preliminary scenarios were

developed for the case study of Bangladesh. Chapter 4 provides the key macro-economic modelling results. Chapter 5 explores the implications of tax reform for the Bangladeshi textiles industry in the context of global megatrends. The final chapter 6 includes recommendations for next steps.

It should be emphasised that the scenarios in this study are not a blueprint for implementation. They are meant to provide directions on how tax systems can be rationalised in light of the SDGs and the circular economy and what the potential impacts are. Any implementation pathway should be researched and then monitored by the designated national institutions with full access to national statistics.

1. Tax in the SDG era: countries in transition



This chapter explores how tax systems in general need to be updated in order to support the SDGs. Value Extracted Tax (in short: Ex'tax) is the proposal to increase taxes on natural resource use and pollution and using the revenues to lower the tax burden on labour and increase (social) spending. Such tax reform aligns financial incentives with economic growth based on the abundance of talents and capabilities of people, instead of natural resources.

1.1 The SDGs and the importance of tax reform

Interconnected social and environmental challenges

Humanity is facing unprecedented challenges (Box 1 provides a selection). The most daunting task will be to adapt the metabolism of our economies to match the carrying capacity of the earth and stay below 1.5°C of global warming. According to the latest Intergovernmental Panel on Climate Change (IPCC) report, global carbon emissions must start to reduce well within 12 years if we are to prevent large-scale natural and human risks from becoming irreversible reality.[1] We face equally important social challenges in our societies, including enabling a growing global population[2] to fulfil their basic needs, develop their full potential and find decent work. Governments need coherent strategies to deal with these megatrends.[3]

Box 1: Social and environmental megatrends (a selection)

Pollution kills 9 million people each year, with most of those deaths in low- and middle-income countries.[4]

Climate change hits the poorest people the hardest. As the effects of climate change worsen, escaping poverty becomes more difficult.[5]

Water scarcity affects nearly half the world's population.[6] Climate change is projected to further reduce water availability in many water scarce regions.[7]

Biodiversity is severely under threat; one million species of animal and plants face extinction.[8]

Food: One-third of all food produced for human consumption is lost or wasted globally – while at the same time, almost one billion people go hungry.[9]

Plastics: A truckload of plastic waste is dumped in the oceans every minute, which means that in a few decades there will be more plastics than fish in the oceans.[10]

Unemployment is a reality for 170 million people in the world today.[11] In addition, 140 million people are classified as 'underutilized labour'. Almost 700 million workers in low- and middle-income countries are living in extreme or moderate poverty (i.e. having to live on less than $3.20 per day in PPP terms).[12]

The Sustainable Development Goals

In 2015, the 193 countries of the United Nations (UN) General Assembly adopted the 2030 Development Agenda titled *Transforming our world: the 2030 Agenda for Sustainable Development*.[13] The agenda sets out 17 ambitious Sustainable Development Goals (the SDGs or Global Goals) that integrate social issues (such as fighting poverty and improving global health) and specific environmental issues (such as combating climate change) (see Box 2). As humanity's 'to do list', the SDGs will dominate the global agenda for the upcoming decades.

Financing the SDGs

According to the UN, achieving the SDGs is going to cost $5 to 6 trillion a year. Developing countries alone face an annual financing gap of $2.5 trillion.[14] Since Official Development Assistance (ODA) is $153 billion per year, the gap is huge.[15] Overall, ODA levels have fallen since 2016 for the second year in a row,[16] and only five countries met or exceeded the UN benchmark for ODA contributions of at least 0.7 percent of gross national income.[17] Private financing flows (including foreign direct investment, institutional investing, remittance (the money sent home by immigrants), foundations, microfinance and private equity) are higher than public flows, but they are mostly received by developed economies and they are considerably below the level of incremental SDG investment needs.[18]

Challenges in collecting taxes

Between 50 percent and 80 percent of what is required for the SDGs in low- and middle-income countries would need to come from domestic resources.[19] Taxation will be a key instrument in financing the SDGs, but the regions that are most in need of resources face significant challenges in collecting taxes:

> *"The rate of taxation (ratio of tax revenue to GDP) in the least developed countries declined from a peak of 11.1 per cent in 2012 to 8.8 per cent in 2016. Countries in sub-Saharan Africa faced a similar trend: a decline from 14.9 per cent in 2006 to 10.7 per cent in 2016." (United Nations 2018)*[20]

Research indicates that tax revenues above 15 percent of a country's GDP are critical for economic growth and, ultimately, poverty reduction.[21] In 2016, within the group of emerging countries with tax-to-GDP ratios below 15%, Nigeria had the largest tax-revenue gap, followed by Indonesia and Bangladesh. The total tax-revenue gap in the top-20 countries was $180 billion (compared to ODA of $46 billion).[22]

Box 2: The Sustainable Development Goals

Goal 1. End **poverty** in all its forms everywhere.
Goal 2. End **hunger**, achieve food security and improved nutrition and promote sustainable agriculture.
Goal 3. Ensure **healthy lives** and promote well-being for all at all ages.
Goal 4. Ensure inclusive and equitable quality **education** and promote lifelong learning opportunities for all.
Goal 5. Achieve **gender** equality and empower all women and girls.
Goal 6. Ensure availability and sustainable management of **water and sanitation** for all.
Goal 7. Ensure access to affordable, reliable, sustainable and modern **energy** for all.
Goal 8. Promote sustained, inclusive and sustainable **economic growth**, full and productive employment and **decent work** for all.
Goal 9. Build resilient **infrastructure**, promote inclusive and sustainable **industrialization** and foster **innovation**
Goal 10. Reduce **inequality** within and among countries.
Goal 11. Make **cities** and human settlements inclusive, safe, resilient and sustainable.
Goal 12. Ensure sustainable consumption and production patterns.
Goal 13. Take urgent action to combat **climate change** and its impacts.
Goal 14. Conserve and sustainably use the **oceans, seas and marine resources** for sustainable development.
Goal 15. Protect, restore and promote sustainable use of terrestrial **ecosystems**, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt **biodiversity** loss.
Goal 16. Promote **peaceful** and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
Goal 17. Strengthen the means of implementation and revitalize the **global partnership** for sustainable development.[23]

Tax policy reform mentioned in four SDG targets

Taxes are explicitly mentioned in the targets of four SDGs (see Figure 1):

- The first target of **SDG 1 (No Poverty)** is to *"Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions."*
- **SDG 10 (reducing Inequality)** includes target 10.4: *"Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality."*
- **SDG 12 (sustainable consumption and production)** includes target 12.C: *"Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and*

minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities."

- **SDG 17 (Partnership for the Goals)**, target 17.1, again mentions the need to *"Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection."*

Taxation strongly connected to the SDGs

According to the *Platform for Collaboration on Tax* (a joint initiative of the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the UN and the World Bank), taxation is a significant factor in 10 of the 17 SDGs. Taxes and the SDGs are connected in multiple ways:

> *"(1) taxes generate the funds that finance government activities in support of the SDGs; (2) taxation affects equity and economic growth; (3) taxes influence people's behavior and choices, with implications for health outcomes, gender equity, and the environment; and (4) fair and equitable taxation promotes taxpayer trust in government and strengthens social contracts that underpin development."*[24]

Figure 1: Tax policy targets in the SDGs

Source: United Nations (2015), Transforming our world: the 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org/content/documents/21252030 Agenda for Sustainable Development web.pdf

Not simply a matter of taxing more

Mobilizing domestic resources is not simply a matter of taxing more:

> *"it's also about taxing better by expanding the tax base, ensuring an appropriate distribution of the tax burden among taxpayers, simplifying and improving the efficiency of tax administration, bringing tax laws up to date, and making sure that tax administrators know how to audit local and multinational companies."(World Bank 2018)*[25]

Total ODA for capacity-building and national planning amounted to $20.4 billion in 2016 (18% of total aid).[26]

A $12 trillion business opportunity

It may be clear that the massive investment gap will not be met by public finances alone and higher private sector investment will be indispensable.[27] Governments, corporations and organizations are now exploring how to make an impact and how to measure progress towards achieving the SDGs. According to a report by the Business and Sustainable Development Commission (BSDC), achieving the SDGs will open up $12 trillion of business opportunities in food and agriculture, cities, energy and materials, and health and well-being.[28] But as UNEP FI concludes:

> *"(…) private finance is constrained by risk and return requirements, while public finance is in scarce supply. If the resulting financing gap remains unresolved, investment needs will grow over*

time because of a cumulative effect. Should we conclude that the SDGs are beyond reach? Or could business models be rethought in ways that would increase SDG serving financial flows, but also make them less risky?"[29]

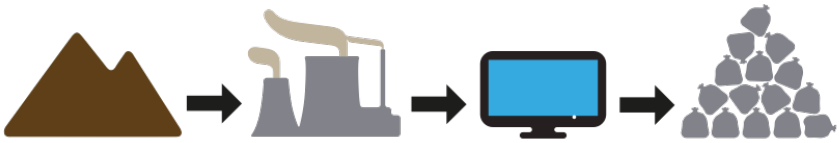
The next section will explore the need to align tax policy with the SDGs and shift financial incentives towards sustainable and inclusive business models. In recent years, corporate income taxes have been in the public eye. This study focuses on two other types of taxes that are less publicised but directly related to today's socio-economic challenges: labour taxes (including social contributions) and environmental (or 'green') taxes.

1.2 The 'polluter pays' principles are not applied

The linear economy

Today's linear 'take-make-waste' industrial model is based on the extraction of natural resources, which are used to create products that become waste after a short lifespan (see Figure 2). This growth model has brought wealth and prosperity, but still leaves many in poverty. Also, the negative side-effects of the model are becoming clear: climate disruption, waste, pollution, loss of biodiversity and scarcity of resources. These impacts are harmful for people, nature and economies worldwide, as waste and pollution are piling up. Every minute, for example, a truck load of textiles is landfilled or incinerated and every second, a truck load of plastics is dumped in the oceans.[30] Between 400,000 and one million people die each year in developing countries because of diseases related to mismanaged waste. At the upper end that is one person every 30 seconds.[31]

Figure 2: The linear 'take-make-waste' economy



External costs

The costs of environmental challenges, such as climate disruption and pollution, are immense. The Lancet Commission, for example, estimates global welfare losses from pollution at $4.6 trillion a year, or 6.2 percent of global economic output.[32] The long-term negative impacts on the global economy caused by carbon emissions in 2017 alone were $16 trillion.[33] In practice, such costs are 'externalised', meaning that they are passed on to society, individuals and future generations, rather than absorbed by the polluter. In recent years, many studies have quantified external costs (or 'negative externalities'). A few examples are provided in Box 3.

Box 3: External costs studies

Plastics. The economic costs (e.g. revenue losses to fisheries, aquaculture, and marine tourism industries) associated with ocean-based consumer plastic pollution amounts to $13 billion per year. (UNEP 2014).[34]

Air pollution. Taking into account only premature deaths, air pollution costs the world economy $5 trillion in welfare losses. The losses are greatest in East Asia and the Pacific, where they amount to 7.5% of GDP, and South Asia, at 7.4% of GDP. (World Bank and Institute for Health Metrics and Evaluation, 2016)[35]

Climate disruption. Southern Asia and Western Africa will be most affected by rising temperatures, with productivity losses equivalent to 4.8% and 4.6%, corresponding to around 40 million and 9 million full-time jobs, respectively. (ILO 2018) [36]

Impacts on businesses. Government inaction on climate change will exacerbate costs and risks, to the tune of $1.2 trillion for 30,000 of the largest listed companies. (UNEP FI 2019)[37]

Considering issues like climate disruption, water scarcity and geopolitical tensions over fuels and materials, it would be rational to put a price on pollution and resource use.[38] Pollution and resource use, however, tend to be relatively tax-free, or even subsidised, as will be addressed next.

Environmental/green taxes

The OECD identifies environmental taxes as taxes on energy, transport, pollution and resources.[39] Throughout this paper, 'green taxes' will refer to all tax measures that put a price on the use of a natural resource. Green taxes are considered growth-friendly, as they are less distortive to the economy than taxes on labour and income.[40] The administrative costs and transaction costs of green taxes are lower than other taxes (notably income taxes).[41] Environmental taxes tend to be much easier to collect than many other taxes, especially direct income taxes. Also, environmental taxes can be levied on a small number of taxpayers, especially upstream taxes on fossil fuel extraction or import. Reducing the number of taxpayers can reduce the overall costs of compliance of the tax system.[42]

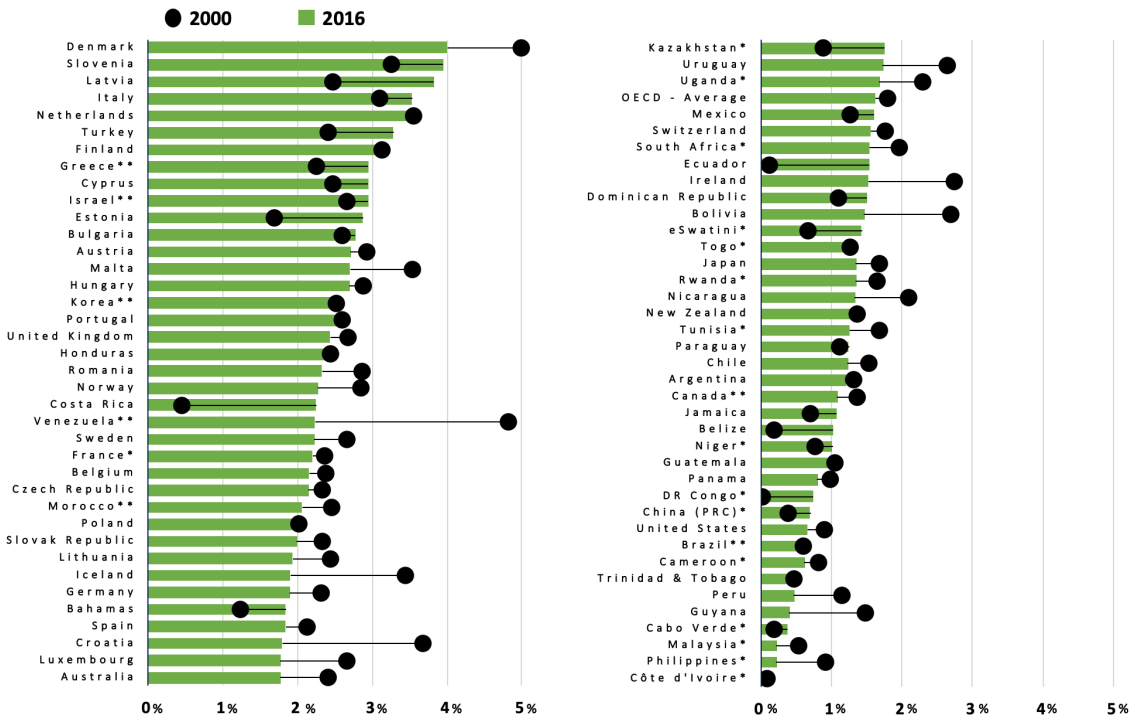
Taxation vs regulation

Unlike emission trading systems or other regulation, green taxes provide more opportunity for recycling the revenues through reducing other taxes to compensate for any welfare loss that may occur. If effectively implemented, cap-and-trade systems can provide greater certainty on environmental outcomes, but green taxes avoid fluctuations in price and provide consumers and businesses with greater certainty on investment decisions.[43] Green taxes are also more economically efficient than direct regulation. MIT's *Global Change* programme found that higher gas taxes are at least 6 to 14 times more cost-effective than stricter fuel standards at reducing gasoline consumption.[44]

Green tax use limited and on declining trend

Despite their benefits, the use of green taxes is limited and on a declining trend. Among OECD countries, environmental tax revenues grew in revenues between 2000 and 2016 (from $471 billion to $742 billion) but declined as a share of total tax revenues (from 5.8% to 5.3%) and as a share of GDP (from 1.8% to 1.6%). Environmental tax as a share of GDP declined in 62% of the countries in the OECD database over the 2000-2016 period (see Figure 3).[45]

Figure 3: Environmental tax as a % of GDP (2000-2016)



**2015, **2014. Source: OECD (Accessed May 2019), Global Revenue Statistics Database.*

Low green tax revenues around the world

Green tax revenues are low around the world. In Canada, for example, environmental taxes raise 3.5 percent of total tax revenues, in the United States 2.6 percent, and in Brazil 2 percent. Data available from Asian economies also show modest green-tax revenues: 3.6% of total tax revenues in China; 12.7% in India; 4.5% in Japan; 10.6% in Korea; 1.5% in Malaysia; 11.3% in Kazakhstan; and 1.3% in the Philippines for example. In Africa, South Africa raises 5.4% of budget through green taxes, Rwanda 8.0%, and Cameroon 4.1%.[46]

Fossil fuel subsidies $373 billion

Besides levying relatively low tax levels on pollution, almost all nations apply direct and indirect subsidies for environmentally damaging activities.[47] Tax credits – defined as a subsidy by the WTO[48]– are a key route of support for the fossil fuel industry.[49] Support measures are typically provided for fossil fuel consumption and production through lower rates, exemptions, or rebates of VAT and excise taxes.[50] The OECD has identified more than 1,000 individual government policies that support fossil fuel production and consumption.[51] In 2009, G20 and Asia-Pacific Economic Cooperation leaders agreed to phase out inefficient fossil fuel subsidies in the medium term.[52] In 2012 global fossil fuel support measures were worth $617 billion. By 2015 they had gone down, but still amounted to $373 billion. The majority of these measures are tax expenditures.[53]

Fossil fuel subsidies $5.2 trillion when taking into account external costs

IMF researchers recently updated their comprehensive report on global fossil-fuel subsidies. They found that, by the common definition of the term, governments subsidized fossil fuels by $296 billion in 2017. The report adds that there is another kind of subsidy, though, which it calls a *post-tax subsidy*. This subsidy reflects the difference between actual fuel consumer prices and the full societal and environmental costs of a fuel. Burning of fossil fuels, the researchers argue, "releases deadly air pollution, hastens the destruction of the climate, and (sometimes) increases traffic fatalities. And since all of those things kill people, they also depress a country's tax base." When taking into account such negative effects, fossil fuel post-tax subsidies are projected as high as $5.2 trillion (6.5 percent of GDP) in 2017.[54]

Fossil fuel subsidies are regressive and distortive

There can be good reasons for governments to make energy more affordable, particularly for the poorest and most vulnerable groups. In practice, however, according to the Asian Development Bank (ADB), fossil fuel subsidies are highly *regressive* as they typically benefit medium- to high-income households, which are bigger energy consumers.[55] The OECD states:

> *"Not only do fossil-fuel subsidies undermine global efforts to mitigate climate change, but they also aggravate local pollution problems, causing further damage to human health and the environment. They represent a considerable strain on public budgets as well, draining scarce fiscal resources that could be put to better use, such as strategic investment in the education, skills, and physical infrastructure that people value most in the 21st century. Last, fossil-fuel subsidies distort the costs and prices that inform the decisions of many producers, investors, and consumers, thereby perpetuating older technologies and energy-intensive modes of production."*[56]

Countries are not sufficiently taxing environmental externalities, as they are "systematically pricing fuels too low."[57] UN Secretary-General António Guterres says it most clearly:

> *"Fossil fuel subsidies mean using taxpayers' money to boost hurricanes, spread droughts and melt glaciers."*[58]

Carbon pricing on the rise but prices are low

As of 2019, 57 national and sub-national jurisdictions around the world have implemented or scheduled carbon pricing schemes; 29 have opted for a carbon tax. Governments raised approximately $44 billion in carbon pricing revenues in 2018, with more than half generated by carbon taxes. This is an increase of nearly $11 billion compared to the previous year. Still, the vast majority (80 percent) of all global greenhouse gas emissions are free of charge. About half of the emissions covered by carbon pricing

mechanisms are priced at less than $10 per tonne. Only 5 percent of emissions covered under a pricing mechanism are priced at a level consistent with meeting the goals of the Paris Agreement.[59]

The benefits of action

Many studies underline the multiple benefits of effective environmental action. A few examples:

- Restoring the oceans could result in being able to feed a billion people a healthy seafood meal each day.[60]
- Elimination of fossil fuel subsidies would have created global net economic welfare gains of more than $1.3 trillion in 2015. At the same time, air pollution deaths would have been 46 percent lower.[61]
- Bold climate action, including carbon pricing, could yield a direct economic gain of $26 trillion through to 2030.[62]

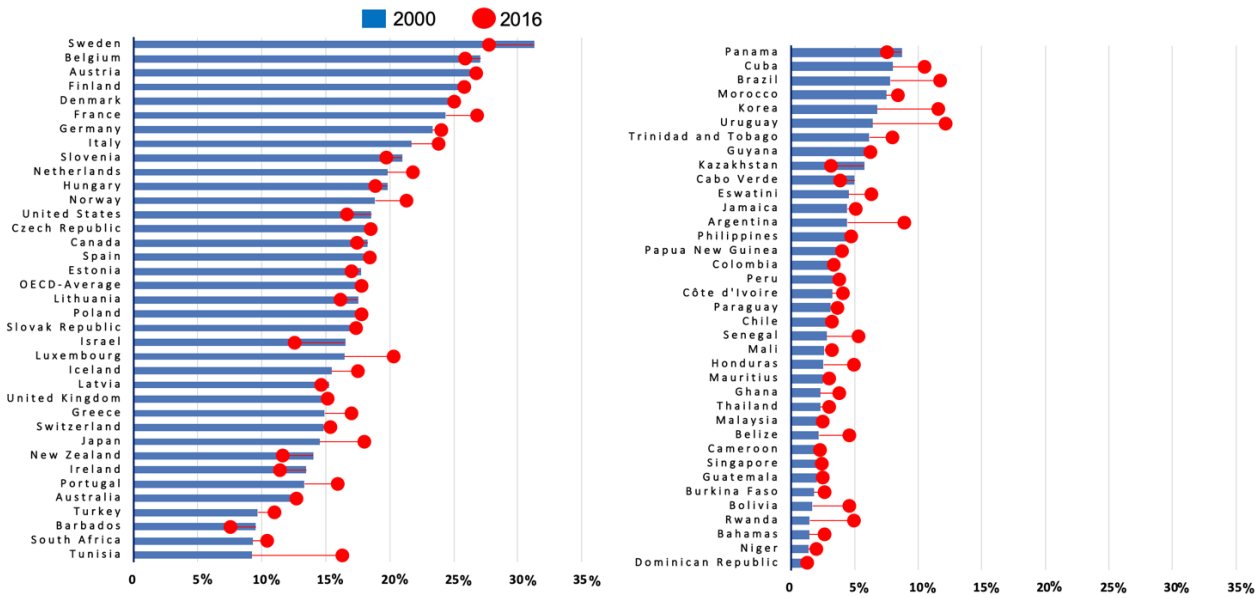
Despite the clear benefits of healthy oceans, clean air, fresh water and, natural resources are structurally overutilized. In our economies, at the same time, human potential is underutilized. Addressing the need for decent jobs will be key in the SDG era. Unfortunately, our tax systems do not support job creation effectively yet, as will be explored in the next sections.

1.3 Labour taxes on the rise

Tax burden on labour high

Consistent with the classification of the European Commission, this study identifies labour taxes including personal income tax, social contributions and payroll taxes.[63] In 2016, in the 36 member countries of the OECD, labour taxes accounted for 51.1 percent of total tax revenues. Such labour taxes are on a rising trend. Labour taxes as a share of GDP increased in 73% of the countries in the OECD database over the 2000-2016 period (see Figure 4).[64]

Figure 4: Labour taxes as a % of GDP (2000-2016)



Source: OECD (Accessed May 2019), Global Revenue Statistics Database. Labour taxes are assumed to consist of the sum of the following line items: (1100) taxes on income of individuals, (2000) social security contributions and (3000) payroll taxes. Costa Rica's earliest available data for PIT: 2003.

Labour tax wedge increased

The *labour tax wedge* is a measure of the tax burden on employment incomes. It is the difference between the employer's cost of hiring a worker and the worker's net disposable income. Between 2009 and 2016, the average labour tax wedge across the OECD increased by 0.7 percentage points, to 36 percent.[65] This means that, on average, of every dollar an employer pays in labour costs, only $0.64 ends up in the pocket of the employee.

Labour versus green tax revenues across continents

In general, while OECD countries rely more on labour taxes, African, Asian, Latin American and Caribbean countries may rely more on taxes on goods and services. Still, labour tax revenues provide significant shares of revenues in these regions, and substantially more than green taxes. In Brazil, labour taxes provide 36 percent of total tax revenues, whereas green taxes raise 2 percent of revenues. In Costa Rica this ratio is 45:10, in Mexico 36:2. Such differences in proportions can also be found in Africa, with South Africa raising 36% on labour and 5% on green taxes. In Rwanda the ratio was 29:8 and in Cameroon 15:4. For Asia, the OECD database includes full data sets for Japan (59:1), Korea (41:11), the Philippines (28:1), Malaysia (15:1), Singapore (17:2) and Kazakhstan (21:11).[66]

Links between labour taxes and employment

Labour taxes have unintended side-effects. Of all taxes, they have the clearest and most direct impact on employment.[67] High taxes on labour income can hamper both job creation and work incentives.[68] Research has demonstrated that a lower tax burden on labour creates employment opportunities.[69] The influence of taxation on employment and unemployment was, for example, significant in a sample of 21 OECD countries. Between 1983 and 2003:

> *"a 10 percentage points reduction of the tax wedge in an average OECD country would reduce equilibrium unemployment by 2.8 percentage points and increase the employment rate by a larger 3.7 percentage points (due to the positive impact on participation)". (Quoted in Dolenc and Laporšek 2010)*[70]

According to the OECD, low-income workers, single parents, second earners and older workers are especially responsive to changes in labour income taxation. The retirement decision of older workers is also highly responsive to tax incentives.[71] In general, both the decision to enter the labour force and the hours worked are affected by labour taxes.[72] Over the years, many researchers and international institutions have called for lower labour taxes to reduce unemployment - see for example (staff) contributions published by the OECD (2018; 2011),[73] World Bank (2015),[74] IMF (2015, 2014),[75] the European Commission (2017, 2013)[76] and the Eurogroup (2014).[77]

Incentives to minimise labour input

For employers, labour taxes increase payroll costs - in addition to net salaries. Such costs tend to encourage employers (both in business and public services such as education and healthcare) to gain efficiency by minimising the number of employees. In general, employers may resort to a number of options to reduce labour input, including:

- Reducing service levels provided to customers (e.g. in hotels,[78] or selling products without additional repair and maintenance services)
- Replacing manual service with machines (e.g. self-checkout lanes in supermarkets[79] and automated assembly lines or 'sewbots').[80]
- Shifting to mass production rather than bespoke, custom-made products (e.g. mass-produced versus hand-made shoes).[81]
- Hiring short-term, informal workers rather than workers on a permanent contract (hiring interns[82] or self-employed persons)[83] or operating in the gig- economy.[84]
- Understaffing (putting pressure on workers to produce more in less time).[85]
- Shifting production to ever-lower income countries.[86]

Automation risks particularly high in South Asia

Cost considerations can also drive the replacement of human roles with automation and artificial intelligence.[87] ILO research found that 137 million workers in South Asia are at a high risk of losing their jobs to automation in the next two decades. Especially garment workers face a high automation risk.[88] This trend makes it even more important to foster inclusive economies in which labour demand is sufficient to enable people whose tasks or jobs are taken over by machines to find new roles.

Human capital in abundance

With roughly 83 million people being added to the world's population every year, the upward trend in population size is expected to continue.[89] This means that there is a growing abundance of human capital (talents and capabilities).

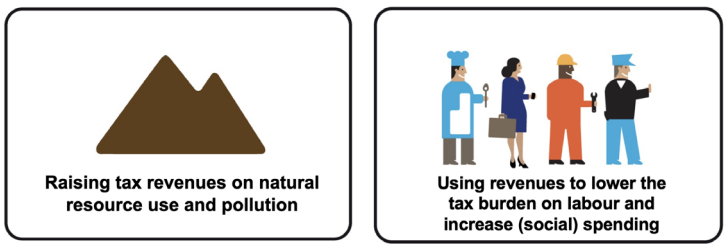
One of the tasks in the SDG era is to accommodate for the full capacity of human potential and provide meaningful employment to a growing world population. Tax could play a significant role. Avoiding a high tax burden on labour while boosting social protection seems to be key. An option for financing such strategy is to increase the tax burden on pollution and resource use. This would enable the 'inclusive circular economy' to grow, as will be discussed next.

1.4 Updating tax systems to support the inclusive circular economy

Tax reform principles

As mentioned before, many tax systems increasingly penalize human input while incentivizing the depletion of resources. Environmental Tax Reform (ETR) (also known as Green Tax Reform (GTR), Value Extracted Tax, or 'Ex'tax') is the proposal to shift financial incentives, by putting a price on natural resource use and pollution and using the revenues to lower the tax burden on labour and increase (social) spending (see Figure 5). Since both ETR and GTR put emphasis on environmental rather than social impact, the broader term 'tax reform' will be used throughout this document.[90]

Figure 5: Value Extracted Tax (Ex'tax) principles



Support for tax reform

Over the years, many researchers and international organisations have called for tax reform - see for example (staff) discussion papers published by the IMF (2016; 2015; 2012),[91] ILO (2018, 2012, 2009),[92] and World Bank (2015)[93] as well as IPCC (2018),[94] OECD (2018; 2015; 2013),[95] the European Parliament (2015; 2013; 2012)[96] and the European Commission (2018; 2017; 2016; 2015).[97] A selection of quotes is provided in Box 4. Business groups such as WBCSD,[98] the Ellen MacArthur Foundation[99] and the BSDC[100] have also supported tax reform. According to the European Commission,[101] a shift from labour to green taxes is 'a winning strategy' and United Nations Secretary-General António Guterres has stated most clearly:

> *"First, let's shift taxes from salaries to carbon. We should tax pollution, not people. Second, stop subsidizing fossil fuels."*[102]

Box 4: Support for shifting from labour to green taxes

"offsetting increased carbon prices with lower labour taxes can potentially decrease labour costs (without affecting salaries), enhance employment and reduce the attractiveness of informal economic activity)." **- IPCC 2018**[103]

"Increased or more effective use of environmentally related taxes can drive growth-oriented reform by shifting the tax burden away from more distortive taxes, e.g. on corporate or personal income, and contribute to fiscal consolidation–" **- OECD 2015**[104]

"taxing 'bads' (pollutants) rather than 'goods' (labor, capital) can allow for a less costly tax system (...). Revenues can also be used to reduce the social charges imposed on labor costs. This may reduce unemployment rates and help increase real wages." **- High-Level Commission on Carbon Prices, led by Nobel Laureate Joseph Stiglitz and Lord Nicholas Stern 2017**[105]

More statements in support of tax reform are available at www.ex-tax.com.

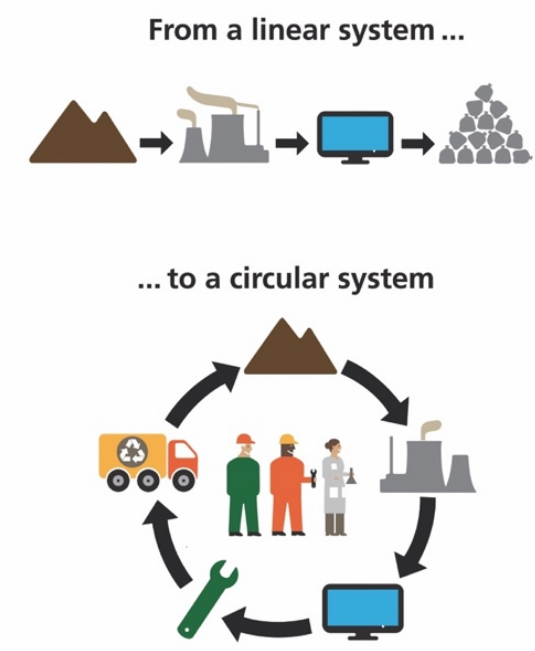
From a linear to a circular economy

In recent years, the concept of the 'circular economy' has gained traction and governments and institutions are adopting circular economy goals, which will likely boost the need for tax reform. A circular economy entails a shift from today's linear industrial model to a carbon-neutral and regenerative model in which products are 'made to be made again'. The Ellen MacArthur Foundation defines a circular economy as follows:

> *"an industrial system that is restorative or regenerative by intention and design. It replaces the "end-of-life" concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models".*

In this way, finite resources and materials are not wasted, and businesses can add value over and over again by applying business models such as repair and maintenance services, recycling, refurbishment and remanufacturing (as illustrated by Figure 6). The circular economy is now an official goal of the 28 countries of the European Union[106] as well as the governments of China,[107] Germany,[108] France,[109] Scotland,[110] Slovenia,[111] Portugal, [112] Italy, [113] Finland[114] and Greece.[115] The Netherlands aims for a 50 percent reduction in the use of primary raw materials (minerals, fossil and metals) by 2030 and a fully circular economy by 2050.[116] Several of these national and regional plans specifically refer to tax reform as a means to achieve a circular economy.[117]

Figure 6: Shifting from a linear to a circular economy



A circular economy is inclusive by design

There is a strong link between labour taxes and the circular economy, as the development of sustainable products and services requires more time, effort, craftsmanship and R&D than linear, mass-produced goods. A World Bank study, for example, showed that clean energy (energy efficiency and renewable energy) creates three times as many jobs as oil and natural gas per million dollars of spending.[118] ILO researchers project that under a circular economy scenario, worldwide employment would grow by 0.1 per cent by 2030 in comparison with a business-as-usual scenario.[119] A circular economy is therefore as much about people and their livelihoods as it is about resource use, emissions and waste.

Climate risks to business $1 trillion

Business leaders have become increasingly aware of the risks of the environmental megatrends. It is now clear that companies that use fewer resources and cause less pollution will in future be less vulnerable to resource supply risks. A recent report by CDP revealed that 215 of the biggest global companies have valued the climate risks to their businesses at almost $1 trillion - with many likely to hit within the next 5 years.[120] The Financial Stability Board's TCFD has stated:

> *"Companies that invest in activities that are susceptible to climate-related risks may be less resilient to the transition to a lower-carbon economy"*[121]

The role of business has changed

The role of business has changed significantly in the debate around carbon and the climate crisis, with businesses actively supporting the Paris Climate Agreement. In 2015, companies and investors with over $11 trillion in assets signed the *Paris Pledge for Action*. Another example is the *We Are Still In Coalition,* whose members represent over $9.4 trillion and comprises more than 3,500 cities, states, businesses and institutions that are working towards the U.S. targets under the Paris Climate Agreement.[122] And by September 2019, a record 515 institutional investors managing $35 trillion in assets had signed a call to governments to 'put a meaningful price on carbon' and 'end government subsidies for fossil fuels'.[123]

Internal carbon pricing

In IEA's *World Energy Outlook*, carbon prices will reach $75–$100 per tonne of CO_2 by 2030, in a scenario consistent with meeting Paris Climate Agreement goals.[124] Many business leaders are acting in anticipation of carbon policies, which they believe are inevitable. In 2017, almost 1,400 companies factored an internal 'shadow price' on carbon into their business plans, representing an eight-fold leap over four years.[125] Unilever, for example, has been internally pricing carbon emissions since 2016, creating a fund of €50 million a year to reinvest in clean technology.[126] Applying such pricing has proven to shift investment decisions toward low-carbon options as they become more competitive than polluting options.[127] Most attention goes out globally towards carbon pricing, but more than 50 companies, including Colgate Palmolive Company and Diageo Plc, have established internal water pricing.[128]

Evolution of business models

Driven by the risks of megatrends and driven by the opportunities of new technologies, new business models are emerging in every sector. Table 1 provides a selection of examples. Companies shift activities from classic linear business models towards urban mining (e.g. Teck and GemChina), towards reuse (e.g. Maersk, Adidas, BMW), towards resale models (e.g. H&M, Ikea, Ycloset) and towards clean energy (e.g. Vattenfall, Shell, Total, BP, Apple). In the apparel industry, for example, H&M has committed to use 100 percent recycled or sustainably sourced materials by 2030[129] and Kering aims to reduce its impact across its supply chain by 40 percent by 2025.[130] IKEA has announced its goal of being a fully circular business by 2030.[131] This means IKEA products will be moving in a 'loop' rather than in a line that ends in landfill or an incinerator.

Table 1: Examples of business model innovation by sector

Food sector

Nescafé has planted 2 million native shade-providing trees within and around coffee farms to protect soil against erosion and improve soil fertility and water retention while offering opportunities for income diversification to the farmers, through the sale of timber and fruit.[132]
Heineken has built circular brewery in Mexico where every piece of waste is repurposed or recycled.[133]
Tyson Foods Inc., the largest U.S. meat producer, is moving into the vegetarian protein business.[134]

Energy

Total invests $300 million to install solar capacity at 5,000 gas stations around the world.[135]
BP and Dupont have developed a second-generation biofuel.[136]
Vattenfall is building the first offshore wind farm without subsidies.[137]
Tata Power Solar commissions the world's largest rooftop solar array.[138]

Metals & mining

Teck recovers materials from e-waste[139]
Tata Steel has developed technology that reduces CO_2 emissions in the steelmaking process by 50%.[140]
SSAB, LKAB and Vattenfall are building a testing facility for steel using hydrogen.[141]
GemChina collects and recycles materials from discarded batteries.[142]
ArcelorMittal steel plant pilot scheme converts harmful by-products into renewable energy.[143]
Goldcorp and Sandvik convert a mine into an all-electric operation, which improves air quality, reduces noise pollution, and eliminates negative health effects that diesel drills have on miners.[144]
Glencore has announced to cap its coal production at current levels after coming under pressure from investors.[145]

Apparel

Levi's makes clothes from hemp and recycled jeans.[146]
Adidas sold 1 million shoes made out of ocean plastic in 2017[147] and develops a running shoe that will be collected and repurposed from consumers.[148]
North Face is cutting waste by selling refurbished coats.[149]
Reebok trainers are comprised of a bio-based sole made from a corn-based plastic substitute, the insole is made from castor bean oil, the fabrics are undyed, and the packaging is made from recycled materials.[150]
Ralph Lauren produces shirts made of plastic bottles and dyed through a process that uses zero water.[151]
H&M sells second-hand clothes.[152]
YCloset offers an online clothing subscription service in China.[153]

Other consumer goods

IKEA is renting furniture, is replacing the use of polystyrene with biodegradable packaging made of mushrooms,[154] and offers solar panel purchase and installation services.[155]
Interface turns discarded fishing nets into carpet tiles.[156]
Carlsberg glues beer cans together to abandon plastic rings.[157]
Unilever launched an education campaign to help consumers save water in Brazil during the country's water shortage. The brand grew at nearly double the market rate.[158]
11 brands (Amcor, Ecover, Evian, L'Oréal, Mars, M&S, PepsiCo, The Coca-Cola Company, Unilever, Walmart and Werner & Mertz) are working towards using 100% reusable, recyclable or compostable packaging by 2025. Together this represents more than 6 million tonnes of plastic packaging per year.[159]
Apple global facilities – retail stores, offices, data centres and co-located facilities in 43 countries, including the U.S., China and India – powered with 100% clean energy.[160]

Transport & logistics

Deutsche Post/DHL is deploying electric vehicles.[161]
Central Japan Railway Company (JR Central) high speed train has a market share of 86% versus 14% for the airplane between Tokyo and Osaka (515 kilometres).[162]
Maersk Line has developed a Cradle to Cradle Passport for ships, creating a detailed inventory that can be used for identifying and recycling the components.[163]
United Airlines will be using biofuel -produced from household trash- to power some of their flights.[164]
SkySails produces large kite-like sails that attach to bulk carrier ships, which can save 30 tonnes of CO_2 per day.[165]
Qantas has trialled the world's first flight ever to produce no landfill waste as the airline embarks on a mission to cut out the use of 100 million plastic items from its planes.[166]

Vehicles

Daimler aims to have 50 all-electric test trucks on roads by end of 2019.[167]
Ford is to invest $4.5 billion in electric cars.[168]
BMW/Mini offers car-sharing services reusing batteries for flexible storage of renewable energy.[169]
Volvo has built electric refuse truck model which can carry a gross weight of 27 metric tons.[170]
Porsche has introduced its first fully electric sports car.[171]

Various

Italcementi has developed a special mix for porous and pervious pavements, roads, walkways and parking lots, specialised for rain and storm water management.[172]
Lafarge has developed cement with a 25–30% smaller carbon footprint.[173]
AkzoNobel Eco Premium Solutions – products that have a significant, measurable sustainability benefit over the competition – account for 19% of sales.[174]
ABN AMRO bank has committed to financing €1 billion in circular assets by 2020.[175]
Credit Suisse Group, ING Bank, FMO and UNDP-UN Social Fund jointly provide funding for the circular economy, sustainable energy and social impact in Asia.[176]
Philips aims to deliver 15% of total revenues from circular solutions and take back and repurpose all the large medical systems by 2020.[177]
Johnson & Johnson, Procter & Gamble, Goldman Sachs, Nike, Starbucks, Salesforce, Steelcase, Voya Financial and Walmart commit to sourcing 100% renewable electricity.[178]

Levelling the playing field

The business models mentioned above are generally more resource-efficient than 'business as usual' models, but at the same time, they require more R&D and human input, to organise take-back systems for products, new supply-chain management and improved service models. Such sustainable business models currently need to compete with activities that require tax-free pollution in order to be competitive. Therefore, in principle, applying the 'polluter pays' principles will level the playing field; what may be a disadvantage to a polluter may mean an advantage to cleaner and innovative solutions.

Tax reform is a potential tool to 'future-proof' economies. The risks and opportunities of tax reform are not evenly distributed, though, and depend on the details of implementation. The next section will look more closely at options in the implementation process and the impacts of tax reform.

1.5 Frequently asked questions

This section will briefly discuss some of the most frequently asked questions on tax reform. How does tax reform work? What are the impacts for the economy? Has it ever been put in practice? And does tax reform increase inequality?

1.5.1 How does tax reform work?

A step-by step approach
Simply put, tax reform requires the following steps:

Step 1: Assessing the pathway necessary to achieve national, regional and global ambitions.

Step 2: Putting a price on pollution and natural resource use.

Step 3: Using the revenues to lower the tax burden on labour, improve social protection (in particular addressing the needs of lower-income households) and increase public investments.

Step 4: Monitoring and adjusting policy measures over time.

During the process, engaging with businesses and the public ahead of any change and communicating the impacts in a transparent manner will be key.

Wide range of policy options
In practice, each country faces a unique set of circumstances and the 'low-hanging fruits' in terms of tax reform differ per country. The Policy Toolkit below was developed by The Ex'tax Project to assess potential options to raise revenues (Figure 7) and use revenues (Figure 8).

- Figure 7 provides more than a hundred tax base options available to governments to apply the 'polluter pays' principles and raise revenues based on natural resource use and consumption (e.g. air pollution, energy, fossil fuels, metals and minerals).[179] Each category includes several sub-categories. For example, pricing schemes could be focused on different types of air pollution, such as carbon, particulate matter and/or nitrogen oxides.
- Figure 8 shows policy options to use tax revenues for the benefit of society (e.g. investments, social assistance and environmental protection). Each category includes several sub-categories. Investments, for example could, amongst others, be directed towards infrastructure, R&D, renewable energy, housing or coastal protection.

Beyond carbon pricing
In international research, most attention goes out to carbon pricing. It is important to keep in mind, though, that carbon emissions, water and materials usage are strongly interconnected. According to the OECD, half of carbon emissions are related to resource management.[180] The Toolkit therefore keeps a broad perspective. Also, a common argument against carbon taxes is that the tax drives carbon emissions down, and therefore, erodes its own tax base, so that there is less and less to tax. This challenge can be solved by increasing rates progressively according to a pre-announced schedule and expanding the tax bases. The Toolkit illustrates that governments have plenty of options to raise revenues, and to make up for any potential eroding tax base.

Climate damages payments
It is important to note, that in addition to putting a price on pollution and resource use in national systems, there is a global dimension that needs to be addressed, since many poor countries are being significantly harmed by the impacts arising from wealthy countries' carbon emissions.[181] Some form of climate damages payments will be needed to raise funding for adaptation measures in low-income countries.[182]

Figure 7: The Ex'tax Toolkit – Raising Revenues

Source: Adaptation from The Ex'tax Project, Deloitte, EY, KPMG, Meijburg and PwC (2016), New Era. New plan. Europe. A Fiscal Strategy for an Inclusive, Circular Economy.

Figure 8: The Ex'tax Toolkit – Use of Revenues

Source: Adaptation from The Ex'tax Project, Deloitte, EY, KPMG, Meijburg and PwC (2016), New Era. New plan. Europe. A Fiscal Strategy for an Inclusive, Circular Economy.

1.5.2 What are the impacts of tax reform for the economy?

Theoretical debate

The foundations of modern tax systems were laid down in the era of the industrial revolution; before globalisation and mass consumption, before the emergence of climate disruption and water supply risks, and before digitisation and automation. Economies and societies have now become highly complex and interconnected. Because of this complexity, modelling the impacts of multiple policy measures is not easy. Since the 1990s there has been much discussion among economists around the different theories and methods used to assess the economy-wide effects of tax reform. The discussion revolves around the question under which circumstances tax reform could contribute to environmental, economic and employment benefits. Studies tend to focus on a variety of countries and use different models, scenarios and assumptions, which makes it difficult to compare the outcomes.[183] Over the years, a large body of research has emerged, though, showing that the costs of inaction are higher (see sections 1.1 and 1.2), and that carefully designed tax reform can actually have multiple benefits.[184]

The many 'dividends' of tax reform

Pigato (2019), published by the World Bank, provides an extensive overview of the considerable benefits of tax reform found in the literature, and summarizes that tax reform can help countries reap a 'triple dividend' of cutting pollution, raising economic activity, and generating and funding public goods and development co-benefits (such as direct improvements in human health). Green taxes, for example, tend to be much easier to collect than many other taxes, especially direct income taxes; therefore, shifting from income taxes to green taxes can reduce the costs of tax evasion. Also, green taxes can be levied on a small number of taxpayers, especially upstream taxes on fossil fuel extraction or import. Reducing the number of taxpayers can reduce the overall costs of compliance of the tax system. Given such considerable benefits, tax reform should be an integral part of all modern fiscal systems, the report states.[185]

Tax reform particularly desirable in developing countries

Tax reform is considered particularly desirable in developing countries, as the benefits reflect several features that are common in developing countries, including:

> *"(i) large informal sectors, which create opportunities to increase employment and output by using ETR revenues to reduce formal-sector taxes; (ii) inefficient tax systems, which create opportunities for ETR to reduce tax distortions, broaden the tax base, and tax rents rather than profits; and (iii) low levels of domestic taxation, which create opportunities for ETR to mobilize domestic resources to fund growth-enhancing public investment. These factors make it likely that ETR will raise measures of economic activity (for example, output and employment) more in developing countries than in developed countries."*

Development co-benefits tend to be particularly large in developing countries:

> *"By discouraging pollution-intensive activities, environmental taxation can promote improvements in air quality and public health, alleviate costly traffic congestion, and reduce the frequency of road accidents. (…) Meanwhile, the revenue from environmental taxes can help the economy to adapt to climate change and fund increased spending on education, infrastructure, social services, and other public goods."*

As a result, co-benefits alone may justify the use of tax reform in developing countries, even before the benefit of climate mitigation is considered.[186]

Impacts on competitiveness

Contrary to popular belief, existing literature (mainly focused on high-income countries) has found little evidence of adverse competitiveness effects from tax reform. Any adverse effects tend to be small and concentrated in a few energy-intensive and trade-exposed sectors. If anything, tax reform incentivizes firms to adopt or invent more efficient technologies. Increases in fuel prices faced by firms across 11 upper-middle-income countries in Latin America and Eastern and Central Europe, as well as Indonesia and Mexico are associated with improvements in labor productivity and profitability. Also,

competitiveness losses for some types of firms or sectors may be more than offset by gains in others. In addition, there is little empirical evidence of significant carbon leakage (when firms relocate to less regulated markets).[187] The European Emission Trading System (EU ETS) induced about 10 percent carbon emission reductions between 2005 and 2012 but had no negative impact on the economic performance of regulated firms. In fact, the carbon pricing mechanism led to an increase in regulated firms' revenues and fixed assets.[188]

1.5.3 Where has tax reform been put in practice?

The most well-known and documented tax reforms have taken place in Europe and in British Colombia:

The case of Europe

In the 1990s and early 2000s, seven European countries took steps to shift the tax burden from labour to energy and transportation. In total, these reforms increased green tax revenues by more than €25 billion annually, for a corresponding decrease in labour taxes. The associated reductions of carbon emissions have been documented in several studies. The burden for specific energy-intensive industries remained modest (1%-2% increase in energy costs) and the tax shifts generally had a positive effect on economic activity, depending on how the revenues from the green taxes were recycled. Also, the reforms caused employment in some of the countries to increase by as much as 0.5 percent.[189]

The case of British Colombia

In 2008, the Canadian province of British Columbia started taxing fossil fuel users, in exchange for business tax cuts and tax credits, personal income tax cuts (targeted at lower income categories), low-income tax credits and reductions in property taxes.[190] The tax credit for low-income households has made the carbon tax progressive.[191] Since then:

> *"the economy has grown by an average of nearly 2 percent a year, despite a big national recession through 2009, outpacing the rest of Canada. The use of gasoline, coal and other carbon-based fuels has dropped 16 percent during the same period, reducing greenhouse gas pollution." (Scientific American 2015)[192]*

Employment in the most carbon-intensive industries fell, but this was more than offset by increases in other industries, and net employment rose 0.74 percent between 2007 and 2013.[193] As of 2019, carbon pricing applies throughout Canada.[194]

Key learnings for implementation

Numerous studies have looked at the prerequisites for successful implementation of -especially- carbon pricing. Recommendations include building public trust and low corruption levels, for example.[195] Developing countries are advised to consider taxing upstream rather than downstream. Upstream fuel taxes tend to entail taxing fewer entities (importing or extracting firms) compared to downstream emissions taxes (such as taxes on the pollution released from individual entities burning the fuel), which minimizes the administrative burden, both for firms and for government bureaucracy.[196] In some countries, avoiding the term 'tax' and instead using the term 'CO2 levy', or 'fee and dividend' could make measure more acceptable to citizens. Overall, there seems to be a consensus that reforms should be introduced gradually, and public acceptance should be built with an information campaign.[197] Drawing on international research, especially in Canada, the *Guide to Communicating Carbon pricing* recommends that "communicators foreground the way that revenues are used and the benefits they generate. For this reason, decisions around revenue use will be critical for how the policy is received."[198] It may be clear that countries will adopt the principles of tax reform only when there is long-term vision, good governance and accountability.

1.5.4 *Does tax reform increase inequality?*

Progressive tax reform

An often-heard worry is that environmental taxes could increase income inequality: they hit low-income households more, as they pay higher shares of their incomes towards energy-intensive goods. It is possible, however, to prevent taxes from increasing income-inequality if the proceeds are used to benefit the poorest population.[199] Also, against popular belief, fuel and coal taxes can have progressive effects. A meta-analysis of 21 country studies found that taxes on motor fuels were progressive in 10 of the 12 developing countries studied. Overall, concerns about distributional equity and poverty are not strong justifications for maintaining low green taxes. Even in instances where the poorest lose out in relative terms, only a small portion (up to a third) of green revenues is needed to compensate lower-income groups.[200]

Options to alleviate low-income groups

In practice, plenty of policy options are available to alleviate the impacts on households in need. Benefits can take the form of (means-tested) tax credits, exemptions, allowances or deductions. In some countries, cash transfers might ease the transition for the unemployed and those who live in poverty: the right solution will differ from one country to another. If desirable, green taxes can also be made more progressive by applying block tariffs (higher rates for higher use) or a tax-free threshold (e.g. leaving a certain amount of water or energy untaxed). Careful design and implementation can alleviate many, if not all of the concerns about discriminatory effects. Overall, it is important to consider all taxes (and transfer payments) together as a system:

> *"not all taxes need be progressive as long as the overall system is." (Mirrlees 2011)*[201]

Failing to tax externalities is regressive

It is important to note that failing to tax environmental externalities is regressive. Fossil fuel subsidies are highly regressive as they typically benefit medium- to high-income households, which are bigger energy consumers (see section 1.4). Furthermore, a large share of the welfare costs of environmental externalities falls on the poor, including increased mortality and morbidity, depletion of resources,[202] crop failures and loss of income.[203]

Policies to leapfrog into the SDG era

Leapfrogging is the concept of bypassing intermediate stages of technology through which countries have historically passed during the development process.[204] A well-known example is how some developing countries have skipped the development of landline infrastructure by moving directly to mobile telecommunications.[205] In Bangladesh in 2017, for example, the share of people with a mobile money account jumped from 3% to 21%.[206] In the field of sustainability, similar leaps are made. Between 2012 and 2017, the Chinese city of Shenzhen electrified 16,000 diesel buses.[207]

Leapfrogging is generally associated with technological innovation but could also apply to policy development.[208] Low-income countries often have a low tax take (if not rates) on labour taxes. As experience in higher-income countries shows, and given the high unemployment rates, increasing taxes on labour may not necessarily be the best option to increase revenues sustainably. Taxing the use of natural resources might be a way of leapfrogging tax systems to the SDG era and the development of social protection systems. For example, in 60 out of the 87 countries reviewed by the World Bank, a domestic carbon tax of $30 per tonne of CO_2 would provide the resources to more than double current levels of social assistance in the country.[209]

How would tax reform work in a country like Bangladesh; a country in transition from low-income to middle-income status? A country with a large and growing population and most vulnerable to climate change? The next chapter will explore the extraordinary achievements and challenges of Bangladesh in terms of economic, social and environmental development. This information will serve as the backdrop to the policy scenarios developed in Chapter 3.

2. Bangladesh introduction

Bangladesh has demonstrated remarkable resilience in addressing severe predicaments. The country is still facing multiple challenges, though, including a need for economic development, jobs and social protection, while at the same time effectively addressing the effects of climate disruption, pollution and resource depletion. This section explores why an alignment of taxes with the SDGs is highly topical for Bangladesh.

The following section explores a selection of geographic, socio-economic, environmental and fiscal characteristics of Bangladesh. This is by no means a complete overview, but the selected information will help assess the needs and potential for tax reform.

2.1 Geography, population and climate

A densely populated delta

Bangladesh is a densely populated country in South Asia. It is bordered by India and has a small border with the Republic of the Union of Myanmar (also known as Burma). The major part of Bangladesh lies in the delta of the Ganges, Brahmaputra and Meghna rivers, which spring from the Himalaya mountain range. The rivers deposit their freshwater and sediment in the Ganges-Brahmaputra-Meghna delta, which historically supported high population densities through the provision of ecosystem services including highly productive farming and fishing systems.[210] The aggregate population of Bangladesh increased from 38 million in 1950[211] to almost 165 million in 2017,[212] and is projected to exceed 200 million by 2050.[213] 73 percent of the population live in rural areas.[214]

A tropical monsoon climate

About 80 percent of the country is made up of fertile alluvial lowland. The country is flat with some hills in the northeast and southeast. About seven percent of the total area of Bangladesh is covered with rivers and inland water bodies and the surrounding areas are routinely flooded during the monsoon. Bangladesh has a tropical monsoon climate with four main seasons: 1) the pre-monsoon during March-May, which has the highest temperatures and experiences the maximum intensity of cyclonic storms; 2) the monsoon during June-September, when the bulk of rainfall occurs; 3) the post-monsoon during October-November which, like the pre-monsoon season, is marked by tropical cyclones on the coast; 4) the cool and sunny dry season during December-February.[215]

A disaster-prone county

Bangladesh is one of the most disaster-prone countries in the world. On average, the country experiences severe tropical cyclone every three years, and about 25 percent of the land mass is inundated with flood waters every year. Severe flooding occurs every 4-5 years and covers 60 percent of the land mass.[216] Over the last decade, nearly 700,000 Bangladeshis were displaced on average each year by natural disasters, such as tropical cyclones, storm surges and floods.[217] Two-thirds of the country's land area is less than five meters above sea level.[218]

Most vulnerable to climate disruption

Following devastating cyclones in 1970 and 1991, Bangladesh has made significant efforts to reduce its disaster vulnerability and is now considered a global leader in climate resilience.[219] Despite these efforts, the vulnerability of the population is on the rise due to climate change,[220] which is causing rising (sea) temperatures, heavier rainfall, droughts,[221] salinization of soil and water,[222] intensified cyclones and sea level rises. Bangladesh is widely recognized as one of the countries that is most vulnerable to climate change.[223] According to the Ministry of Environment:

> *"(…) extreme temperatures, erratic rainfall, floods, drought, tropical cyclones, rising sea levels, tidal surges, salinity intrusion and ocean acidification are causing serious negative impacts on the lives and livelihoods of millions of people in Bangladesh, and are gradually offsetting the remarkable socio-economic development gained over the past 30 years"*[224]

Sheikh Hasina, Prime Minister of Bangladesh has stated:

> *"To our utter dismay, without contributing to environmental destruction, we are confronted with a situation where Bangladesh is one of the most climate-vulnerable countries in the world."*[225]
>
> *"The risks are so grave that, for Bangladesh, climate change may displace more than 30 million people by 2050."*[226]

2.2 Socio-economic development

A lower middle-income country

Despite the political turmoil that has characterized its history since independence from Pakistan in 1971, according to the OECD, Bangladesh is a 'competitive economy with ambitions to achieve middle-income country status'.[227] Bangladesh has been a lower middle-income country under World Bank classification since 2015 and has officially started the UN graduation process out of the least developed category towards becoming a developing country in 2024.[228]

High growth rates and development

During the last decade, Bangladesh achieved on average more than 6% economic growth.[229] In 2017, GDP was $250 billion (or $1,517 per capita).[230] More than half of GDP is generated through the services sector.[231] Bangladesh is the world's second-largest exporter of clothing after China[232] and the ready-made garment (RMG) sector represents 80 percent of foreign earnings.[233] Bangladesh has made remarkable progress on key development indicators with poverty falling from 49% in 2000 to 25% in 2015[234] and life expectancy growing from 46 years in 1972 to 72 years in 2011.[235]

Poverty still widespread

Despite the aforementioned progress, one-fourth of the population lives below a poverty line of approximately $29 per month.[236] Income distribution in Bangladesh is very uneven. 53% of national income is owned by the richest 20% of the population. The 40% lowest income groups (representing 40% of the population), have only 13% of total income. More than one-third of children under five are stunted, limiting their ability to grow and learn.[237]

A growing need for decent jobs

The working age population (15-64 years) consists of more than 100 million people.[238] The vast majority of the workforce (87%) is in the informal economy.[239] Almost 40% of Bangladeshis are employed in the agriculture sector, with rice as the single-most-important product.[240] The RMG (ready-made garment) sector is the country's largest employer, employing some four million people.[241] A few striking facts on the labour market (in 2017):

- Mean nominal earnings of employees are $165 per month.[242]
- 56% of employment is 'vulnerable' (according to the ILO definition of own-account workers and contributing family workers who have a lower likelihood of having formal work arrangements).[243]
- 40% of the population is underemployed (working only a few hours a week and at low wages).[244]
- 11% of the *employed* live on less than $1.90 a day.[245]
- There is extensive migration of labour to Saudi Arabia, Kuwait, UAE, Oman, Qatar and Malaysia.[246]
- Overall, 50 per cent of manufacturing workers in Bangladesh work excessively long hours (over 48 hours per week).[247]
- 1.7 million children (5-17 years) are engaged in child labor.[248]

The World Bank has identified job creation as the country's top development priority:

"Bangladesh needs to create more and better jobs for the 2 million youths entering the job market every year. To do so, Bangladesh will need to remove the barriers to higher growth posed by low access to reliable and affordable power, poor transportation infrastructure, limited availability of serviced land, uncertain and complex business regulation, rapid urbanization and vulnerability to climate change and natural disasters, among others."[249]

Electrification success

Bangladesh is considered one of the world's great success stories in access to energy. In 2017, electricity reached some 80 percent of the population, up from 20 percent in 2000.[250] The government target is universal access to electricity by 2021.[251] The estimated cost of rural electrification 2015-2030 are $3 billion.[252] Since 2013, Bangladesh has installed more than 4 million Solar Homes, ensuring the supply of solar electricity to 18 million people who previously used kerosene lamps for lighting purposes.[253]

Business climate

The World Bank's *Ease of Doing Business* survey put Bangladesh at 176th of 190 countries. The ranking is based on 10 areas in the life cycle of a business, including starting a business, getting electricity and credit, paying taxes and trading across borders.[254] The World Economic Forum *Executive Opinion Survey* identified the five highest risks of doing business in Bangladesh being energy price shock, failure of national governance, cyber-attacks, failure of regional and global governance, and unemployment or underemployment.[255] The OECD concludes:

"Bangladesh has made remarkable progress on key development indicators (…). Nonetheless, inequality remains endemic and climate change, population growth and natural disasters continue to constrain progress. Corruption, the weak rule of law and limited transparency contribute to an insecure environment."[256]

Cheap labour for the apparel industry

Bangladesh offers cheap labour for the apparel industry. The legal minimum wage for garment workers in the country is only 8,000 taka ($95) a month. The amount was increased by 51 percent (from $63) in December 2018, but campaigners say workers need at least 16,000 taka ($190).[257] The last time garment workers' salaries were raised was in 2013, after the Rana Plaza disaster, when an industrial building housing several garment factories collapsed, killing more than 1,130 workers.[258] The legal minimum wage in Bangladesh is significantly lower than in other sourcing countries such as China, Vietnam and Cambodia, (where minimum wage are $326, $180 and $182 respectively).[259]

2.3 Environmental issues

Carbon emissions relatively low but rising

Carbon emissions in 2017 were 0.51 tonne of CO_2 per capita in Bangladesh. By comparison, Americans emit 30 times more per person. When ranking counties by their share of global cumulative emissions, Bangladesh ranks 75th out of 226 countries. The main emitters of carbon in Bangladesh are the power sector (42% of total), other industrial combustion (21%), buildings (14%), transport (12%) and 'other' (12%).[260] In the period 2004-2016 the annual average growth rate of carbon emissions was 9.2%.[261]

The costs of climate disruption

Bangladesh is responsible for less than 0.1 percent of total cumulative CO_2 emissions in the world,[262] but the country is bearing the brunt of the devastating effects of climate disruption. The World Bank estimates that the adaptation costs of tropical cyclones and storm surges plus the cost of flooding will be around $6.6 billion by 2030.[263] The Ministry of Environment of Bangladesh estimates the country will need to invest $40 billion from 2015 to 2030 to address the adverse impacts of climate change.[264] The country has two climate change trust funds.[265] The Bangladesh Climate Change Trust Fund (BCCTF), operational since 2010, is the first ever national climate fund established by a least developed country.[266]

Limited use of clean energy

Main energy sources are natural gas (56%), biofuels and waste (25%), whereas renewables such as hydro, geothermal and solar provide less than 0.1 percent.[267] There is one hydropower station, which was installed in 1988.[268] Some 80 percent of households (more than 140 million people) rely primarily on polluting fuels such as biomass for cooking. For lighting, 40 percent of households rely on polluting fuels such as kerosene.[269]

One of the highest incidences of air pollution

In 2017, annual exposures to PM2.5 (particulate matter fine enough to penetrate the lungs and bloodstream) were highest in South Asia. Nepal, India and Bangladesh had the highest exposures.[270] In Bangladesh, the full 100 percent of the population is exposed to levels of air pollution exceeding guideline values set by the World Health Organization (WHO).[271] Bangladeshi would have an expected gain in life expectancy of nearly 1.3 years if they had met the WHO guideline.[272]

Access to water up, but water resources are severely polluted

Bangladesh has made remarkable progress with regard to access to water and sanitation. Between 1990 and 2015, the population experienced a 20-percentage point gain in water access and 29-percentage point gain in sanitation access. [273] The quality of water, however, is poor, as Bangladesh's water resources are heavily contaminated.[274] Access to piped water supply was a mere 12% in 2016.[275] Just 3% of the population is connected to a sewer system[276] and only about half of manufacturing enterprises in Bangladesh have toilets.[277]

Climate crisis puts more pressure on water systems

Climate change is increasing the intensity and frequency of natural disasters that disrupt water and sanitation services. During times of disaster, about a third of households in the country's high-risk areas switch to contaminated, unimproved water sources.[278] In 2002 Bangladesh became the first country in the world to implement a ban on plastic bags, after it was found they played a key role in clogging drainage systems during disastrous flooding.[279]

Industrial effluents

Around 250 industries are discharging chemical pollutants into the Buriganga and Sitalakhya rivers. Every day 4,000 tons of solid waste and 22,000 tons of tannery waste mixes with water in Buriganga river.[280] In 2016, textile industries in Bangladesh generated around 217 million cubic meters of wastewater.[281] By 2021, the garments export target has been set at $50 billion, but the success comes at a huge environmental cost:

> *"The dyeing and finishing plants are the major pollutants of water. Turag that flows by Tongi is almost dead with pollution. Its water looks ink black and gives out such a foul smell (Inam and Refayet, 2017). Wetlands around Dhaka city are being destroyed through land development and dumping of toxic effluents and untreated sewage. Industrial effluents have totally destroyed the ecology of rivers near these large urban areas (Shishir, 2018)."*[282]

Rohingya refugees from Myanmar

In 2017, more than 723,000 Rohingya (a Muslim minority in Myanmar) fled to Bangladesh. The Kutupalong refugee settlement in the Cox Bazar district in Bangladesh has grown to become the largest of its kind in the world, with more than 600,000 people living in an area of just 13 square kilometres. The Bangladesh government has responded generously throughout the latest crisis, straining their already limited resources.[283] In addition to the humanitarian challenges, the influx of refugees has resulted in environmental degradation both within the refugee camp and in the surrounding areas.[284]

2.4 Tax structure

Revenues

Table 2 provides an overview of the central government revenues in Bangladesh in 2016 (the latest year for which such data are available). As explained in section 1.1, tax revenues above 15 percent of a country's GDP are a key ingredient for economic growth and, ultimately, poverty reduction. Bangladesh has one of the lowest tax-to-GDP ratios in the world. In 2016, only ten countries in the World Bank database had a lower tax-to-GDP ratio.[285] In that year, Bangladesh had a tax-revenue gap of $14.9 billion.[286] In 2017-18, tax revenue receipts amounted to $25.5 billion, which was 17.3% higher than the previous year.[287] The tax-to-GDP ratio of Bangladesh has been on the rise, albeit slowly; rising from 8.6% in 2010 to 10.9% in 2017.[288] IMF staff advised Bangladesh:

> *"To boost growth, higher public investment in critical infrastructure and human development is needed and for that purpose it is necessary to improve revenue generation."*[289]

Table 2: Bangladesh Budgetary Central Government Revenues (2016)

	Revenue ($ bln)	% of total revenue
Taxes	**18.0**	**85%**
Taxes on income, profits, and capital gains	5.3	25%
Payable by individuals	1.8	8%
Payable by corporations and other enterprises	3.6	17%
Taxes on payroll and workforce		-
Taxes on property		-
Taxes on goods and services	6.8	32%
General taxes on goods and services	6.5	30%
Excises	0.2	1%
Taxes on international trade and transactions	5.2	25%
Other taxes	0.6	3%
Social contributions	**-**	**-**
Grants from foreign governments	**0.3**	**1%**
Other revenue	**3.0**	**14%**
Total revenues	**21.2**	**100%**

Source: IMF (2018), Government Finance Statistics Yearbook 2017.

Personal income tax

Total personal income taxes are only 1.4 percent of GDP,[290] with less than one percent of the population filing tax returns.[291] Every year, a week-long Income Tax Fair is held across the country, with the aim of increasing the number of income tax payers[292] and November 30 marks Income Tax Day.[293] The National Board of Revenue (NBR) then honours the highest paying citizens (in categories such as: highest paying architect, athlete, lawyer, the highest paying female, the highest paying individual aged under 40, etcetera) and corporations. The highest tax cardholders are entitled to a number of privileges, including priority while reserving seats in public transport and access to VIP lounges at the airports.[294]

Other observations

A few remarkable features of the Bangladeshi budgetary revenues are:

- There is **no concept of social security** in Bangladesh. However, companies of a certain size need to pay 5% of their profits into a Workers Profit Participation Fund. No contribution from employees is required in this case.[295]
- At 1.1% of total tax revenues, **excise duties are relatively low** compared to Pakistan (5%), Bhutan (13%) and India (16%).[296]
- Bangladesh has a **complicated VAT system**. The standard VAT rate is 15% and there are reduced rates of 10%, 7.5%, 6%, 5%, 4.5%, 4%, 3%, 2.25%, 1.5%, and 0%. A VAT rate of 15%, for example, applies to airconditioned restaurant, whereas 7% applies to unairconditioned restaurant.[297]

- Bangladesh is among the countries **receiving a relatively large share of global development aid**:

  "In 2015-16, half of gross bilateral ODA expenditures (…) were directed at 8 countries out of the 48 LDCs [least developed countries]: Afghanistan (USD 3.4 billion), Ethiopia (USD 2.0 billion), the United Republic of Tanzania (USD 1.5 billion), Bangladesh (USD 1.4 billion), South Sudan (USD 1.3 billion), the Democratic Republic of Congo (USD 1.2 billion), Mozambique (USD 1.1 billion) and Uganda (USD 1.0 billion)." (OECD 2018)[298]

Budgetary expenses

Table 3 (below) provides an overview of the use of revenues by the central government. A few striking features from an SDG perspective:

- **Public social expenditure** is around 2% of GDP in Bangladesh, which is the second lowest in the Asia/Pacific region (after Myanmar).
- In Bangladesh, **public spending on education** amounts to less than 2% of GDP (which is half of the average spending across the Asia/Pacific region and the OECD).[299]
- Just 0.1% of the budget is used for **environmental protection**.[300] Note that in general, in South Asian countries, environmental protection expenditures are low (e.g. 0.02% in Pakistan; 0.3% in Bhutan; and 1% in Nepal).[301]

Table 3: Bangladesh Budgetary Central Government Expense by Economic Type (2016)

	Expense ($ bln)	% of total
Compensation of employees	**4.9**	**25%**
Wages and salaries	4.9	25%
Employers' social contributions	-	-
Use of goods and services	**2.7**	**14%**
Consumption of fixed capital	**-**	**-**
Interest	**4.0**	**20%**
Subsidies	**1.4**	**7%**
Grants to other general government units	**3.2**	**17%**
Social benefits	**2**	**10%**
Social security benefits	-	-
Social assistance benefits	0.7	4%
Employment-related social benefits	1.2	6%
Other expense	**1.3**	**7%**
Total expense	**19.5**	**100%**

Source: IMF (2018), Government Finance Statistics Yearbook 2017.

Fiscal ambitions

Bangladesh has high fiscal ambitions, aiming to raise the number of registered taxpayers from 900,000 to 10 million between 2011 and 2023.[302] A number of targets have been set for fiscal year 2020, aiming to increase total revenues, government spending and Foreign Direct Investment (FDI), while maintaining the fiscal deficit.[303] The status of these indicators is included in Table 4.

Table 4: Status of fiscal targets mentioned in the 7th Five Year Plan of Bangladesh

Indicator (% of GDP)	Status FY17-18	Target FY20
Total revenue (% of GDP)	12.2	16.1
Fiscal deficit (% of GDP)	5	5
Government spending (% of GDP)	17.5	21.1
FDI ($ million)	1.583	9,600

Sources: Government of the People's Republic of Bangladesh (December 2015), 7th Five Year Plan. FY2016-FY2020. Accelerating Growth, Empowering Citizens. General Economics Division (GED) Bangladesh Planning Commission; Government of the People's Republic of Bangladesh (December 2018), Bangladesh Economic Review 2018.

2.5 Progress on achieving the SDGs by 2030

Strategies to address the challenges

The *SDG Index and Dashboards* report presents an assessment of countries' distance to achieving the SDGs. In 2018, Bangladesh ranked 111th out of 156 countries.[304] Table 5 provides an overview of some of the formal strategies developed by Bangladesh to address the SDGs.

Table 5: Selection of Bangladesh' national strategies to address SDGs

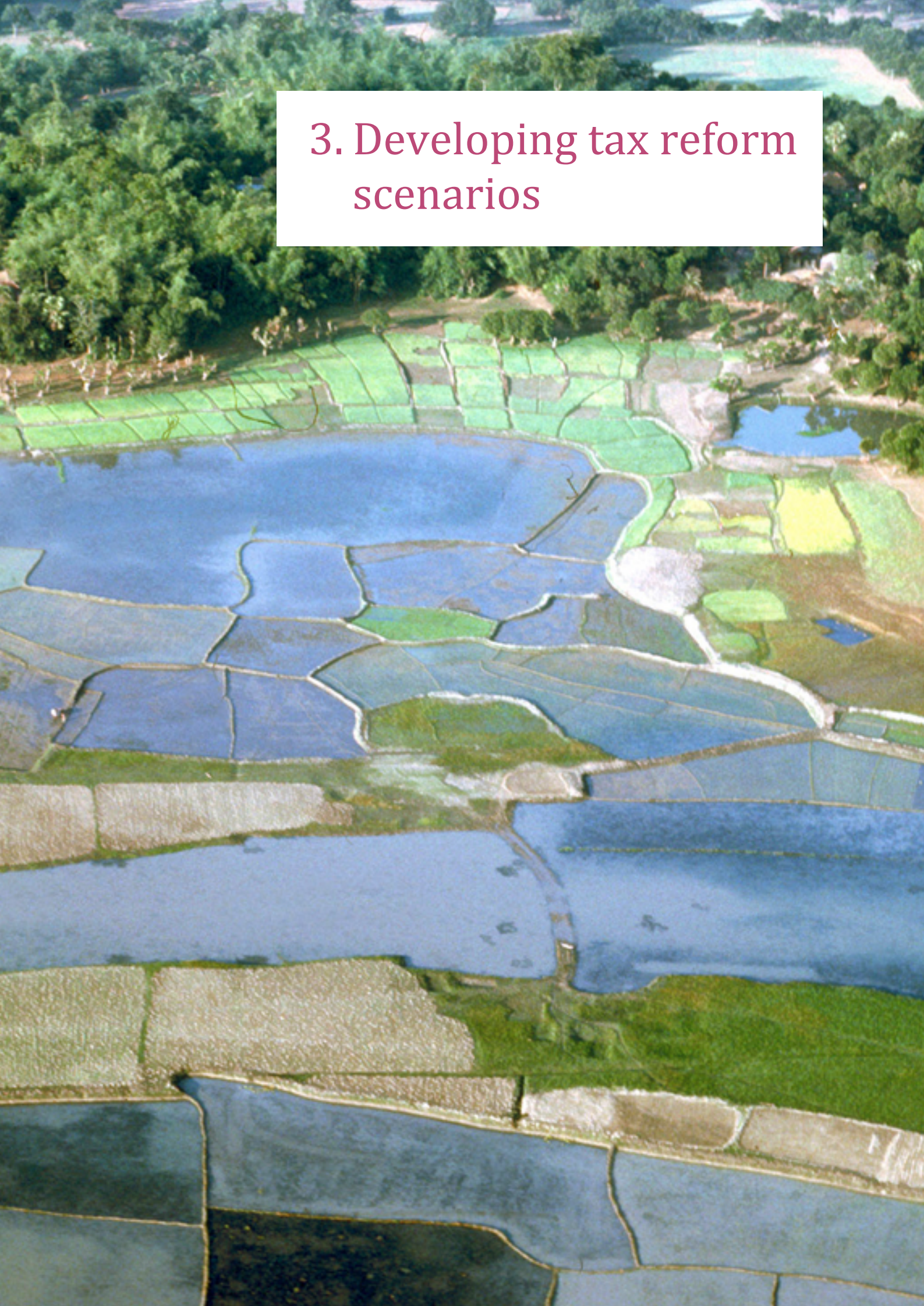
7th Five Year Plan FY2016-FY2020[305] - update under development	Includes specific targets consistent with the scope of the SDGs, with regard to Income and poverty, Sector Development, Macroeconomic Development, Urban Development, Human Resource Development, Water & Sanitation, Energy & Infrastructure, Gender equality, income inequality & social protection, Environmental Sustainability & ICT Development.
Vision 2021[306]	Eight goals that reflect citizens' aspirations with regard to the future of Bangladesh by 2021, when Bangladesh will be celebrating 50 years of independence, including: 1) To become a participatory democracy, 2) To have an efficient, accountable, transparent and decentralised system of governance, 3) To become a poverty-free middle-income country, 4) To have a nation of healthy citizens, 5) To have a skilled and creative human resource, 6) To become a globally integrated regional economic and commercial hub, 7) To be environmentally sustainable and 8) To be a more inclusive and equitable society.
Bangladesh Delta Plan 2100 (BDP 2100)[307]	In view of the long-term challenges presented by climate change and natural hazards, the BDP 2100 seeks to integrate the medium to long term aspirations of Bangladesh. The plan was formulated with the Dutch government and seeks to map out the land-use planning, and disaster management changes needed to meet growing pressures on the delta.
The Bangladesh Second Country Investment Plan (2016-2020) (CIP2)[308]	The overarching goal of the CIP2 is to achieve improved food security and nutrition for all at all times by making food systems nutrition-sensitive and sustainable. It is a tool to mobilise funds and align sectoral and cross-sectoral food and nutrition security related programmes.
Bangladesh Climate Change Strategy and Action Plan (BCCSAP)[309]	Sets out 44 programmes within six strategic areas – food security, social protection and health; comprehensive disaster management; infrastructure; research and knowledge management; mitigation and low carbon development; and capacity building and institutional strengthening.
Intended Nationally Determined Contributions (INDC)[310]	The INDC aims to put forth mitigation actions that Bangladesh can take to tackle its growing emissions and to play its role in global efforts to limit temperature rise to 2°C or preferably 1.5°C above pre-industrial levels. Targets include an unconditional GHG emissions reduction of 5 percent compared to business as usual levels by 2030 in the power, transport and industry sectors.
National Social Security Strategy (NSSS) of Bangladesh (2015)[311]	Priority challenges for the medium-term to ensure a more comprehensive social protection system for its population. The NSSS envisions a Bangladesh where poverty and inequality are effectively tackled, growth and employment are efficiently accelerated, and the weak and vulnerable are adequately protected.[312]

The case for tax reform in Bangladesh

Based on the information above, Bangladesh has achieved much but is still facing significant challenges. The country has a large and growing population, which is in need of decent jobs and inclusive economic growth. Air and water pollution have grown to be detrimental for the economy, health and wellbeing. Although climate change is not the fault of the Bangladeshi people, the nation is already paying the price of the global climate crisis and climate disruption is high on the political agenda. As indicated by Ahmed and Chattopadhyay (2018), the case for tax reform in Bangladesh is clear. First, tax reform can help raise public revenues, which is attractive for Bangladesh as it has a very low tax-to-GDP ratio. Second, green taxes can be helpful in improving the environment. Third, fossil fuel subsidy reform can ensure resource efficiency and less pollution. Finally, the revenues mobilised can be a major contributor to public spending in infrastructure, health, education, water supply, environmental protection and social protection to support poverty reduction.[313]

Taking into account the national context, how could a country like Bangladesh align its tax system with the SDGs? What would be the impacts of such alignment on the economy, labour market, inequality and business sectors? The next chapter will develop some ideas on a potential tax reform scenario and its impacts.

3. Developing tax reform scenarios



How could Bangladesh create a tax system that supports the SDGs? Applying the Methodology and Toolkit of The Ex'tax Project, two preliminary scenarios were developed, based on national priorities in Bangladesh, data availability and opportunities for macro-economic modelling.

3.1 The Ex'tax Methodology and Toolkit

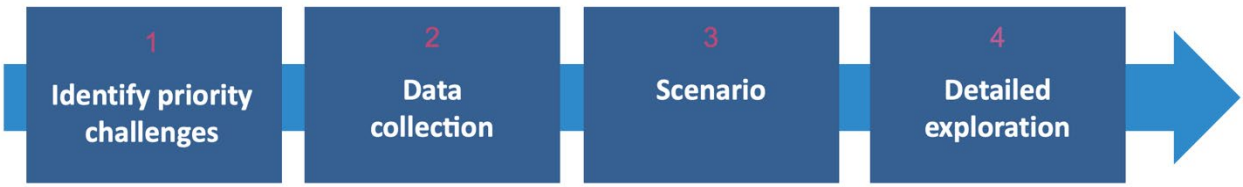
The Ex'tax Methodology

In cooperation with tax experts of Deloitte, EY, KPMG and PwC, The Ex'tax Project has developed a Methodology and Toolkit to help assess country and regional tax reforms.[314] In this study, the step-by-step approach (see Figure 9) was applied to the Bangladeshi context. The first step in the Methodology is to identify priority challenges of the geographic area under review. Secondly, data are collected to explore the economic, social, environmental and fiscal landscape. Thirdly, the Ex'tax Policy Toolkit (see below) is used to create one or more policy scenarios, by:

1. Mapping the range of options available for a specific region to apply the Ex'tax principles;
2. Identifying a focus group of tax bases and
3. Identifying a focus group of policy options.

The final step in the Methodology entails an exploration of the potential impacts of the scenario(s) on the economy, environment, employment and business sectors.

Figure 9: The Ex'tax Methodology



The Ex'tax Toolkit

As mentioned in section 1.5, the Ex'tax Toolkit presents an overview of potential options to raise and use new revenues. **Figure 7: The Ex'tax Toolkit – Raising Revenues** (on page 27) provides policy options to apply the 'polluter pays' principle and raise revenues based on natural resource use and consumption (e.g. on air pollution, energy, fossil fuels, metals and minerals). Each category includes several sub-categories. For example, pricing schemes could be focused on different types of air pollution, such as carbon, particulate matter and/or nitrogen oxides. **Figure 8: The Ex'tax Toolkit – Use of Revenues** (see page 27) shows policy options to use tax revenues for the benefit of society (e.g. for investments, social assistance and environmental protection). Each category includes several sub-categories. Investments, for example could, amongst others, be directed towards infrastructure, R&D, renewable energy, housing or coastal protection.

3.2 Limiting factors

In the selection process of policy options for this analysis, several factors had to be taken into account, including national priorities, data limitations, modelling limitations and the stakeholder and political context. Also, a long-term perspective was taken, which means that the proposals are not aimed to be implemented immediately, but gradually over time.

National priorities

The national priorities of Bangladesh (Step 1 of the Methodology), were mapped based on the 7th Five Year Plan of Bangladesh (FYP) and other national plans (see Table 5 on page 38). The FYP, for example, specifically mentions investments in infrastructure, social protection and electricity coverage.

Using revenues to reduce the deficit or to lower personal income tax levels, for example, is not among the priorities.

Data limitations
In Step 2 of the Methodology, a large number of sources were consulted, including but not limited to databases of the Government of Bangladesh, the OECD, IEA, the IMF and the World Bank. A selection of the identified data is provided in Chapter 2. For modelling purposes, the available datasets provided a number of limitations. Some of the datasets provide recent and detailed information; others do not. For example, detailed data on fossil fuel use, energy consumption, carbon emissions and fertilizer usage are available. Data on other pollutants are limited and data on water usage are available yet outdated.

Modelling limitations
For the purpose of this study, a model (FRAMES: Bangladesh) was developed by Cambridge Econometrics, based on the theoretical framework of the E3ME macro-econometric model (see Chapter 4). Since this newly developed model is not yet as extensive as the original global E3ME model, some potentially desirable policy options could not be included in the scenarios. The 'business as usual' (or 'baseline') scenario was drawn from established sources such as HSBC and the World Bank. It is important to note that such official prognoses do not include the expected negative impacts of climate disruption on the GDP of Bangladesh (as mentioned in section 2.3). In future, the FRAMES model and its baseline could be adjusted to include such parameters.

Stakeholder and political context
Every country has its own dynamics in politics, culture and sensitivities. Through conversations with several stakeholders, some of the sensitivities could be taken into account. Due to the limited duration of this project, however, only a limited number of consultations could take place.

Medium- to long-term perspective
Putting a price on carbon emissions and abolishing fossil fuels subsidies are the two most documented and most obvious avenues to raise revenues in the SDG era. In countries around the world, such policies are generally met with resistance from corporations that are being subsidized to sustain their polluting activities. In the process of weighing such interests, in essence, the health and wellbeing of the people should be the top priority for governments. The scenarios presented in this study do not claim to be an immediate solution but should be viewed as a medium- to long-term pathway, to assist in the process of balancing the interests of different stakeholders.

Administrative capacities
Every government faces administrative challenges that inhibit the introduction of new policies. The authors are aware of such challenges in Bangladesh. Restraints in capacity have been taken into account as much as possible, but since the scenarios depict a medium- to long-term perspective, a certain development in capacity building can be assumed.

3.3 Two preliminary tax reform scenarios

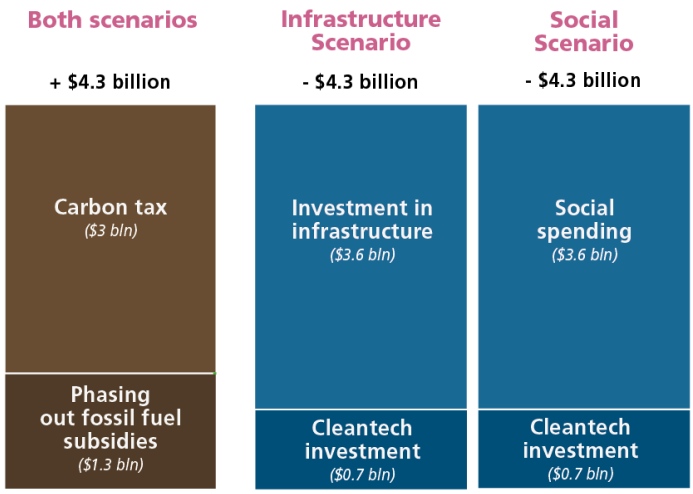
Based on the above analyses and limitations, a few policy measures were chosen to be included in the scenarios under review. Unfortunately, due to data and modelling limitations, more detailed measures, such as pricing of water, fish, timber extraction and industrial water pollution are not yet included.[315] In future research, the number of options in the modelling could be expanded. The two scenarios under review include the following measures:

- Both scenarios raise revenues by introducing a carbon tax for industries and abolishing fossil fuel subsidies to industries.
- The *Infrastructure Scenario* invests the bulk of revenues in infrastructural development, while parts of the revenues are assumed to be invested in clean technology in the textiles sector.

- The *Social Scenario* assumes the bulk of revenues to boost social spending, while parts of the revenues are invested in clean technology in the textiles sector.

Both scenarios are revenue-neutral tax reforms, which means that the revenues from new tax rates introduced are used to offset something else.[316] Figure 10 visualizes the way revenues are raised and used in this study. Please note that of course, in practice, the government of Bangladesh would be able to spend on any combination of cleantech, infrastructure and social spending - or any other use of revenues.

Figure 10: The Infrastructure Scenario and the Social Scenario (in 2025, Bangladesh)



Source: Model projections, Cambridge Econometrics 2019.

In the next sections, the measures under review are discussed in terms of their scope and rationale, their connection with the SDGs and national targets, as well as some international examples.

3.3.1 Raising revenues through a Carbon Tax (for industries)

The measure

Gradual introduction of a carbon tax of $30 per tonne of CO_2 emitted by industries and the power sector. The tax does not apply to transport and household/residential emissions. Such a measure would raise $3.0 billion in revenues in 2025 in each of the scenarios.

Rationale

It's important to note that first and foremost, high-income countries, who are responsible for historic carbon emissions, should lower their carbon emissions and compensate low-income countries for carrying the burden of the climate crisis.[317] However, in the SDG era, each and every economy should prepare for and benefit from carbon neutrality:

> *"Given the magnitude of the warming-induced growth penalties that poor countries have already suffered, expansion of low-carbon energy sources can be expected to provide a substantial secondary development benefit (by curbing future warming-induced growth penalties), in addition to the primary benefits of increased energy access." (Diffenbaugh 2019)[318]*

The Bangladeshi Ministry of Finance has stated that a carbon tax can be levied on the production, import, distribution, or use of fossil fuels. Such a tax increases the costs of carbon-emitting fossil fuels, compared to such non-carbon emitting energy sources as renewable energy and nuclear power.[319] Carbon taxes can be relatively simple to implement:

> *"[Carbon taxes] can be collected using the same administrative systems as existing taxes, or with only small modifications. In addition, when levied "upstream," such as on fuel wholesalers*

(importers and producers), carbon taxes need only be collected from relatively few firms. Wholesalers then pass the tax on to retailers, who pass it on to consumers. This "keep-it-simple" approach is strongly recommended by the experience of other countries." (Davies et al. 2018)[320]

According to these World Bank experts, introducing a carbon tax in Bangladesh could help rebalance the tax system away from workers and toward the payment of taxes on things that cause harm.[321]

World Bank supports carbon tax in Bangladesh

The World Bank has estimated that Bangladesh could raise up to one percent of GDP in tax revenues, at $30 per tonne of CO_2. The potential benefits of a carbon tax for Bangladesh are numerous, according to the World Bank, including:

- Carbon taxes are **easier to collect** than many other types of taxes.
- Carbon taxes can **boost Bangladesh's low revenue** while allowing it to lower other taxes to boost competitiveness.
- Carbon taxes will add to **resources available to adapt to the impacts of climate change**.
- Carbon taxes can help Bangladesh to **meet its commitments under the Paris Agreement** of reducing carbon emissions to 5 percent below the 'business as usual' scenario.
- Carbon taxes can help Bangladeshi firms to **prepare for changing global market** ("pre-empt changes in sentiment in increasingly environmentally aware export markets").
- Carbon taxes are **less susceptible to economic cycles** than most other taxes.[322]

Transport fuels versus other fuels

The main carbon emitters in Bangladesh are the power sector (42% of total), other industrial combustion (21%), buildings (14%), transport (12%) and other (12%).[323] In this study, for a number of reasons, transportation and household mobility are as of yet excluded from carbon taxation. Firstly, alternatives in the form of public transport are not yet readily available for consumers in Bangladesh. Also, in the past, transport tax proposals have been met with resistance. In fiscal year 2014-2015, the National Board of Revenue contemplated the introduction of a carbon tax on private vehicles,[324] which was not followed through. In 2017, a carbon tax proposal was abandoned due to backlash from (amongst others) the transport sector.[325] Another reason to exclude transport and mobility is that recent studies modelled the impact of a carbon tax on petrol and diesel, which is not duplicated here (see Box 5).

Box 5: Carbon tax studies Bangladesh

World Bank: 'Options for a carbon tax in Bangladesh' (2018)

Carbon taxes could be a significant revenue source for the government of Bangladesh, raising up to one percent of GDP, at $30 per tonne of CO_2 equivalent. Simulations show that most revenue would initially come from gas and petroleum products. Households of all wealth levels would pay a similar amount as a share of their income, making the first-round effects of a carbon tax distribution neutral. A carbon tax increases the cost of fuel but only by a small amount. At $5/t$CO_2$, the motor gasoline price could be expected to increase from TK89/litre to TK90/litre. At $30/t$CO_2$, it would increase to an estimated TK94-95/litre. Other fuels would see similarly small increases. However, some sectors would be more affected than others, particularly since some currently receive special treatment, benefiting from cheap fuel. The study provides an excellent overview of challenges, solutions and lessons from other countries' experiences. It concludes: "Given the potential benefits, and its ability to mitigate the risks, Bangladesh should consider implementing a carbon tax".[326]

Ahmed and Khondker: 'Towards a Carbon Tax in Bangladesh' (2018)

This study modelled the impacts of a carbon tax on petrol, octane and diesel, furnace oil and kerosene in Bangladesh, imposing a 10 percent tax on the current prices starting in FY2019 and gradually increasing to 25 percent by FY2041. The main conclusion is that such a tax lowers CO_2 substantially and raises considerable revenues. There are initial small negative output and employment effects that can be offset with fast transition to a clean energy environment. Additionally, the adverse output effects can be compensated with additional public investments in clean energy and infrastructure and social protection spending facilitated by higher revenues from the carbon tax. The report concludes that "a proper combination of fossil fuel pricing, carbon tax and investments can make carbon tax a win-win policy package".[327]

The political context for fossil fuel pricing reform is not easy, and all potential fuels taxes have been politically opposed.[328] The World Bank, however, advices that:

> *"Implementing comprehensive energy sector reform that targets inefficiencies at different stages of power supply and distribution could boost supply while also limiting reliance on imported fossil fuel. This would not only minimize the direct cost of electricity generation, but also help avoid harmful emissions from fossil fuel-based generation."*[329]

It's important to keep in mind that since 2009, the cost of wind turbines has dropped by nearly 33 percent, and that of solar photovoltaic modules by 80 percent, making both technologies increasingly competitive with fossil fuel power generation. Solar energy is now the cheapest generation technology in many parts of the world.[330] Hence, alternatives for energy generation are getting more readily available.

The measure supports multiple priorities

The measure would tie in with the SDGs that mention domestic resource mobilization (1,10,12 and 17) as well as SDG 3 (healthy lives), 7 (energy), 8 (sustainable economic growth), 12 (sustainable consumption and production patterns) and 13 (climate change). Finally, the measure ties in with national priorities to 'Ensure energy mix for energy security' and 'Environmental, Climate Change and disaster risk reduction considerations are integrated into project design, budgetary allocations and implementation process'.[331] It also supports the INDC of Bangladesh (see page 38).

Pricing level

A wide variety of estimates exist of the so-called social cost of carbon (i.e. the damage that results from emitting a tonne of CO_2). The price of $30 per tonne is roughly based on the (€30) minimum pricing level proposed by the OECD, as being "truly a minimum" estimate of climate damages from carbon emissions. In 2018 the OECD added a benchmark of €60 per tonne to their analyses to reflect the estimated cost of carbon in the future.[332] Other estimates do not take into account the external costs to society, but the price range needed to achieve certain reduction targets. The High-level Commission on Carbon Pricing concluded that a $40–$80 range in 2020, rising to $50–$100 by 2030, would be consistent with the core objective of the Paris Agreement of keeping the average temperature rise below 2°C.[333]

International examples

As of 2019, 57 national and sub-national jurisdictions around the world have implemented or scheduled carbon pricing schemes, 29 of which have opted for a carbon tax. 96 Parties - representing 55% of global GHG emissions - have stated in their Nationally Determined Contributions that they are planning or considering the use of carbon pricing to meet their commitments.[334] In Asia, **India** introduced a carbon tax in 2010 as a tax on domestic coal, which was later broadened to include petrol and diesel.[335] **Japan** introduced a carbon tax in 2012.[336] **Singapore** is scheduled to introduce a carbon tax in 2019. The **China** national Emission Trading Scheme (ETS) was launched in 2017 and work is underway to prepare for its implementation. The **Kazakhstan** ETS was restarted in 2018 following a two-year suspension. The **Republic of Korea's** ETS started in 2015.[337]

Carbon taxes in Mexico and South Africa

Mexico has been moving from fossil fuel subsidies to carbon pricing. In 2015, fuel tax receipts accounted for 8% of total tax revenues in 2015 (the third largest tax in terms of revenues in Mexico). In addition, a modest carbon tax raised about 0.3% of total tax revenues.[338] Revenues in Mexico are not earmarked, but flow into the general budget.[339] **South Africa** has recently signed a carbon tax law. Set at $8 per tonne, the tax will be largely offset by allowances to lower it to an effective rate of $0.40-$3 per tonne in the first three years. The tax is set to rise at two percent above inflation until 2022 and in line with inflation afterwards.[340]

Putting a price on the extraction of fossil fuels

Putting a price on the domestic extraction of a fuel (rather than its carbon content) can also be an option to serve development goals, and to a lesser extent, environmental goals. Since the 1960s, the government of the Netherlands has raised almost €417 billion in revenues for the national coffers from

the exploitation of oil and gas fields, which has enabled investments in social security and infrastructure.[341] At the same time, the extractive industry benefited from €1 trillion in turnover.[342] Considering the fact that natural gas is a finite resource, and causes pollution, it is important to plan for substitution in time. In the Netherlands, exploitation of the gas fields will come to an end soon, as supplies are running out. Also, the exploitation is causing earthquakes.[343] Norway has invested its fossil fuel extraction revenues in a sovereign wealth fund, which could be looked at as an example for Bangladesh.

3.3.2 Raising revenues through removal of fossil fuel subsidies (for industries)

The measure

Gradual removal of fossil fuel subsidies for industries and the power sector, for natural gas ($1.3 billion in 2025) and oil ($7 million in 2025). The residential and transport sectors are not directly affected. Also, the subsidy for electricity remains unchanged. In total, this would raise $1.3 billion in revenues in 2025 in each of the scenarios.[344]

Rationale

In 2017, Bangladesh imported $4.8 billion worth of petroleum products.[345] That same year, the country provided $1.5 billion worth of fossil fuel subsidies;[346] a quarter of the amount allocated towards social safety programs in the 2017 budget.[347] When taking into account the external costs of burning fossil fuels (including global warming and air pollution), fossil fuel subsidies cost Bangladesh as much as $8.8 billion in 2015.[348] According to the Ministry of Finance of Bangladesh:

> *"Subsidized energy discourages initiatives that might develop better alternatives, for example green energy such as solar power. Renewable energies are relatively more expensive, however, and subsidies for fossil fuels put these alternative energy sources at a further disadvantage, discouraging their adoption."*[349]

Natural gas main recipient of subsidies, supply risks loom

The bulk of fossil fuel subsidies support the use of natural gas. In Bangladesh, natural gas provides 58 percent of total primary energy supply and 80 percent of electricity generation.[350] As of yet, natural gas is domestically sourced. BGR (2015) data for total natural gas resources and reserves show that Bangladesh could meet natural gas demand domestically until at least 2025 (assuming productive capacity can expand to exploit domestic resources). But dependence on imports is expected to rise given Bangladesh's current natural gas production levels, its natural gas reserves, and its fast-growing economy.[351] Supply risks are already emerging:

> *"Owing to substantial underpricing of natural gas compared to economic cost, natural gas consumption has been highly inefficient and constrained domestic investment in gas extraction. Rapid depletion of natural gas has now led to a severe gas rationing, thereby causing production loses in manufacturing and growing reliance on carbon emitting fuel oil for power production." (Ahmed 2018)*[352]

Restructuring fuel subsidies would be rational

Even though natural gas subsidy reform is a highly sensitive issue, restructuring fuel subsidies would be rational. As the Ministry of Finance of Bangladesh stated in 2014:

> *"The adverse consequences of subsidy reduction on some segments of the population, (…) could be offset in the longer term by economy-wide benefits such as better fiscal sustainability, increased social spending targeting the poor, more efficient resource allocation, increased investment, and higher growth."*[353]

Research by the Asian Development Bank found that:

> *"over time the new reality of higher-priced fossil fuels spurs users to change behavior and switch to cheaper forms of energy, which encourages investment in clean energy and drives down its cost. In time, the initial exaggerated effects of more expensive fossil fuels are softened as the economy returns to a path of cleaner energy and sustainable fiscal positions."*[354]

And the World Bank supports gradual reform in combination with social assistance:

> *"hikes in gas and electricity prices can cause immediate economic distress, especially for the poor and vulnerable. Raising prices gradually while providing targeted social assistance can mitigate the impact. (…) price reform delivers large economic benefits in the long term".*[355]

The measure supports multiple priorities

The measure ties in with the SDGs that mention domestic resource mobilization (1,10,12 and 17). It also supports SDG 3 (healthy lives), 7 (energy), 8 (sustainable economic growth), 12 (sustainable consumption and production patterns) and 13 (climate change). Finally, the measure ties in with the national priority: 'Ensure energy mix for energy security'.[356]

International examples

In 2009, G20 and Asia-Pacific Economic Cooperation leaders agreed to phase out inefficient fossil fuel subsidies in the medium term. Although implementation has been slow and patchy, several Asian countries have lowered subsidies, including India, Indonesia, Malaysia, the Philippines, Thailand and Vietnam.[357] The IEA and IMF have documented fossil fuel reforms undertaken in almost 30 countries in 2013 and 2014, including:[358]

- **Egypt** raised fuel prices by 78% in 2014 and is doubling electricity prices over a period of five years.
- **Indonesia** raised petrol and diesel prices by an average of 33% in 2013 and by another 34% in 2014.
- **India** eliminated diesel subsidies in 2014 after incremental increases over the preceding two years.
- **Iran** raised petrol prices by 75% in 2015.
- **Malaysia** raised fuel prices by 10–20% in 2013 and again in 2014.
- **Namibia** removed subsidies steadily according to a three-year reform plan.
- A gradual approach was also adopted by **Kenya** (electricity), where the authorities were able to progressively gain support for broader reform by delivering improved services.

Earlier reforms in **Indonesia** and **Ghana** (in 2005) have been successful because of accompanying social policies:

> *"Indonesia's unconditional cash transfer program, which covered 35 percent of the population, was an important component of its successful strategy in overcoming social and political opposition to fuel subsidy reforms. (…) In Ghana, in 2005, the government commissioned an independent poverty and social impact analysis to assess the winners and losers from fuel subsidies and subsidy removal. This was an important foundation for persuasively communicating the necessity for reform and for designing policies to reduce the impact of higher fuel prices on the poor." (European Parliament 2017)*[359]

Areas of concern and solutions to be studied more carefully

The revenue raising measures in sections 3.3.1 and 3.3.2 share a similar purpose and face similar challenges with regard to their impacts. Table 6 below provides some areas of concern and a few potential solutions. These issues are to be studied more carefully.

Table 6: Purpose, areas of concern and potential solution of the revenue-raising measures

Goals	Area of concern	Potential solution
- Creating a level playing field between energy sources (the 'polluter pays' principle). - Aligning tax policy with climate and health goals. - Creating fiscal space to invest in public services. - Incentivizing a shift to clean technologies - Limiting reliance on imported fossil fuels.	- Price increase for industries. - Costs may be passed on to consumers. - Production may shift to other countries (competitive disadvantage).	- Industries can shift to less polluting options. - The measure is introduced gradually and accompanied by social policies. - Additional measures to support investments in low-carbon technologies.

The next sections will take a closer look at the use of revenues in each of the scenarios under review.

3.3.3 Use of revenues: investing in clean technologies

The measure

In each of the scenarios under review, $0.7 billion (20% of the newly raised revenues) in 2025 is allocated to support the Bangladeshi textiles sector in the transition to clean technologies and circular business models. With this measure, negative impacts of price increases in the scenarios are negated. The measures protect the long-term competitiveness of Bangladesh's most important export sector.

Rationale

Governments tend to provide tax exemptions to industries that are vulnerable to global competition, in order to reduce the risk of industries shifting their activities to less-regulated countries. In Bangladesh, for example, a reduced corporate income rate is applicable for the textiles industry (15% compared to 25% for listed and 35% for unlisted and private limited companies).[360] In this study, the risk of outsourcing production is mitigated through innovation policy rather than exemptions. In the modelling, part of the revenues is allocated for cleantech funding targeted towards the textiles industry. Such investments may not neutralize expenses for the industry, but the investments do contribute to future-proofing production methods and mitigating the costs of climate disruption and water scarcity. It is estimated that:

> *"the adoption of resource-efficient and cleaner technologies in the Bangladeshi textile and leather industries could reduce long-term investments and operational expenditures needed to ensure a continued supply of water by up to US$9 billion by 2030". (WRG 2015)[361]*
>
> *"Gradual adoption of improved technology and cleaner production options could reduce wastewater volume by around 23% by 2021." (Sakamato 2019)[362]*
>
> *"36 per cent of the industry's climate impacts occur during dyeing and finishing (…). This is because the electricity and heat being used in this stage mostly comes from hard coal and natural gas. If we could substitute these fossil fuel-based energy sources with renewable energy sources we would make a lot of progress." (Schragger n.d.)[363]*

Chinese mills taking effective measures

Investments in clean technologies can be highly effective. In China, for example, five pilot mills tested a series of "easy to implement, low cost, quick return" measures that are profitable and reduce environmental impact. Enabled by smart metering, the average reduction in water use was 9%, with the best mills achieving a 20% reduction. Average energy consumption fell by 6% and in some cases energy reduction was as high as 10%, with total savings equivalent to 61,000 tonnes of coal. Economic benefits totalled $14.7 million.[364]

Types of investments

Cleantech funds could potentially be invested in R&D and technologies to deploy sustainable processes such as waterless dyeing and ultrasound laser cutting.[365] Investments in energy saving solutions and renewable energy could also be included. In addition, funds could enable the development and use of sustainable dyes[366] and new types of materials.[367] Note that if such materials are locally sourced, they could contribute to Bangladesh becoming less dependent on cotton imports. The textiles sector is currently 90 percent dependent on imports.[368]

The measure supports multiple priorities

Depending on the specific use of the funding, the measure ties in with SDGs 6 (sustainable management of water), 7 (sustainable and modern energy), 8 (sustainable economic growth), 11 (safe and sustainable cities), 12 (sustainable consumption and production patterns), 13 (combat climate change), 15 (sustainable use of ecosystems). The measure also ties in with the national priority for 'Spending on Research and Development to constitute 1% of GDP'.[369] Date on current levels of R&D spending have not yet been identified.

3.3.4 Use of revenues: investing in infrastructure

The measure

In the *Infrastructure Scenario,* $3.6 billion (80% of the newly raised revenues) in 2025 is used to invest in infrastructure. The exact infrastructure projects are not defined; the supply side effects of the policy are not modelled.

Rationale

The *Global Competitiveness Report 2018* found that inadequate infrastructure is one of the most problematic factors for doing business in Bangladesh.[370] Infrastructure is one of the core themes set under the 7th Five Year Plan of Bangladesh, with targets such as the construction of bridges, expressways and highways.[371] According to an IMF review:

> *"A planned investment of US$409.0 billion is expected under the Seventh Plan, but the chronic under-implementation of the Annual Development Plan, despite its higher priority and continuing growth with each budget, needs to be addressed. (…) the government needs to raise tax revenues to create the fiscal space to upgrade infrastructure, such as electricity, roads, rails, and ports. This will in turn improve the business environment, attract FDI [Foreign Direct Investment], and diversify exports.*[372]

The World Bank also identifies infrastructure bottlenecks as "a risk for future growth prospects" in Bangladesh.[373]

Foreign investments are not enough

Large infrastructural works are being financed through foreign investments. Under the *Belt and Road Initiative*, the Chinese authorities have planned to finance several infrastructure projects of Bangladesh in sectors like telecom, agriculture, power and energy. A line of credit with India totalling $4.5 billion was signed in 2017.[374] Despite these foreign investments, this measure is included in the scenarios based on the large ambitions of Bangladesh with regard to infrastructure, public utilities, R&D and sustainability.[375] The modelling in this study (see Chapter 4) allows for a comparison of the impacts of investments in infrastructure versus increasing social spending, which will be discussed in section 3.3.5.

Potential role of local solutions

Bangladesh has a strongly developed culture of local, bottom-up initiatives. In practice, therefore, taking a bottom-up, participatory approach rather than taking a top-down planning approach, should be considered.[376] Investments could also, for example, be targeted towards electric transit (including electric buses[377] and electric rickshaws),[378] which could contribute to cleaner air and less traffic congestion. Also, off-grid energy solutions (such as Solshare)[379] and low-carbon agricultural infrastructure (such as digital demand and supply platforms[380] and rooftop gardens[381]) could be among potential investment opportunities.

The measure supports multiple priorities

Depending on the use of revenues, the measure potentially supports SDGs 6 (sustainable management of water and sanitation), 7 (energy), 9 (infrastructure and innovation), 10 (inequality), 11 (sustainable and safe cities), 12 (sustainable consumption and production patterns) and 13 (climate change). An IMF review identified access to clean water, electricity and reliable and affordable transportation also as key enablers to (female) labor force participation and inclusive growth (SDGs 5 (gender equality) and 8 (sustainable and inclusive growth and decent work)).[382]

3.3.5 Use of revenues: increasing social spending

The measure

In the *Social Spending Scenario*, $3.6 billion (80% of the newly raised revenues) in 2025 is used to boost household income. The measure is targeted towards the lowest two income quintiles. The exact nature of the payment is not defined; in the modelling framework it is treated as a basic transfer from government to households. Implementation could take the form the government deems most suitable

(including child benefits, cash transfers, social security, in-kind transfers[383] or perhaps employment guarantee schemes which provide a certain number of days of work to low-income groups).[384]

Rationale: shared prosperity for the bottom 40 percent

In the 2017-18 revised budget of Bangladesh, $6.1 billion (13.1% of the budget, or 2.2% of GDP) was allocated for social safety net programs.[385] The 7th Five Year Plan of Bangladesh includes the goals to 'Reduce or maintain the current income inequality' and 'Spending on Social Protection as a share of GDP to be increased to 2.3% of GDP' by 2021.[386] In the modelling, the additional social spending is targeted towards the bottom 40 percent of the population. The World Bank promotes 'shared prosperity' defined as 'the income growth of the bottom 40 percent of the population'.[387] The OECD *Inclusive Growth Initiative* also puts the emphasis on policies that can improve the perspectives of the bottom 40% of the income distribution.[388] Such approach is in line with SDG 10 (Reduce inequality within and among countries), target 10.1, which reads:

> *"By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average."*

The measure supports multiple priorities

The measure potentially ties in with SDGs 1 (end poverty), 2 (food security), 3 (health), 7 (access to energy), 8 (inclusive economic growth), 10 (reduce inequality) and 11 (inclusive, safe human settlements). As mentioned before, the measure ties in with the national priorities to reduce or maintain the current income inequality, to increase spending on social protection, and to reduce the head-count poverty ratio and extreme poverty. Finally, it ties in with the National Social Security Strategy (NSSS) Priority Challenges to expand coverage of social protection for the extreme/hard-core poor and most vulnerable people of the society, ensuring that the most vulnerable women are provided with income security and expanding coverage to the residents of urban areas and to the socially excluded people.[389]

International example

In Egypt, in 2013, the phase-out of fossil fuel subsidies was inaugurated alongside two cash transfer programs to help offset the impact of fuel price increases on poor and vulnerable households. By 2017, these programs covered about 1.5 million families (6 million Egyptians) out of the 1.7 million families targeted.[390] As mentioned in section 3.3.2, reforms in Indonesia and Ghana (in 2005) have been successful because of accompanying social policies.

Cambridge Econometrics modelled the impacts of the scenarios on tax revenues and macroeconomic and environmental indicators in Bangladesh. The next chapter will describe the results.

4. Modelling results

Cambridge Econometrics has modelled some of the impacts of two preliminary scenarios, which include putting a price on carbon emissions and abolishing fossil fuel subsidies, while using the revenues to invest in clean technologies, infrastructure and social spending. The modelling suggests that by 2025, such tax reforms could lead to higher GDP and employment levels, while reducing carbon emissions and energy imports. The transition can be highly progressive when revenues are mainly used to increase social spending.

4.1 Introducing the macro-econometric model

The modelling framework

Cambridge Econometrics is a UK based company founded in 1978 as a spin-off from the University of Cambridge, to take forward the work of Prof Sir Richard Stone, Nobel Laureate in Economics.[391] Cambridge Econometrics developed the 'E3ME model', a computer-based macro-econometric model of global economies, used for analysing the detailed linkages between the economy, materials, environment and energy.[392] The model was originally developed through the European Commission's research framework programmes[393] and is now widely used in collaboration with a range of institutions for policy assessment, forecasting and research purposes.[394] E3ME covers details of 61 countries and regions, including China, India, Korea, Taiwan and Indonesia. The other countries in Asia are grouped in the 'rest of ASEAN' category. Based on the parameters and expertise developed in E3ME, Cambridge Econometrics has created the Framework for Modelling Economies and Sustainability (FRAMES) model to estimate potential tax revenues and macro-economic impacts for this study on Bangladesh.

Assumptions and limitations

The E3ME and FRAMES: Bangladesh models are based on a post-Keynesian economic framework and its assumptions are consistent with this branch of economics.[395] The approach is generally an empirical one, with behavioural parameters determined by relationships in the data. It is assumed that these relationships are maintained in the projection period, i.e. that behavioural responses remain consistent with those in the past. There are several important assumptions specific to this analysis:

Baseline projections. A 'baseline' scenario (assuming no policy intervention) was developed for the modelling, based on projections by the World Bank[396] and HSBC.[397] All results represent the difference on top of any changes that occur in the baseline.

National policy. The measures are introduced in the model on a national level in Bangladesh.

Phasing in. Policy measures are assumed to be introduced gradually from 2020, to reach the full measures by 2024 and remain the same beyond 2024. A linear path of introduction is applied over the five-year period 2020-2024, so the initial tax rates in 2020 are in general quite low.

Budget-neutrality. Each year, all revenues are used ('recycled') in accordance with the scenarios (this means there is no impact on the public deficit).

Price effects. The model captures price effects and does not include any awareness or signalling effects from the green taxes. This means that the responses to changes in tax rates should be attributed to the financial effects, rather than any publicity or virtue-signalling that accompanies the reforms.

Prices. All dollar-values in the results are in 2017 prices, unless specified differently.

Behavioural parameters. The behavioural parameters in the model are taken from E3ME. Bangladesh is not represented individually in E3ME; India was therefore chosen as the most appropriate region to be the proxy.

Impact beyond 2025. The tax reform is introduced gradually to 2024. The model assumes that by 2024, full behavioural responses are realised. Effects from 2025 onwards would be similar, unless further reform was introduced.

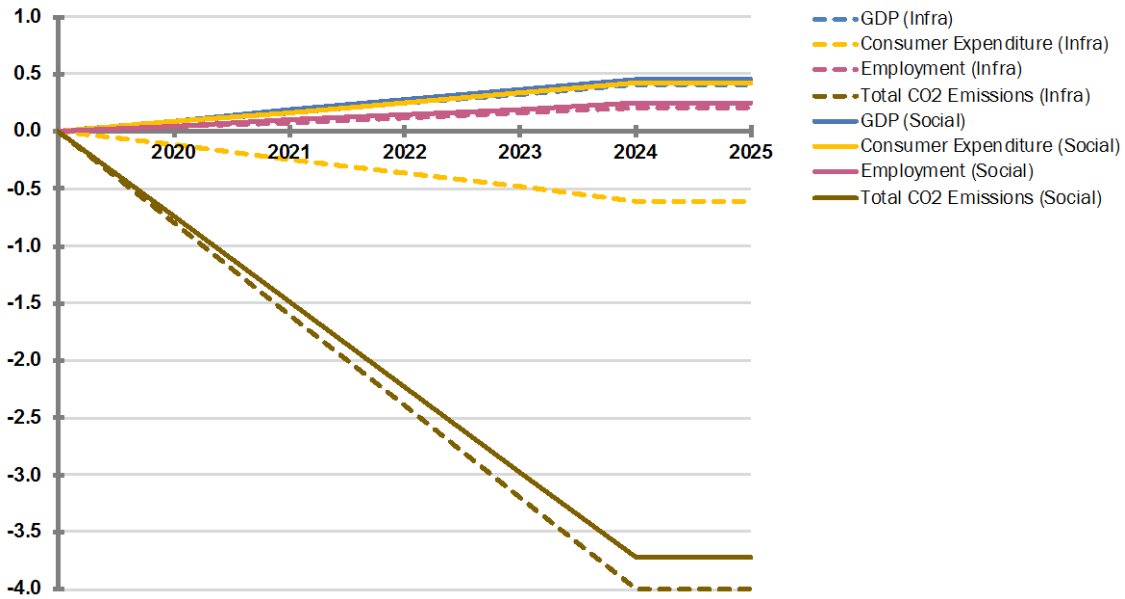
Appendix A provides a more detailed description of the model and the modelling results. Below is a summary of the key modelling results (section 4.2) and selected impacts by sector (section 4.3).

4.2 Key results

Addressing development and environment simultaneously

In the year 2025, both scenarios mentioned in section 3.3 are expected to raise $4.3 billion in revenues. In the modelling, every year, the revenues are fully recycled. In the *Infrastructure Scenario*, all revenues are recycled through investments in clean technology and infrastructure. In the *Social Spending Scenario* (or *'Social Scenario'*), all revenues are recycled through investments in clean technology and social spending. The key message from the results is that it is possible to design policy measures that reduce harmful emissions and final energy consumption, while at the same time stimulating the economy of Bangladesh, creating jobs and (in the *Social Scenario*) increasing income for the bottom 40 percent. These results demonstrate that Bangladesh doesn't need to choose between development and environment.

Figure 11: Overall result: decoupling (2020-2025, % difference from baseline, Bangladesh)



Source: Model projections, Cambridge Econometrics 2019.

Decoupling of GDP and carbon emissions

Figure 11 provides some key results over the 2020-2025 period, demonstrating decoupling effects in the scenarios, as GDP is higher, and emissions are lower. An increase in employment is observed in each scenario. The scenarios add $6.9 billion (in the *Infrastructure Scenario*) and $7.8 billion (in the *Social Scenario*) to GDP over the 2020-2025 period (Table 7 provides cumulative impacts). Additional findings include, over a six-year period:

- **Resource mobilisation.** Phasing out fossil fuel subsidies could potentially raise $4.7 billion in domestic resources, while a carbon tax could add another $10.6 billion in domestic resources.
- **Job creation.** Both scenarios show significant increases in employment (540,000 and 670,000 years of employment respectively).
- **Carbon emission reductions.** Both scenarios demonstrate a significant reduction in carbon emissions (saving 19.9 and 18.5 megatonnes of carbon respectively).
- **Savings on energy imports.** In both scenarios, Bangladesh saves significant amounts on energy imports ($429 million and $405 million respectively).

- **Public investments.** In the *Infrastructure Scenario* $12.8 billion is invested in infrastructure. In the *Social Scenario*, $12.9 billion is invested in social protection. Cleantech investments in both scenarios are $2.6 and $2.5 billion respectively.

Distribution of benefits and cost

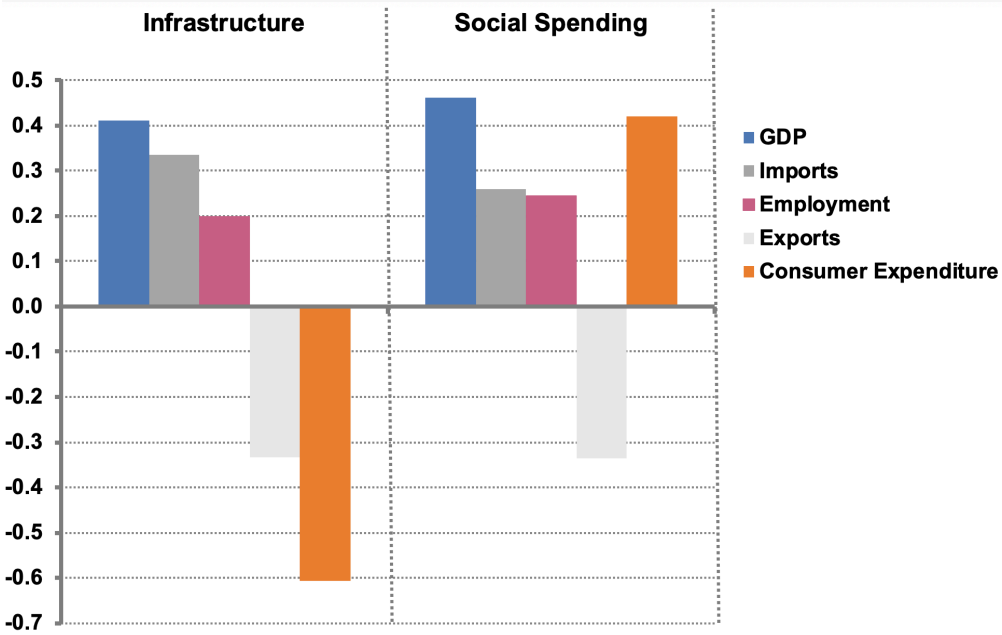
As with any reform, the benefits and costs will not be spread evenly (see section 4.3). In both scenarios, the textiles sector shows a slight negative result in terms of gross output (0.24% and 0.15% respectively) by 2025, but overall, the economy would be stronger and more competitive in terms of carbon intensity and energy import dependency. Also, it's important to note that the competitiveness impacts of the cleantech investments (totalling more than $2.5 billion) are not yet captured in the model. The modelling results suggest that a progressive impact with higher benefits (in relative terms) for lower income households is possible, particularly in the *Social Scenario*.

Consumer expenditure key difference between scenarios

A key difference between the scenarios is in consumer expenditure. Whereas the *Infrastructure Scenario* does not compensate low-income groups for increased living expenses, the *Social Scenario* specifically boosts consumer spending (see Figure 12).

- In the *Infrastructure Scenario*, total consumer expenditure is 0.6% lower than it is in the baseline, in real terms. The infrastructure investment creates jobs and there are positive multiplier effects throughout the economy. Price rises outweigh this effect, however, meaning household income and consumption are lower in real terms.
- In the *Social Scenario*, total consumer expenditure is 0.4% higher than the baseline, in real terms. The revenue recycled in social spending increases consumer expenditure and creates a stimulus effect which creates jobs. These effects are substantial enough to outweigh the effect of price rises.

Figure 12: Key modelling results (2025, % difference from baseline, Bangladesh)



Source: Model projections, Cambridge Econometrics 2019.

Table 7 and Table 8 provide details for a number of line-items.

Table 7: Cumulative results (2020-2025, difference from baseline, Bangladesh)

	Infrastructure Scenario	Social Scenario
GDP	$6.9 billion	$7.8 billion
Employment	543,000	670,000
CO_2 emissions	- 19.9 million tCO_2	- 18.5 million tCO_2
Final energy consumption	- 5,346,000 toe	- 4,720,000 toe
Energy import savings	- $429 million	- $405 million

Source: Model projections, Cambridge Econometrics 2019.

Table 8: Economic, social & environmental impacts (2025, difference from baseline, Bangladesh)

Difference from baseline	INFRASTRUCTURE		SOCIAL	
	(%)	(value)	(%)	(value)
Economic indicators				
GDP*	0.4%	$1.9 bln	0.5%	$2.2 bln
Output*	0.5%	$5.6 bln	0.4%	$4.2 bln
Consumer expenditure	-0.6%	-$2.2 bln	0.4%	$1.6 bln
Investment	3.3%	$4.8 bln	0.8%	$1.2 bln
Exports	-0.3%	-$0.2 bln	-0.3%	-$0.2 bln
Imports	0.3%	$0.4 bln	0.3%	$0.3 bln
Social indicators				
Employment	0.2%	139,000 persons	0.2%	172,000 persons
Change in household income poorest 1st quintile	-0.4%	-$4.7 bln	12.3%	$135.0 bln
Change in household income 2nd quintile	-0.4%	-$11.3 bln	4.9%	$129.1 bln
Environmental indicators				
Final energy consumption	-3.0%	-1,499 ktoe	-2.6%	-1,324 ktoe
CO_2	-4.0%	-5.6Mt	-3.7%	-5.2Mt

* Non-discounted.

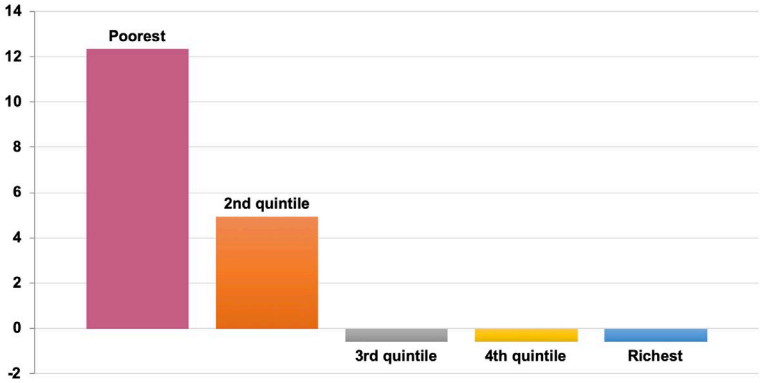
Source: Model projections, Cambridge Econometrics 2019.

Real incomes and inequality

Real incomes in the scenarios are affected by changes in wage income, income from government social spending, and prices. Rich and poor households spend their incomes in different ways and have different effective taxation rates; the impacts may vary across household groups. The important differences in the context of the scenarios are expenditure on energy and energy-intensive goods and services. In Bangladesh, higher income households spend a larger share of income in these areas, and therefore face higher price increases.

- In the *Infrastructure Scenario*, there are no explicit redistributive policies. The scenario is progressive, however, because the lower income quintile households experience smaller reductions in real incomes than those in the higher quintiles. Overall, the differences are small; the lowest quintile has a 0.4% real income reduction, compared to 0.6% for the highest quintile.
- When we account for the measure to boost incomes in the lowest two quintiles, the effect is substantially more pronounced. In the *Social Scenario*, real income increases by 12.3% for the lowest income quintile, and 4.9% for the second lowest. Real income in the highest three quintiles reduces by 0.6% (see Figure 13).

Figure 13: Social Scenario - real incomes per quintile (2025, % diff. from baseline, Bangladesh)



Source: Model projections, Cambridge Econometrics 2019.

The next section will provide a brief explanation on the impacts by sector, in terms of output, employment and carbon emissions.

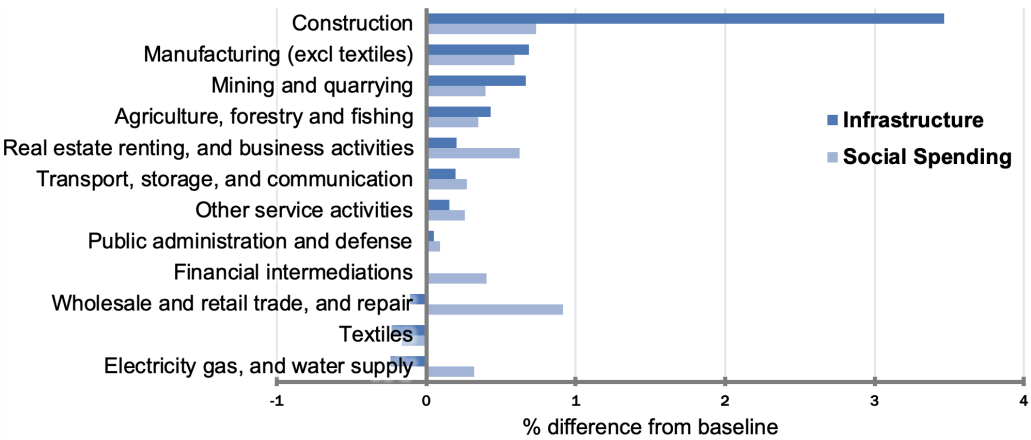
4.3 Impacts by sector

Output

Figure 14 provides the impacts of the scenarios on sectoral output. While GDP represents the value added in the economy, output is a gross measure that includes input material and energy (but not labour) costs.

- In the *Infrastructure Scenario*, the largest increases in output, both in relative and absolute terms, are in the construction, manufacturing (excluding textiles) and mining and quarrying sectors. These sectors benefit from the investments in infrastructure. Some of the manufacturing companies in the supply chain also benefit. Output falls marginally in sectors that are supplying consumer final demands, such as retail. In the textiles industry output falls because energy prices increase, leading to some loss of price competitiveness and lower exports.
- In the *Social Scenario,* most sectors demonstrate an increase in output as they benefit from higher local consumer spending. Manufacturing and construction also have relatively high increases, because of the investment in cleantech for textiles. Textiles lags behind due to an energy prices increase, leading to some loss of price competitiveness and lower exports. The overall implications and outlook for the textiles sector will be discussed in more detail below.

Figure 14: Output by sector (2025, % diff. from baseline, Bangladesh)



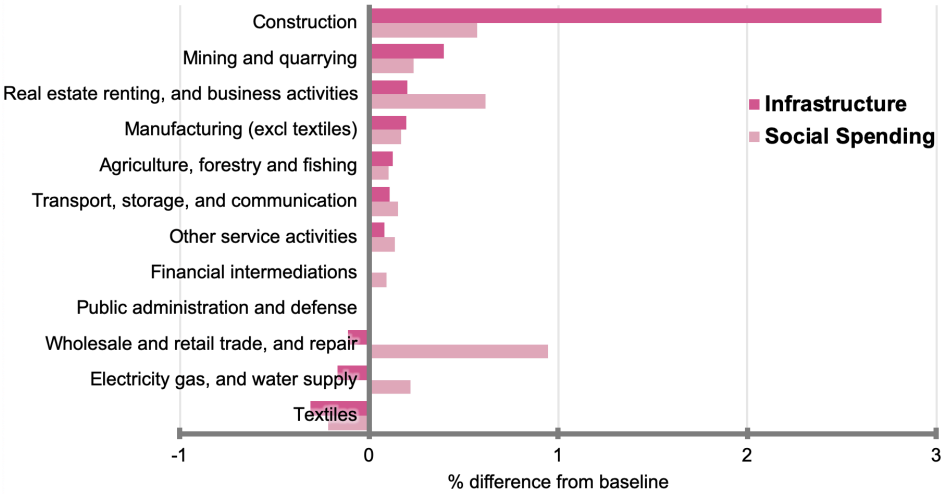
Source: Model projections, Cambridge Econometrics 2019.

Employment

The percentage changes in employment by sector (see Figure 15) largely follow the pattern of changes in output, whilst allowing for different returns to scale. Therefore, the largest changes are found in labour-intensive sectors, and those where output changes by the most.

- In the *Infrastructure Scenario*, the largest increases in employment, both in relative and absolute terms, are in construction, mining and quarrying and real estate (see Figure 15). These sectors benefit from the investments in infrastructure. Some of the manufacturing companies in its supply chain also benefit. In absolute terms, 63% of new jobs in this scenario are created in the construction sector. Agriculture creates the second greatest number of jobs, because of the size of the sector and its labour-intensity. Employment falls in the energy and utilities sectors because of reduced demand for energy products, and in the textiles industry because of some loss of price competitiveness and lower exports.
- In the *Social Scenario,* all sectors (except textiles) demonstrate an increase in employment as they benefit from higher local consumer spending. The textiles industry lags behind due to some loss of price competitiveness and lower exports. In absolute numbers, wholesale and retail trade create the most jobs (53% of the total), followed by agriculture and construction. Jobs are created in construction because of the investment in cleantech for textiles, and the induced positive effects in economy-wide investment.

Figure 15: Employment per sector (2025, diff. from baseline, # of employed persons, Bangladesh)



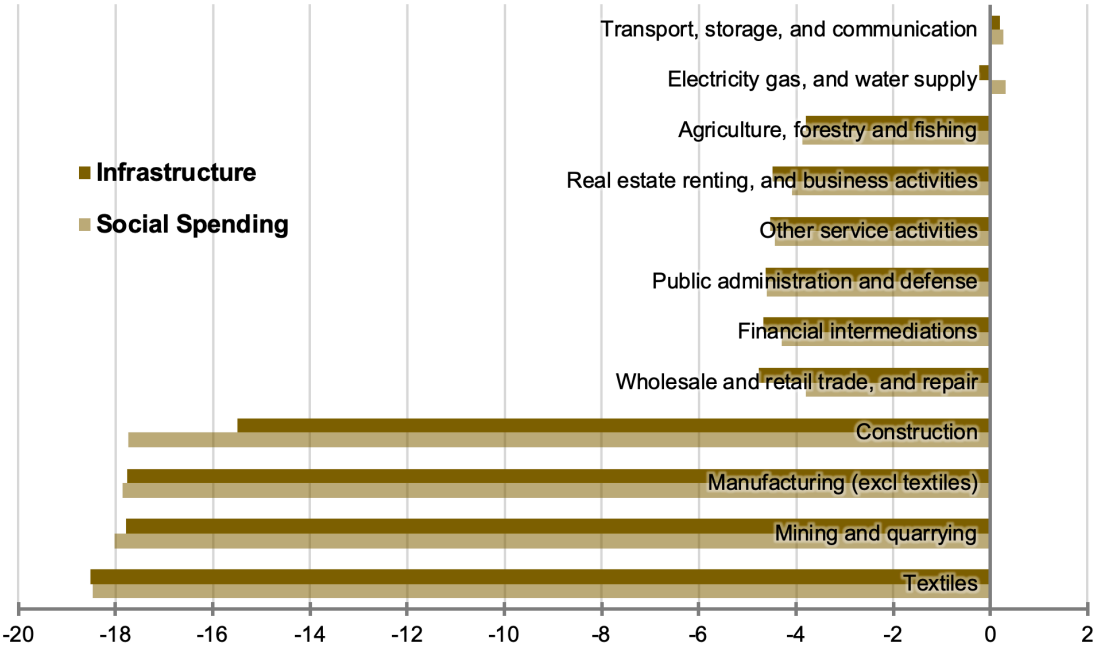
Source: Model projections, Cambridge Econometrics 2019.

Carbon emissions

In 2025, the policy measures in the scenarios reduce CO_2 emissions by 4.0% and 3.7% compared to the baseline, in the *Infrastructure Scenario* and *Social Scenario* respectively. The impacts on emissions from the different sectors vary according to their fuel mix, existing fuel prices (including tax rates) and whether they are included in the new measures. The largest proportional reductions in CO_2 in both scenarios is across the industrial sectors (see Figure 16). This is because, in Bangladesh, industry is responsible for approximately 85% of coal use, the fuel which is most affected by these reforms.

The power generation sector has minimal changes in emissions, because of limitations in the modelling framework. The model assumes that the power generation mix is constant over time and across scenarios. These tax reforms provide a strong incentive for different power generation technologies. However, the time horizon of analysis is 2025 and given the lifetime of power generation technologies, there would be limited retirement of capacity to be replaced over these years.

Figure 16: CO_2 emissions per sector (2025, % difference from baseline, Bangladesh)

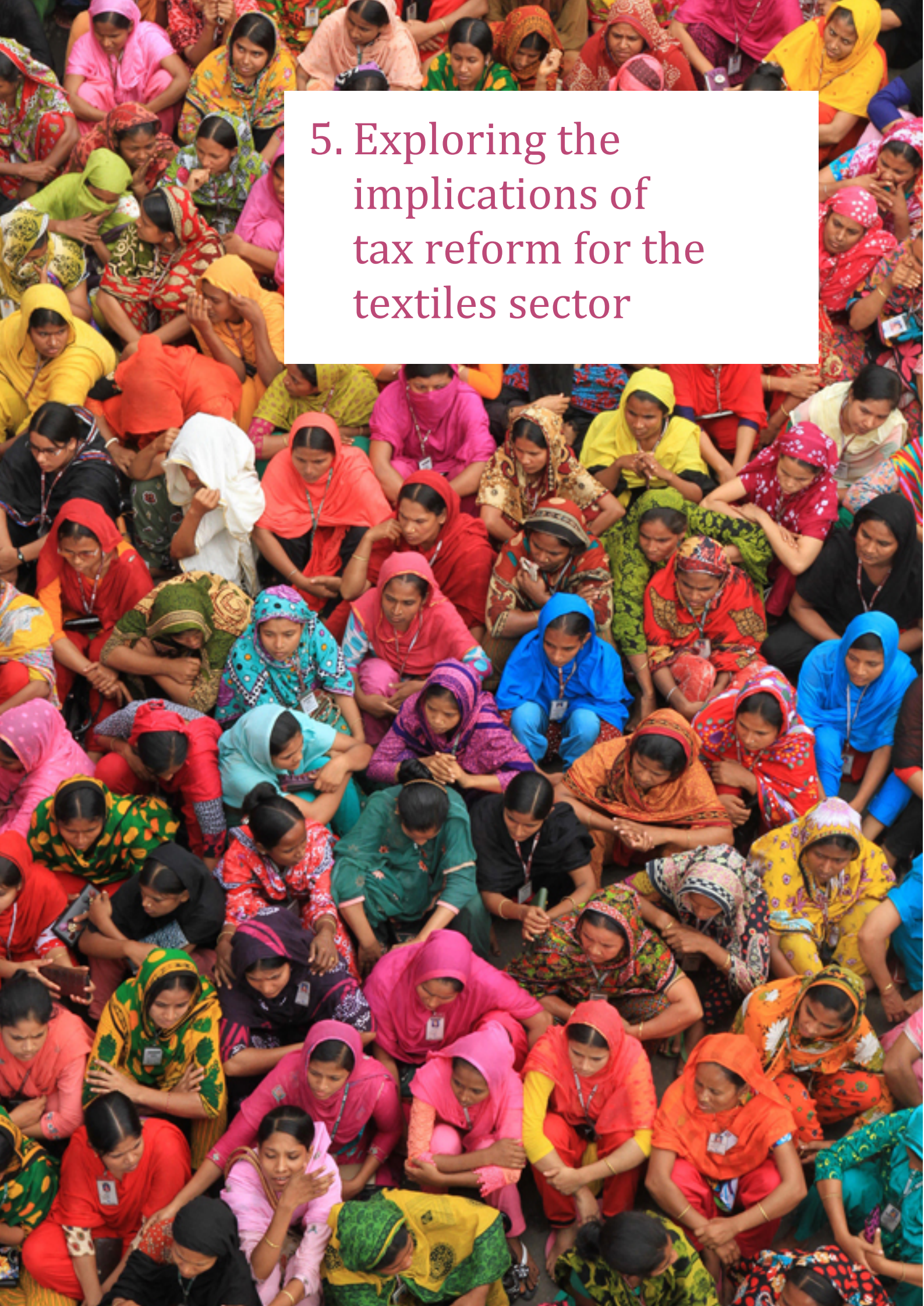


Source: Model projections, Cambridge Econometrics 2019.

Focus on the textiles sector

The textiles sector is unique in the Bangladeshi economy and in the dynamics it faces from tax reform. Textiles is the only sector that is reliant on exports, rather than domestic demand. It is therefore the most vulnerable to the loss of international competitiveness arising from increased costs of production resulting from tax reform. Exports reduce by 0.4 percent in both scenarios by 2025. A portion of the revenue accruing from the tax reforms is allocated to investing in the sustainability of production in the textiles industry. This investment would ameliorate the negative price competitiveness effects on the industry, with positive quality effects. These effects have not been quantified in the model.

Considering the importance of the textiles sector to the economy in Bangladesh, the next chapter will look closer at the perspectives and dynamics in the textiles sector.



5. Exploring the implications of tax reform for the textiles sector

The textiles sector in Bangladesh faces significant challenges to remain competitive in the face of global megatrends. This chapter reviews the dynamics of tax reform and its impact on the textiles sector in Bangladesh.

5.1 Setting the scene: global megatrends

The disposable clothes trend

Fast fashion constantly offers new styles to buy, as the average number of collections released by European apparel companies per year has gone from two in 2000 to five in 2011, with, for instance, Zara offering as many as 24 new clothing collections each year. This has led to consumers to see cheap clothing items increasingly as perishable goods that are nearly disposable, and that are thrown away after wearing them only seven or eight times.[398] Between 1996 and 2012, the amount of clothes bought per person in the European Union increased by 40 percent,[399] but about a third of those dresses, shirts and pants end up sitting in closets largely unused.[400] The fashion industry produces 100 billion garments per year; nearly 14 items of clothing for every person on earth.[401]

Massive environmental impact

Apparel and footwear account for 8% of global greenhouse gas emissions.[402] Globally, less than 1% of garments are recycled into new clothing. Every second, a garbage truck of textiles is landfilled or incinerated.[403] In 2015, the global textiles and clothing industry was responsrible for the consumption of 79 billion cubic metres of water, 1,715 million tons of CO_2 emissions and 92 million tons of waste. By 2030, under a business-as-usual scenario, these numbers would increase by at least 50%.[404]

Global fashion market committed to circularity

Leading industry groups, together with global fashion organizations, are pushing for the industry to change its ways. The 2020 *Circular Fashion System Commitment* was signed by 94 companies, representing 12.5 percent of the global fashion market. This commitment focuses on four immediate action points: 1) Implementing design strategies for cyclability; 2) Increasing the volume of used garments and footwear collected; 3) Increasing the volume of used garments and footwear resold; and 4) Increasing the share of garments and footwear made from recycled post-consumer textile fibres.[405]

Making the business case

The goals of the apparel industry to become sustainable and circular are ambitious especially since financial incentives embedded in current tax systems favour the business-as-usual linear economy. As indicated in Chapter 1, pollution and resource use are practically tax-free and even subsidized. In a high-volume, low-cost industry, such as the apparel industry, under these circumstances, it is particularly difficult to make a business case around saving water, using renewable energy and abolishing pollution. The development of sustainable supply chains requires more time, effort and R&D; all of which require more labour input than simply sustaining the linear model. In a system that puts a high or rising tax burden on labour, making such investments is even less financially attractive. Therefore, there is no level playing field for cleaner and innovative solutions.

The risk of corporations shifting their production to regions with ever-lower wages and lower environmental standards is eminent. Countries like Bangladesh therefore are required to perform a balancing act, combining a need to reduce environmental and health damage, while increasing the number of decent jobs *and* keeping costs as low as possible, in order not to deter producers. This struggle is likely to intensify if global trade is to adhere to the goal of keeping global warming within safe limits, as will be discussed next.

5.2 Staying competitive in a 1.5-degree warmer world?

A global competitive market

Bangladesh is battling to keep its position as the world's second-largest exporter of clothing after China, as it faces intensifying competition from Cambodia, Vietnam, Myanmar and now African countries like Ethiopia, as global brands search for cheap labour. H&M, for instance, has started sourcing from an Ethiopian clothing factory it set up with garment maker DBL.[406] Ultimately, to break this cycle of shifting to countries with ever-lower production costs, consumers (in high-income countries) will probably need to pay more for products.[407] Paying living wages to garment workers would add just one percent to the retail price of a piece of clothing.[408] However, if all negative social and environmental impacts were taken into account, a pair of jeans from Bangladesh, for example, would cost €33 more.[409]

Textiles industry at crossroads

The global market is changing fast, with water supply risks and carbon pricing on the rise. In Bangladesh:

> *"If "business as usual" water demand continues for the textile sector, in particular, this will result in an additional water demand of over 6,750 megalitres per day by 2030. This is equivalent to the annual water needs of a population of approximately 60 million people in Bangladesh.*
>
> *(…) It is estimated that the level of investment in new assets (water abstraction treatment and distribution plant as well as effluent treatment plant) to support growth in the textile sector will be in the order of $19 to $30 billion through to 2030 under a "business as usual" water demand scenario."(WRG 2015)* [410]

It is clear that in future, water usage will not be free of charge, as the costs of water scarcity to society can no longer be ignored. It's also clear that carbon emissions can't be free of charge - or even subsidized - in a 1.5°C warmer world. Nor can brands ignore the impacts of toxic chemicals and the ever louder call for more social practices, such as paying living wages and creating a safe working environment. Global demand for clothing is also changing, with resale growing 21 times faster than the retail apparel market over the past three years.[411] The textiles industry is therefore at a crossroads; continuing the linear model (while imposing external costs to society and future generations), or shifting to circular models, and adapting to changing circumstances. According to the Ellen MacArthur Foundation, a leading think tank in sustainability, a 'New Textiles Economy' is 'distributive by design' and 'reflects the true cost (environmental and societal) of materials and production processes in the price of products'.[412]

Textiles and tax reform

This study demonstrates how aligning tax policy with the SDGs can be relatively neutral to the sector while sustaining an overall better functioning economy, higher investments in future-proofing technologies and higher consumer spending in Bangladesh. Will this be reason enough for the fashion producers to support tax reform? Maybe not; as nobody likes to pay more for something that was previously for free. But looking at global trends, tax reform, including fossil fuel subsidy reform, would be a way to reduce risks and future-proof the sector. According to the World Bank, carbon taxes in Bangladesh can benefit firms, including exporters:

- There is well-established empirical evidence that environmental regulations can stimulate innovation.[413] Note that the scenarios under review directly contribute to innovation in the textiles sector.
- A carbon tax would allow firms producing in Bangladesh to market their products as more sustainable than those produced in other countries.[414]
- A carbon tax would help Bangladeshi exporters get 'ahead of the curve' as consumers (and laws) in developed markets become more environmentally conscious in their sourcing of imports.[415]

There is a risk of carbon leakage if firms leave Bangladesh for countries without carbon pricing mechanisms. The evidence to date suggests that such negative impacts are non-existent to minimal.

However, they may impact some sectors, and Bangladesh's garment sector may be one example that deserves consideration. The World Bank notes that the risks are reducing as more countries impose a carbon tax.[416] Also, research shows that investments in resource efficiency, secure work environments and sustainable materials would actually boost profitability by up to 1-2 percentage points in EBIT margin by 2030.[417]

Opportunities for circular business models in Bangladesh?

Impacts on global supply chains of circular practices need to be researched, as many issues remain unclear. For example:

- How could Bangladesh shift from activities with relatively low value-added towards higher value-added activities, such as design, reuse and customization and towards production methods with a smaller footprint and more quality employment?
- How could smart policies support the transition to a circular supply chain? In Bangladesh, a reduced tax rate of ten percent has been introduced for garment factories that have an internationally recognized green building certification.[418] Is this measure effective? Should it be complemented with other policies?
- How could a country like Bangladesh be part of the 'closed loops' of fashion brands? Could products be returned to Bangladesh in a responsible way to be recycled or modified?
- What are the opportunities in local or regional circular business models? How to connect local and regional loops?
- If shipping were a country, it would be the sixth biggest in terms of emissions share.[419] How will global trade be sustained in a 1.5-degree warmer world? Will high-volume carbon-neutral shipping be possible?

Questions like these should be the subject of continued research with and in Bangladesh.

Adaptation in the DNA of business

The textiles sector is an important driver for growth in Bangladesh, but it still fails to pass on equally to the population. 'Business as usual' will be difficult to sustain considering global megatrends such as climate disruption and displacements, water supply risks, the global focus on the SDGs, social needs, and circular business models. Fortunately, adapting to changing circumstances is in the DNA of business and the global sense of responsibility in business is growing. As the CEO of Royal DSM (an €8.6 billion health, nutrition and materials company) stated:

> *"[As business leaders] We cannot be successful, nor call ourselves successful, in a society that fails. The increased impact and power of business need to lead to an increased responsibility to contribute to the real, higher goals of our economy, to serve society."*[420]

Considering all of the above, business can and should play a prominent role in assisting governments in aligning tax systems with the SDGs.

6. Conclusion and recommendations

We have entered the SDG era; an era of unprecedented global social and environmental challenges. The most daunting task will be to adapt the metabolism of our economies to match the carrying capacity of the earth and stay well below 2°C global warming. We face equally important social challenges in our societies, including enabling a growing population to develop to their full potential and find decent work.

Aligning economic growth with the goals of the SDGs will be key. The linear (take-make-waste) economy is no longer maintainable. A shift is needed towards inclusive circular economies, which are regenerative, carbon neutral and distributive. Tax systems play a fundamental role in this transition and there is now widespread support for the principles of tax reform; putting a price on pollution and resources and using the revenues for social impact.

Updating the tax system is not a simple task, especially in countries with low- and middle-incomes, which face the multiple challenge of developing the economy and social systems, while at the same time preserving natural resources. This study confirms that countries may not need to choose between those goals. Smart policies could help countries to 'leapfrog' into the SDG era.

It may be clear that many details and complications still need to be researched. The question is whether to resolve these issues or allow them to immobilize our current systems, that were built for a different era.

We therefore call upon all stakeholders, businesses, governments and NGOs to do what is in their power to turn tax into a force for good. And to help build modern tax systems that enable prosperity based less on natural resource use and more on the abundance of human capacities and talents. For this is growth that can be sustained by generations to come.

Below are four recommendations for next steps in Bangladesh and other countries to be taken by business leaders and governments.

RECOMMENDATIONS FOR BUSINESSES:

1) Evaluate the risks and opportunities related to global environmental and socio-economic megatrends.

Companies should focus on getting the insights necessary to evaluate the company's external costs and benefits and disclose consistent information on the risks and opportunities.

2) Gain and share insights on the impact of tax reform from a business perspective.

Tax reform changes the dynamics in business. There is a substantial lack of knowledge about the risks and opportunities for companies; how does a shift in taxation affect strategic choices concerning products, services and new technologies? Businesses should help governments gain more insight in the transformational power of businesses. This will enable a well-informed discussion between policy makers and businesses.

3) Lead by example.

Businesses can be a gamechanger for the SDGs. Business leaders could lead by example by:

- Joining the global community in support of climate action and carbon pricing.
- Applying internal carbon pricing and extending such mechanisms to other externalities.
- Shifting towards more inclusive and sustainable business models, thereby contributing to the goals of the SDGs.

4) Engage proactively with government to implement policies to support the SDGs.

Businesses should engage proactively with governments in the process of aligning public and private interests in support of the SDGs. Responsible business associations could play a significant role in this process.

RECOMMENDATIONS FOR GOVERNMENTS:

1) Extend data systems to have accurate information in place for effective policymaking.

A robust and future-proof tax system will require adequate risk assessments and increasing level of responsiveness to urgent matters. Detailed and up-to-date economic, environmental and social data are needed to assess the potential for policy measures. This starts with detailed measurement of the metabolism of our economies.

2) Create interdisciplinary research programs.

As tax policy is intertwined with economic, environmental and social issues, a systemic and long-term approach is needed. Fostering cooperation between government departments (Tax, Finance, Environment, Economic Affairs and Employment), as well as businesses and other stakeholders (such as NGOs and research agencies), will be key for the development of effective and fair policies.

3) Start the implementation process.

Practical steps towards tax reform include:

Step 1: Assessing the pathway necessary to achieve national, regional and global ambitions.

Step 2: Putting a price on pollution and natural resource use, starting with abolishing fossil fuel subsidies and pricing carbon emissions.

Step 3: Using the revenues to lower the tax burden on labour, improve social protection (in particular addressing the needs of lower-income households) and increase public investments.

Step 4: Monitoring and adjusting policy measures over time.

During the process, engaging with businesses and the public ahead of any change and communicating the impacts in a transparent manner will be key.

4) Seek international cooperation.

Work together with other countries and regions to achieve a coherent international tax strategy serving the SDGs. This lays the ground for global coordination.

The world has moved on; tax systems need to do the same.

Appendix A: FRAMES: Bangladesh

By Cambridge Econometrics

Description of the model

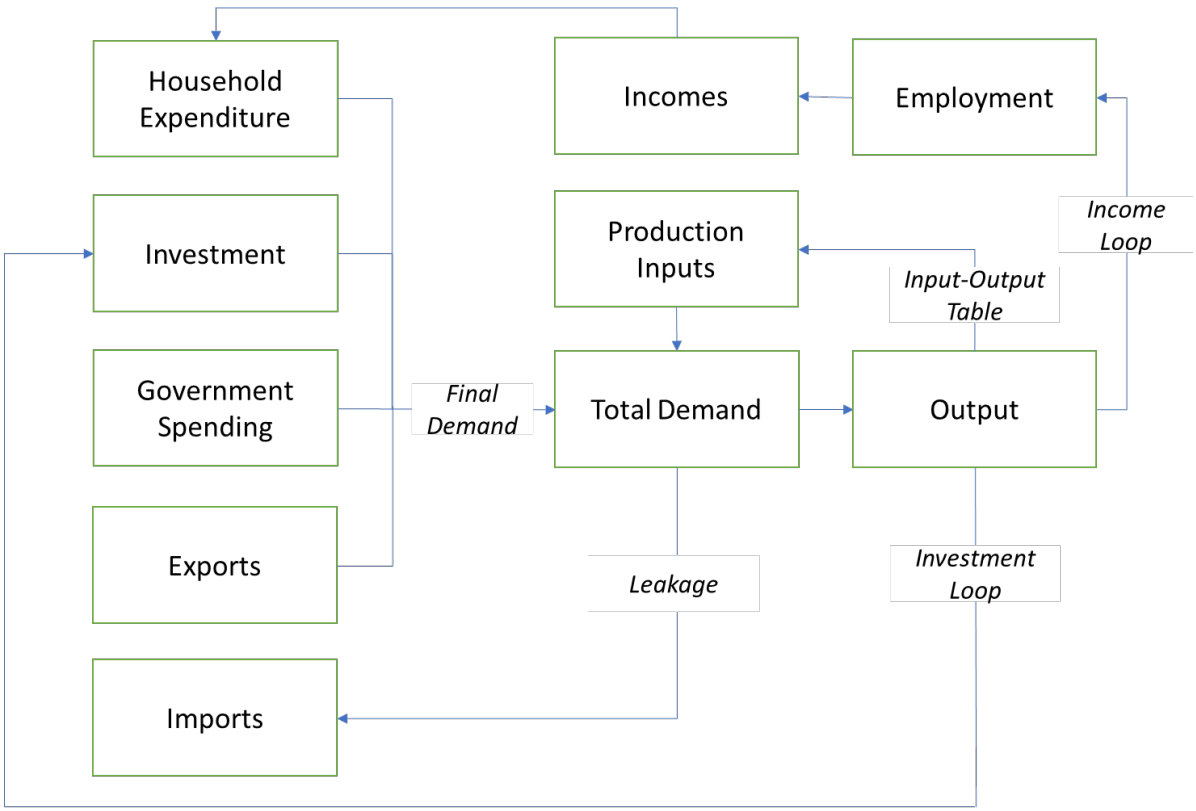
FRAMES: Bangladesh is an economic model of the Bangladeshi economy, developed specifically for this study, by Cambridge Econometrics. The model was built to examine the socioeconomic and environmental effects of energy-environment-economy (E3) policies in Bangladesh.

The key features of FRAMES: Bangladesh are:

- An economic accounting framework based on the system of national accounts.
- Integrated treatment of the economy, energy, and the environment, with linkages between each component.
- Detailed sectoral disaggregation, and a national level input-output table, reflecting the specific structure of the economy.
- Calculations of income effects by quintile, providing distributional results.

Figure 1 details the basic economic structure in the model. At the core of the economic modelling in FRAMES: Bangladesh is a national input-output table for Bangladesh[1]. Relationships for investment, prices, employment, and trade are modelled using elasticities which have been econometrically estimated. The FRAMES: Bangladesh model is based on a post-Keynesian economic framework, and its assumptions are consistent with this branch of economics. The application of this theory to economic modelling are informed by E3ME[1], a computer-based model of global economies, used for analysing the detailed linkages between the economy, materials, environment and energy.

Figure 1: Economic Structure in FRAMES: Bangladesh



Modelling ETR

The analysis in this study focuses on a scenario of Environmental Tax Reform (ETR) in Bangladesh; specifically, adjustments to fossil fuel consumption subsidies, and introduction of a carbon tax. The first order effect of both policies is to increase the price of fuel use; the two measures are additive in their effect on prices. The revenues generated by these reforms are recycled. The details of the polices are provided below.

Carbon Tax:

- The carbon tax rate in 2025 is \$30/tCO_2 (2017 prices).
- The carbon tax levied per unit of energy use is determined by calculating the carbon content of individual fuels for each unit of energy.
- The carbon tax rate is added to the price of fuel use for all fuel users affected by the tax.
- The carbon tax is only levied on power generation and industry. The residential and transport sectors are not covered by the tax.

Oil and Natural Gas Consumption Subsidies:

- The value of oil and natural gas consumption subsidies are calculated using data from IEA. In the absence of data detailing the relative subsidies received by different fuel users, the per unit subsidy is calculated by dividing total subsidy value by total fuel use. In the baseline, the per unit subsidy is assumed to be constant over time.
- The value of the withdrawn subsidy is added to the prices of oil and natural gas use, for all fuel users affected by the tax.
- The subsidies are withdrawn only from power generation and industry. The residential and transport sectors are not affected.

Revenue Recycling:

- By design, the government implements full revenue recycling so that the tax reforms are revenue neutral. The full value of the carbon tax receipts, and the savings from subsidy removal are offset by compensating measures.
- In both scenarios, a share of the revenue from ETR is allocated to compensate the textiles sector for the negative impacts it faces from ETR. The value of this compensation is equal to the reduction in gross value added (GVA) in the textiles sector in each scenario. The compensation is in the form of ‘cleantech’ investment, directed to improve the sustainability of production practices in the Bangladeshi textile industry.
- In the first scenario, remaining revenue is spent on a programme of public investment in infrastructure. The exact infrastructure projects are not defined; the supply side effects of the policy are not modelled.
- In the second scenario, remaining revenue is spent on benefit payments to the bottom two quintiles in the income distribution. Benefit payments are spent equally on the two quintiles. The exact nature of the payment is not defined; in the modelling framework it is treated as a basic transfer from government to households.

Note that if a carbon tax was levied on transport fuels, total revenues would be notably larger, given that transport is responsible for over 11 percent of fossil fuel consumption in Bangladesh. Subsidy removal would be less significant because the unit subsidy on oil is relatively small. The effects of tax reform would then be directly felt by households. Consumer price rises would be larger. Further, the energy import bill would reduce substantially more than in the current scenario. Oil is the main component of the energy import bill, and transport, currently exempt in the scenario, is the largest consumer of oil.

Limitations and Assumptions

- A 'baseline' scenario was developed for the modelling. The importance of the baseline is minimal, because the modelling framework solves scenarios as differences from the baseline. The assumed GDP growth in the baseline is 7.1% per annum to 2030, taken from 'The World in 2030' (HSBC, 2018). The report provides details of its assumptions to produce the growth forecasts. The working-age population growth rate is assumed to be 1.6% per annum (extrapolation of the 1.6% per annum from 2018-2023 detailed in HSBC (2018)).
- The baseline assumes that the individual components of GDP grow at the same rate as total GDP. Labour force is assumed to grow in proportion to working-age population (constant labour participation rate). Energy use per unit of gross output is assumed to be constant over time. The proportion of income accruing to each quintile is assumed to be constant over time.
- Total power generation equals demand in each given year. Composition of the power generation mix is assumed to be constant over time. This is equivalent to assuming that as any capacity retires, it is replaced with the same technology. And that investment in new capacity follows historical shares.
- Environmental tax reforms are modelled to be introduced linearly to 2024. By 2024, the carbon tax rate is \$30/tCO_2 (2017 prices), and oil and natural gas subsidies are fully removed for power generation and industry.
- As noted above, by design, each scenario is budget-neutral in terms of policy costs/revenues.
- The behavioural parameters in the model are taken from E3ME. Bangladesh is not represented individually in E3ME; India was therefore chosen as the most appropriate region to be the proxy.
- Switching between fuels is not estimated in the modelling. Coal, oil, and gas use long-run price elasticities from E3ME. The values of these estimates are taken from literature, rather than econometrically estimated. See the E3ME manual (https://www.e3me.com/wp-content/uploads/2019/04/E3ME-Technical-Manual-v6.1.pdf).
- The cost pass-through rate in each sector (share of change in costs passed on to final prices) is determined by the econometric parameters; importantly, reflecting different levels of competitiveness in individual sectors. The exception is power generation, which is not subject to international competition: here, the full cost of taxes is passed through to prices.
- Change in demand for oil is directed to imports, given the extant minimal domestic production in Bangladesh. Change in demand for coal is met by a reduction in domestic production, and reduction in imports, proportional to the import share in 2016. Change in demand for gas is met entirely by adjustments to domestic production. Bangladesh's cumulated natural gas consumption to 2030, in the modelling baseline, is less than total natural gas reserves (data for natural gas reserves is taken from BGR (2015) (https://www.bgr.bund.de/EN/Themen/Energie/Downloads/energiestudie_2015_en.pdf?__blob=publicationFile&v=2). This assumption would need to be reconsidered if the modelling horizon extended beyond 2030.
- **National policy.** The measures are introduced in the model on a national level in Bangladesh. Policy in all other global regions is constant across scenarios.
- **Price effects.** The model captures price effects and does not include any awareness or signalling effects from the green taxes. This means that the responses to changes in tax rates should be attributed to the financial effects, rather than any publicity or virtue-signalling that accompanies the reforms.
- **Prices.** The model is solved in constant prices, in Bangladeshi taka, 2016 prices.
- **Impact beyond 2025.** The tax reform is introduced gradually to 2024. The model assumes that by 2024, full behavioural responses are realised. Effects from 2025 onwards would be very similar, unless further reform was introduced. The caveat is that Bangladesh has limited natural gas reserves; economic benefits of reduced gas use would increase if natural gas was not sourced domestically.

Scenario results

Scenario results

The ETR policies are modelled across two scenarios of revenue recycling. For the 'infrastructure scenario', revenues are spent on a programme of investment in public infrastructure. For the 'social spending scenario', revenues are spent on increasing the real incomes of the lowest two income quintiles.

Variable	Infrastructure	Consumption
GDP	0.4	0.5
Consumer Expenditure	-0.6	0.4
Investment	3.3	0.8
Imports	0.3	0.3
Exports	-0.3	-0.3
Total CO2 Emissions	-4.0	-3.7
Employment	0.2	0.2
Employment ('000s)	139	172
Environmental Tax Revenue as a Share of Total Tax Revenue	11.8%	11.9%
Total Environmental Tax Receipt (Million 2017 USD)	4305	4314
Total Final Energy Consumption (% baseline)	-3.0	-2.6
Total Tax 2020-2025 Cumulative (% baseline)	8.3%	8.3%

National Level Results

GDP

GDP is higher than the baseline in both scenarios: 0.4% in the infrastructure scenario, and 0.5% in the social spending scenario. The main driver of positive macroeconomic impacts is the effect of redistributing profits to investment and consumption. Prices in the economy generally increase less than the cost of the environmental taxes, subject to the level of competition in each sector, leading to a reduction in profits. The full values of the taxes are recycled, however, leading to a net stimulus effect. Reductions in energy use also produce positive macroeconomic effects because of the reduction in the value of energy imports.

Consumption (Household Expenditure)

In the design of the tax reform, none of the reforms directly affect households. Consumer prices do increase across consumption categories, however, because power generation and industry face higher costs of production.

- In the infrastructure scenario, total consumer expenditure is 0.6% lower than it is in the baseline, in real terms. Nominal incomes are higher than in the baseline; the infrastructure investment creates jobs and there are positive multiplier effects throughout the economy. Price rises outweigh this effect, however, meaning household income and consumption are lower in real terms.
- In the social spending scenario, total consumer expenditure is 0.4% higher than the baseline, in real terms. The revenue recycled in social spending increases consumer expenditure and creates a stimulus effect which creates jobs. These effects are substantial enough to outweigh the effect of price rises.

Investment

Investment is higher in both scenarios than in the baseline. The positive macroeconomic results in both scenarios mean higher production levels in the economy, which stimulates investment in additional

productive capacity. The investment increase is much greater in the infrastructure scenario, because the revenue recycling mechanism directly increases investment in the economy. Investment is 0.8% higher in the social spending scenario, and 3.3% higher in the infrastructure scenario.

Imports and Exports

- Total imports are higher in both scenarios than in the baseline, by a similar amount. Higher levels of production in the economy increases the demand for imports of production inputs. Part of the higher consumer expenditure in the social spending scenario is spent on imported goods. Imports are a 'leakage' from the domestic economy, reducing the positive multiplier effects of the investment and consumption stimuli.
- Energy imports are lower in both scenarios, because higher prices of fuel use reduce demand. The value of coal imports is approximately 34% lower in both scenarios, and oil imports are 1% lower. The reduction in coal imports is much greater because: 1) the proportional price increase of coal is substantially more than for oil (coal is less expensive per unit of energy, and contains more carbon); 2) transport is protected from the tax reforms, and transport is responsible for 60% of the final energy consumption of oil products.
- Total exports are lower than in the baseline in both scenarios. Bangladeshi firms face higher costs of production because of the direct tax incidence, and the higher prices of domestic production inputs. Resulting price increases reduce the competitiveness of exports from Bangladesh. If other regions globally were to implement comparable environmental policy, this competitiveness effect would be mitigated. Investment is made in the sustainability of production in the textiles sector, to compensate for this effect, and protect the long-term competitiveness of Bangladesh's most important export sector.

Employment

Total employment increases in both scenarios, by 0.2%. Employment increases as a result of higher economic activity in each scenario. The revenue recycling mechanisms more than outweigh the negative effect on output of price increases due to higher energy costs.

Energy Consumption

Total final energy consumption falls in both scenarios, as expected. Carbon tax and subsidy removal directly increase the price of fuel use, reducing demand. In the absence of revenue recycling, energy consumption in the model is reduced by 3.9%. In the infrastructure and social spending scenarios, however, energy consumption decreases by 3.0% and 2.6%, respectively, given the rebound effects of higher production and consumer expenditure.

CO_2 emissions

Both scenarios have lower total CO_2 energy emissions than the baseline. CO_2 emissions fall by 4.0% and 3.7% in the infrastructure and social spending scenarios, respectively. The reduction in CO_2 is greater than energy consumption; the carbon tax increases the price of coal use substantially given its baseline low price relative to other fuels, and high carbon content. The tax levied on natural gas and oil is a much lower share of the baseline price.

Air Pollution

None of tax reforms in the scenarios directly affect air pollution, but given the reforms reduce use of polluting energy products, air pollutants such as SOx, NOx, PM_{10} and $PM_{2.5}$ would be expected to fall as well. These effects have not been quantified in the modelling.

Inequality/Real Incomes

Real incomes in the scenarios are affected by changes in wage income, income from government social spending, and prices. Households in different income groups spend their income in different ways. The important differences in the context of ETR are expenditure on energy and energy intensive

goods/services. In Bangladesh, higher income households spend a larger share of income in these areas, and therefore face higher price increases.

- In the infrastructure scenario, there are no explicit redistributive policies. The scenario is progressive, however, because the lower income quintile households experience smaller reductions in real incomes than those in the higher quintiles. Overall, the differences are small; the lowest quintile has a 0.4% real income reduction, compared to 0.6% for the highest quintile.
- In the social spending scenario, the inequality results are substantially more marked. The revenue recycling mechanism is designed to improve the incomes of the bottom two quintiles. Real income in the highest three quintiles reduces by 0.6%. But real income increases by 12.3% for the lowest quintile, and 4.9% for the second lowest.

Sector Level Results

Output

The main differences in the output structure of the economy are determined by changes in exports, and the revenue recycling mechanism. The modelling framework uses a fixed input-output structure and does not include a treatment of consumption substitution across categories.

- In the infrastructure scenario, the sectors with largest increases in output are construction, manufacturing (excluding textiles) and mining and quarrying. The public infrastructure investment increases demand substantially in each of these sectors, either directly, or indirectly through supply chains. Gross output is marginally lower in sectors which are supplying consumer final demands, such as retail.
- In the social spending scenario, gross output increases in all sectors except textiles. The sectors with the largest increases are those associated with consumer expenditure. Manufacturing and construction also have relatively high increases, because of the investment in 'cleantech' for textiles. Textiles loses out because of a loss of exports.

Employment

The percentage changes in employment by sector largely follow the pattern of changes in output, whilst allowing for different returns to scale. Therefore, the largest changes are found in labour-intensive sectors, and those where output changes by the most. In the infrastructure scenario, 63% of new jobs are created in the construction sector. Agriculture creates the second greatest number of jobs, because of the size of the sector and its labour-intensity. In the social spending scenario, employment changes are more even across the economy. Wholesale and retail trade create the most jobs (53% of the total), followed by agriculture and construction. Jobs are created in construction because of the investment in 'cleantech' for textiles, and the induced positive effects in economy-wide investment.

CO_2

The largest proportional reductions in CO_2 in both scenarios is across the industrial sectors. This is because, in Bangladesh, industry is responsible for approximately 85% of coal use, the fuel which is most affected by these reforms. The fuel user contributing least, proportionally, to emissions reductions is the residential sector; the residential sector was protected in scenario design from the tax reforms. In the social spending scenario, emissions from the residential sector increase, as total consumer expenditure increases. The power generation sector has minimal changes in emissions, because of limitations in the modelling framework. The model assumes that the power generation mix is constant over time and across scenarios. These tax reforms provide a strong incentive to different power generation technologies. However, the time horizon of analysis is 2025 and given the lifetime of power generation technologies, there would be limited retirement of capacity to be replaced over these years.

Energy Consumption

Changes in energy consumption by fuel user follow a very similar pattern to the CO_2 results, though the differences across sectors are less marked. Where industrial sectors reduce coal use, the relative CO_2 reduction is larger than that of energy use.

Textiles Sector

The textiles sector is unique in the Bangladeshi economy, and in the dynamics it faces from ETR. Textiles is the only sector that is reliant on exports, rather than domestic demand. It is therefore the most vulnerable to the loss of international competitiveness arising from increased costs of production resulting from tax reform. Exports reduce by 0.4% in both scenarios by 2025. A portion of the revenue accruing from the tax reforms is allocated to investing in the sustainability of production in the textiles industry. This investment would ameliorate the negative price competitiveness effects on the industry, with positive quality effects. These effects have not been quantified in the model.

Model Classifications

Sectors
1. Agriculture, forestry & fishing
2. Mining & quarrying
3. Manufacturing (excl. textiles)
4. Textiles
5. Electricity gas, & water supply
6. Construction
7. Wholesale & retail trade, & repair
8. Transport, storage, & communication
9. Financial intermediations
10. Real estate renting, & business activities
11. Other service activities
12. Public administration & defence

Fuel Users
1. Agriculture, forestry & fishing
2. Mining & quarrying
3. Manufacturing (excl. textiles)
4. Textiles
5. Electricity gas, & water supply
6. Construction
7. Wholesale & retail trade, & repair
8. Transport, storage, & communication
9. Financial intermediations
10. Real estate renting, & business activities
11. Other service activities
12. Public administration & defence
13. Residential

Consumption Categories
1. Food & non-alcoholic beverages
2. Alcoholic beverage, tobacco & narcotics

3. Clothing & footwear
4. Housing, water, electricity, gas & other fuels
5. Furnishings, household equipment & household maintenance
6. Health
7. Transport
8. Communication
9. Restaurants & hotels
10. Miscellaneous goods & services

Fuels
1. Coal
2. Oil
3. Natural Gas
4. Electricity
5. Biofuel

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- A 2016 study found that shifting taxes from labour and towards natural resources and consumption in 27 Member States of the European Union over the 2016-2020 period would add €842 billion in GDP, enable 6.6 million more people to be in employment, cut carbon emissions by 8.2%, all by 2020, and save €27.7 billion on the energy import bill over the five-year period. The Ex'tax Project, Deloitte, EY, KPMG, Meijburg and PwC (2016), New Era. New plan. Europe. A Fiscal Strategy for an Inclusive, Circular Economy. http://www.neweranewplan.com/

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- A meta-study of 69 different simulations from 40 studies using General Equilibrium models showed 55% of simulations achieved both environmental and economic dividends. 90% of the studies that reduced social security contributions achieved such double dividend. The majority of simulations that recycled via labor incomes, capital taxes and other taxes achieved a double dividend. Recycled revenues towards lump-sum transfers were least successful in achieving a double dividend across these studies. González, J.F. (2018), Environmental taxation and the double dividend hypothesis in CGE modelling literature: A critical review. Journal of Policy Modeling. Volume 40, Issue 1, January–February 2018, Pages 194-223. https://www.sciencedirect.com/science/article/pii/S0161893817301205?via=ihub
- Gago, Labandeira, and López-Otero (2014) reviewed 699 simulations, using different models and methodologies, from 100 papers on the effects of different taxes that have in common that they are applied to one or more energy products, in most cases with an environmental rationale and part of wider tax reform schemes. 95% of the simulations reported decreases in emissions with respect to the business-as-usual scenario. The effects, on average, were positive on GDP, employment and consumer prices, and negative on energy demand, energy prices and welfare. Gago, Alberto, Labandeira, Xavier, Lopez-Otero, Xiral (2014), A Panorama on Energy Taxes and Green Tax Reforms. Revista Hacienda Pública Española. 208. 145-190. 10.7866/HPE-RPE.14.1.5. https://www.researchgate.net/publication/284350683_A_Panorama_on_Energy_Taxes_amd_Green_Tax_Reforms
- Patuelli, Nijkamp and Pels (2005) looked at a total of 186 model simulations from 61 separate studies. On average, all of the different groupings of studies predicted net job creation with significant reductions in CO_2 emissions. Patuelli, Roberto, Nijkamp, Peter, Pels, Eric (2005), Environmental tax reform and the double dividend: A meta-analytical performance assessment. Ecological Economics, Elsevier, vol. 55(4), pages 564-583, December, cited in Aarhus University, Eunomia (2015), Study on Environmental Fiscal Reform Potential in 14 EU Member States: Appendices. Final Report to DG Environment of the European Commission. https://ieep.eu/uploads/articles/attachments/51df7de3-0b82-4771-83d7-85ee0a348a17/Eunomia_EFR_Final_Report_APPENDICES_V0.1.pdf?v=63664509889.

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