REMIT | Revenue Mobilisation, Investment & Trade

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TRADE POLICY MEASURES TO ENCOURAGE A SHIFT TOWARDS GREEN TECHNOLOGIES

cdpr Consortium for Development Policy Research

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The study has been sponsored and quality assured by
Revenue Mobilisation, Investment and Trade (REMIT) Programme

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ABBREVIATIONS

SDG	Sustainable Development Goal
EV	Electric Vehicle
ARE	Alternative and Renewable Energy
CBAM	Carbon Border Adjustment Mechanism
EU	European Union
NTMs	Non-Tariff Measures
EG	Environmental Good
ES	Environmental Service
PREIA	Pakistan Regional Economic Integration Activity
USAID	United States Agency for International Development
NTL	National Tariff Lines
OECD	Organisation for Economic Co-operation and Development
IMF	International Monetary Fund
CEPII	Centre d'Études Prospectives et d'Informations International
WITS	World Integration Trade Solution
ESCAP	Economic and Social Commission for Asia and the Pacific
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization
SSWMB	Sindh Solid Waste Management Board
LWMC	Lahore Waste Management Company
TFA	Trade Facilitation Agreement
VAT	Value Added Tax
NDC	Nationally Determined Contribution

EXECUTIVE SUMMARY

Over the last two decades or so, the context for economic development in Pakistan has been increasingly affected by environmental considerations. In brief, these considerations reflect the need for Pakistan to reduce its carbon footprint. Indeed, in the most recent round of international discussions, the Government has reiterated its commitment to the specific target of halving projected carbon emissions by 2030. While actions in many areas would be relevant, the Government has identified three priority areas: electric vehicles, coal imports, and renewable energy.

This report assesses the extent to which trade and related policy actions can help Pakistan achieve greener growth. It focuses on the following specific policy areas: tariff and non-tariff measures on environmental goods; a framework for dealing with environmental services; and broader industrial policy measures.

With respect to tariffs on environmental goods, we present information from two prior studies, one conducted by the World Bank and the other by the PREIA program of USAID. Both conclude that the average tariff on environmental goods should be reduced. Both recommend reducing tariffs on electric vehicles, energy saving equipment, and air pollution equipment as a matter of priority. We have also conducted our own assessment using a broader set of environmental goods than considered by the earlier studies. We show that environmental goods attract a higher average rate of tariffs than non-environmental goods, that some neighboring countries apply lower tariffs on such goods than does Pakistan, and that the import expanding effect of reducing tariffs is likely to be modest and can be offset by tariff rebalancing measures applied to carbon-intensive imports. Accordingly, we reinforce the recommendations of the earlier studies. Detailed guidance on tariff reductions at the eight-digit level is contained in the PREIA study.

With respect to non-tariff measures on environmental goods, we find that Pakistan applies very few such measures and on very few items in comparison to neighboring countries. We recommend that Pakistan apply non-tariff measures more actively to control the import of carbon-intensive goods both to reduce its own carbon footprint and to preserve access to some export markets that are increasingly requiring certifications of carbon-intensity along the entire supply chain. This may require certifications of energy efficiency on a wide range of electrical goods and machinery.

Trade in environmental services is less amenable to quantitative analysis. We explore some aspects of this trade by examining the case of two Turkish companies that were contracted to deliver solid waste management services in Lahore about ten years ago. The main lessons from this case are that contracts for trade in services face resistance from domestic political and business interests and actual performance is subject to the provision of ancillary infrastructure and services that are not under the control of the awardee. Accordingly, if cost and performance benefits are to be obtained from trade in environmental services, local authorities must be transparent in making awards and must provide supportive ancillary services.

We approach the matter of broader industrial policy for green growth using information collected from focus group sessions with participants from three subsectors: textiles, electric vehicles, and renewable energy. We recommend that a range of actions be considered depending on the sector.

For the textile sector, we recommend that tax and financial incentives continue to be provided to help manufacturing units install renewable energy equipment to reduce their carbon footprint. We also recommend that a public agency be tasked with attesting carbon use at several stages of the supply chain for textiles. This will help textile firms meet digital tracing standards that are to be applied in their principal export markets.

For electric vehicles and renewable energy, we recommend that the Government (referring to both federal and provincial units) use the power of public procurement to set an example. Thus, it could commit to phasing out the use of gasoline-powered vehicles over time in its own fleet, using only electric vehicles as replacements. As an important consumer of cars and trucks, it can influence the speed at which the transition to less carbon intensive sources of automotive power is accomplished in the transport sector. Government could set a similar example in its use of electricity by committing to a phased transition from fossil fuel-based electricity to renewable energy in public buildings.

A table summarizing our recommendations and the stakeholders associated with their implementation is provided on the next page.

Table ES.1: Summary of key recommendations

Policy Area	Recommendation	Key Stakeholders
Tariffs on Environmental Goods	Tariff cuts on Electric Vehicles, Energy Saving Equipment, and Air Pollution equipment	Ministries of Commerce and Climate Change
Non-Tariff Measures	Adopt labelling, testing and certification requirements on a wider range of EG imports; adopt energy efficiency standards for a range of electrical goods and machinery	Ministries of Commerce, and Industries and Production
Environmental services	Award contracts with clear and measurable terms of performance and provide supportive infrastructure and ancillary services	Local and Provincial Governments
Industrial Policy	Encourage private investment in renewable energy through tax and financial incentives, broaden access to net metering. Facilitate digital tracing of carbon emissions produced in textile and leather industry	Ministries of Finance, Commerce, and Energy, Board of Investment and Power Distribution Companies (DISCOs)
Public sector procurement	Adopt targets to replace public sector transport fleets with electric vehicles; adopt targets for use of renewable energy in government buildings.	Various government departments

INTRODUCTION

Economic development and environmental consequences

As in other developing countries, and historically in the now-developed countries, economic development in Pakistan has led to adverse effects on the environment, particularly through air and water pollution and the depletion of key resources such as forests and water. These outcomes pose ongoing public health risks and can potentially constrain future economic growth.

Pakistan's pattern of agricultural development has led to the depletion of forests and water aquifers. Since agricultural water is subsidized, it is used above socially optimal levels and with considerable wastage. The use of fertilizers has polluted water resources in some areas and has depleted the natural nutrient quality of arable land. Inadequate sanitation has created alarming public health risks in some rural areas, resulting in stunting and wasting among children. Stubble burning of rice fields generates significant amounts of air pollution with adverse quality of life and health consequences for large tracts of surrounding areas, including towns and cities.

Industrial activities, urbanization, and reliance on fossil fuels have contributed to significant air pollution in Pakistan's cities, particularly in major urban centers like Karachi and Lahore. The level of urbanization has been rising over time, reaching 36% in 2017.[1] Meanwhile, 57% of Pakistan's electricity comes from fossil fuels. A rising level of energy consumption, fueled by demographic trends, is leading to higher levels of carbon dioxide emissions.[2]

Urbanization and sprawl have led to congestion and inefficient transport systems in major cities. Congestion not only wastes time and fuel, it also generates air pollution with attendant public health consequences including high levels of respiratory and related illnesses. According to the Air Quality Life Index, air pollution reduces the average lifespan in Pakistan by 3.9 years. Several of Pakistan's cities feature among the top ten most polluted in the world. Air pollution in Lahore is so high that it is calculated to reduce life expectancy there by 7 years.[3]

1 Urbanization in Pakistan - UNDP
2 Our World in Data
3 Pakistans Air Pollution Shortens Lives - Human Rights Watch

Air pollution can also affect cognitive function and mental health, which are essential for productivity in various fields. Studies have shown that exposure to air pollutants such as fine particulate matter (PM2.5) and nitrogen dioxide (NO2) is associated with cognitive decline, decreased attention span, and impaired decision-making abilities.[4] [5] Additionally, poor air quality has been linked to increased rates of depression, anxiety, and stress, which can further reduce productivity by affecting motivation and concentration in the workplace.[6]

Water pollution is also a critical issue, primarily due to poor waste management practices both in agriculture and industry. Currently able to treat only 1% of its wastewater, Pakistan is far from its commitment under the relevant sustainable development goal (SDG) to treat up to 50% of its wastewater.[7] Polluted water sources contribute to waterborne diseases such as cholera and dysentery and lead to significant adverse health impacts, especially amongst children. Affected children subsequently experience weaker cognitive development and academic performance. This in turn has a lifelong effect on their productivity and earnings.

Failure to address these constraints could lead to a downward spiral, where environmental degradation hampers economic growth, exacerbating social inequalities. Sustainable development strategies that prioritize environmental goals and public health are essential for ensuring long-term growth and prosperity in the country.

Pakistan's environmental goals

The most recent enunciation of national environment goals is contained in Pakistan's commitments to combat climate change made in 2021. As a party to the Paris Agreement by the United Nations Framework Convention, Pakistan updated its Nationally Determined Contributions (NDCs) to accelerate the transition towards a climate-resilient economy. The update commits Pakistan to halving its projected emissions by the year 2030, with 15% of the reduction to be achieved through own resources and 35% through international grant finance. The three most important mitigation actions to meet this goal are as follows: 60% of energy consumption will be sourced from renewable energy, 30% of the vehicle fleet will consist of electrical vehicles (EVs), and the import of coal will be banned.

4 Chandra et al. (2022)
5 Zhang et al. (2018)
6 Thomson (2019)
7 Parveen & Khan (2023)

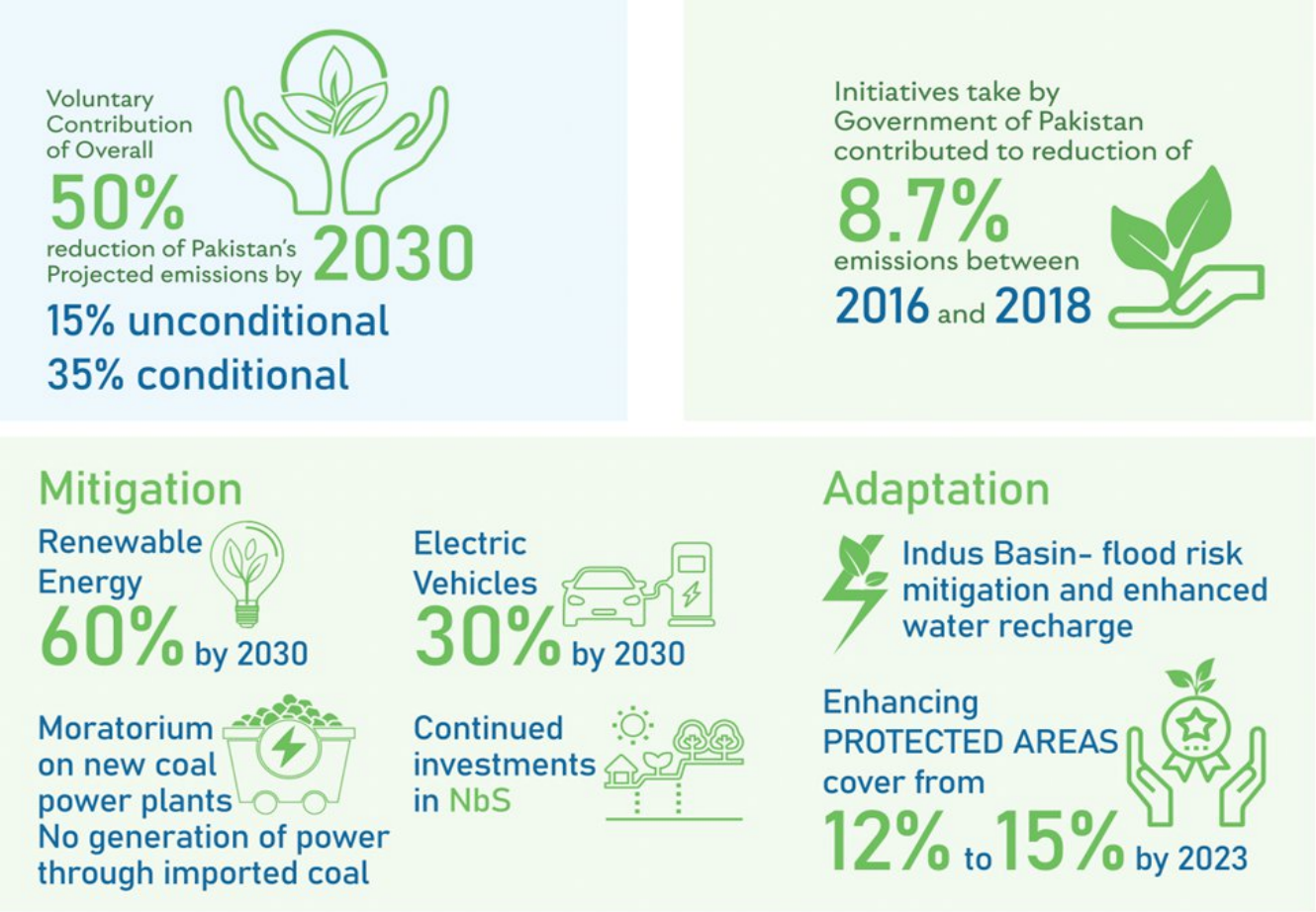

Figure 1.1: Goals and high priority actions set by Pakistan's NDCs 2021[8]

A broader approach towards EVs was outlined in the National Electric Vehicle Policy issued by the Ministry of Climate Change in 2019. This document breaks down the strategy into four phases: market development and public awareness, facilitating EV imports, incentivizing local production of EVs, and promoting EV exports. A similar phased approach towards the development of Alternative and Renewable Energy (ARE) was outlined as early as 2006 under the Policy for Development of Renewable Energy for Power Generation (RE Policy 2006)[9], this policy was updated and a more up to date policy was formulated in 2019.[10] The objective was to provide a new policy direction to help Pakistan transition towards greener energy and a more environment friendly energy mix. The 2019 policy incorporates a variety of investment options for tapping different ARE resources for on-grid and off-grid applications as well as encouraging consumer driven applications and initiatives.

8 The figure is taken from 'Pakistans updated Nationally Determined Contributions 2021 report.
9 Policy for Development of Renewable Energy for Power Generation, 2006
10 Alternative and Renewable Energy Policy, 2019

Why have actions with respect to ARE and EVs been given high priority in the Pakistani mitigation plan? One reason is because Pakistan is highly dependent on imported oil and gas to meet its energy and transportation needs and moving away from fossil fuel sources will help the country manage its chronic balance of payments problem. In recent years, Pakistan has been spending close to $17 billion per annum on oil and gas imports. At current rates of growth of demand, the import bill for oil and gas could reach $30 billion in a few years. This is close to the entire amount of foreign exchange earned by Pakistan from the annual exports of goods in recent years.

Another reason to focus on these priorities is because the relationship between carbon emission levels and the use of fossil fuels is reasonably well understood from global studies. For example, with respect to cars, analyses comparing lifecycle emissions across EVs and FFVs (fossil fuel vehicles) confirm the superiority of EVs. While emissions are higher for EVs at the car and battery production stage, they are far lower than for FFVs when compared across a full life cycle of use.[11] A comparison among popular brands of cars is shown in Figure 1.2 below. Studies also show large reductions in emissions going from FFV to EV choices in trucks and buses. The technical coefficients emerging from international studies linking emissions levels to types and sizes of vehicles can be adapted to assess the likely benefits of switching from FFV to EV in the case of Pakistan as well.

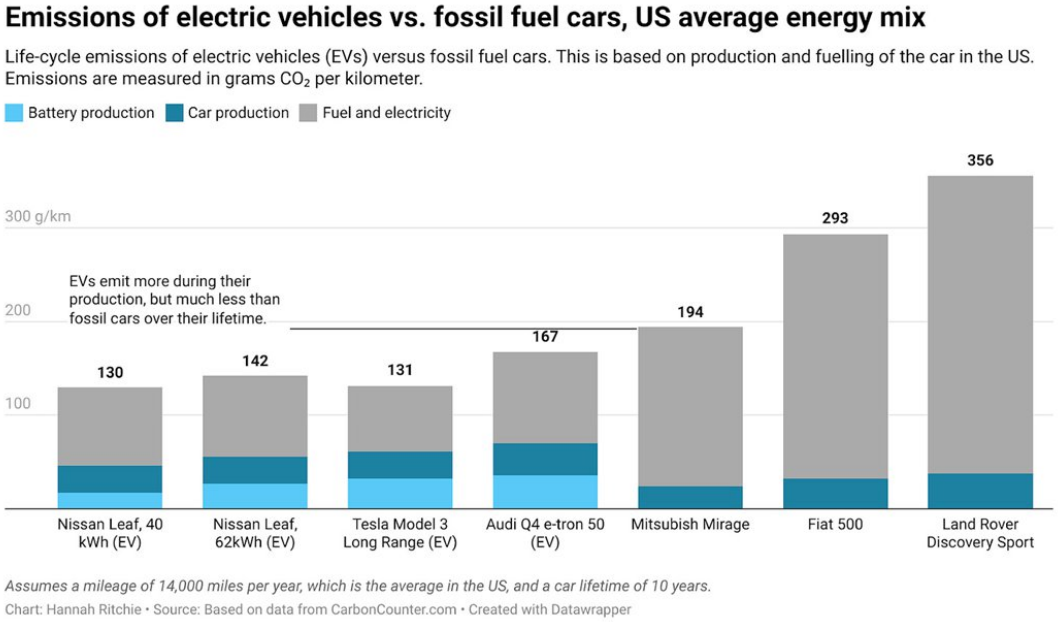

Figure 1.2: Emission comparisons across EVs and FFVs

[11] Electric cars are better for the climate than petrol or diesel, 2023

Using trade policy to enable green growth

Achieving economic growth that is also environmentally sustainable requires action across a broad range of sectors and policy instruments. Trade policy is an instrument that can facilitate progress towards domestic environmental objectives as well as preserve access to external markets. Pakistan's national climate change policy, drafted in October 2021, does not specifically mention the prospective use of trade policy and global trade agreements.[12] Similarly, the most recent statement on trade policy (Strategic Trade Policy Framework, 2020-25)[13] does not explicitly specify trade policy priorities in light of the challenges and opportunities posed by environmental goals and commitments. These gaps in dialogue across the relevant ministries need to be bridged so that environmental and trade policies can proceed in a complementary fashion.

Relevant domestic environmental goals include greater use of renewable energy, more effective treatment of wastewater to reduce harmful effluents generated in industrial and agricultural processes, and better control of air pollution in part through greater use of electric vehicles. In recent decades, a range of eco-friendly products, such as solar panels, air filters, and wastewater treatments, have become available. Since Pakistan does not produce many such products, it must import them. Trade policy can influence the terms and conditions under which such items can be imported at low cost.

Many developed countries have already begun including environmental protocols in their trade agreements.[14] In essence, these agreements seek to ensure that imported goods meet the same environmental standards as domestically produced goods.[15] One prominent example of such an initiative is the Carbon Border Adjustment Mechanism (CBAM) that is being implemented by the European Union (EU). Such initiatives imply that exports from developing countries to the EU will have to achieve full compliance over time with domestic EU standards. To reduce the risk of production and associated emissions being displaced to other countries because they have a lower or no carbon price and tackling 'carbon leakage,' The UK has also decided to implement a new import carbon pricing mechanism by 2027.[16] Under this mechanism, imports of iron, steel, aluminum, ceramics and cement will face a comparable carbon price to those goods produced in the UK. A suitably designed trade policy can help Pakistan achieve

12 National Climate Change Policy, Government of Pakistan
13 Strategic Trade Policy Framework, 2020-2025
14 See Annex A for brief notes on some regional trade agreements that include environmental protocols,
15 Countries that face competition, that care about the environment and that are democracies are more likely to include environmental provisions in their trade agreements. See Morin, Dur and Lechner (2018).
16 The details of the UK levy to level carbon pricing can be found at the following link: https://www.gov.uk/government/news/new-uk-levy-to-level-carbon-pricing

compliance with evolving international standards, mitigate the costs associated with carbon emissions, and preserve access to export markets. This is important since Pakistan has struggled to raise its exports in recent years.

Purpose, scope, and methodology

The main purpose of this report is to consider how trade and related policy measures can help Pakistan meet its environmental goals, whether domestically determined or set through international commitments. The scope of this report covers the following: tariffs applied to EGs; non-tariff measures (NTMs) applied to EGs; a framework for managing trade in environmental services (ESs) and broader industrial policies relevant to the achievement of sustainable growth. The methodology is flexibly designed to make the best use of the data at hand. As and where necessary, it features desk reviews of relevant documents, analyses of primary data on trade flows and trade policy instruments, and information gathered from focus group sessions with industries of interest.[17]

The remainder of this report is organized as follows. Chapters 1 and 2 discusses how tariffs and NTMs apply to EG imports into Pakistan. Chapter 3 uses a case study of solid waste management to derive pointers for trade in environmental services. Chapter 4 considers how trade-related and broader industrial policy instruments may be harnessed to meet environmental and economic purposes. Chapter 5 summarizes the recommendations of the report.

17 See Annex B for list of sectors and firms consulted.

CHAPTER 1:

TARIFFS APPLIED TO EGs

Review of past studies

There are two main reasons for Pakistan to reform its tariff policy with respect to EGs. First, Pakistan has committed to certain targets in international agreements relating to carbon dioxide generation and climate change.[18] By changing the mix of imports, tariff policy can facilitate progress towards meeting these targets. Second, large markets such as the EU and the USA have begun developing a range of environment-related standards that will apply to their imports. Complying with these standards with the help of reformed tariffs will help maintain export market access for Pakistan.[19]

Several international bodies have taken up the matter of defining EGs and by now several lists are circulating. These lists do not yet have unanimous assent. However, they can be used to illustrate the scope and content of the tariff rationalization that may be considered as Pakistan moves towards future economic and environmental objectives. Two recent attempts at applying such lists to Pakistan are particularly helpful. The first is a study carried out by the World Bank in 2019 bearing the title: "Import Duty Structure for Select Environmental Goods in Pakistan." The second is a study supported by the USAID under the Pakistan Regional Economic Integration Activity (PREIA) in 2023, resulting in a report entitled "Tariff Rationalization of Environmental Goods in Pakistan." These two reports bring the reader up to date on the state of knowledge relating to the tariffs that currently apply to EGs in Pakistan. We summarize the findings and recommendations of these studies in the sections that follow.

The World Bank Study

The World Bank study (see Table 2.1 for key data) yields the following observations:[20]

i) The average import duty across environmental goods following the Finance Act of 2022 was 15.7 percent, which was below the average of 20 percent across all imports into Pakistan.

ii) There was moderate variation among broad categories with the highest tariffs applying to electric vehicles (29.1 percent) and plastic waste and scrap (26 percent).

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[18] Such commitments have been made in various international fora and most recently at the COP28 meeting in Doha in 2023.

[19] The EU approach is reflected in its Carbon Border Adjustment Mechanism (CBAM) which will initially apply to highly carbon-intensive industries such as cement, iron and steel, fertilizers, and electricity. Pakistan is not a direct exporter of any of these items to the EU market. However, all of Pakistan's exports to the EU must eventually reduce the carbon intensity of inputs to comply with CBAM.

[20] The analysis is summarized in a blog published in November 2021 under the title: Pakistan's policy options to make trade work for environmental sustainability (Sugathan and Varela, 2021). We understand that the World Bank is conducting additional work on this subject.

iii) Among more narrowly defined items than those shown in the table, one finds some that are duty free; this includes items of relevance to renewable energy such as hydro turbines and solar thermal equipment.

iv) Among narrowly defined categories one also finds items that carry moderately high tariffs; this includes purifiers and filters (for air and water pollution reduction) and some solar and wind power components.

Assessing the 15.7 percent average tariff level to be "non-negligible" the World Bank study concludes that Pakistan should reduce tariffs on EGs to zero over a specified period. This would encourage the import and use of technologies and goods to help Pakistan meet its international environmental commitments as well as enable the export sector to make progress towards compliance with emerging sustainability standards in major global markets. The blog report notes that Pakistan already allows many relevant EG items to enter duty free under the China-Pakistan Free Trade Agreement. What is needed is a generalization of this facility to other major producers of EGs.

Category	Average Import Duty FY22 (%)
Electric Vehicles	29.1
Renewable Energy Equipment	12.9
Onshore Wind	15.3
Solar PV	11.5
Solar Thermal	0
Hydropower	2
Crosscutting RE equipment	15.3
Energy Saving Equipment	15.7
Air Pollution Control	16.3
Water-Use Efficiency and Safe Drinking Water	17.1
Wastewater Treatment	11.7
Solid Waste Management	6.7
Environmentally Preferred Products	16.2
Miscellaneous Product Categories	9.5
Plastic Waste and Scrap	26
Fuelwood, Wood waste and Scrap	0
All Environmental Goods	15.7

Table 2.1: Tariffs applicable to environmental goods (World Bank study)

The PREIA Study[21]

The PREIA study builds on the World Bank study in an important respect by mapping tariff categories at the 8-digit HS level. This has the advantage of providing tariff rationalization recommendations at a very detailed level corresponding directly to National Tariff Lines (NTL). The study also uses the 2022 HS classification to provide a direct link with the format now being used by the FBR.

Table 2.2 shows average tariffs according to the PREIA study methodology. In addition to customs duty, the PREIA study also reports averages for two para tariffs: additional customs duty and regulatory customs duty. The para tariffs are reported in the second column of Table 2.2. The findings of the PREIA study may be summarized as follows:

i) Custom duties across all categories of environmental goods average to 11.4 percent using the latest data.
ii) There is some variation across categories: some items, such as Electric Vehicles, have customs duty set at more than twice the average while others, such as Solid Waste Management, are set at less than half the average.
iii) Para tariffs can make a notable difference in some cases. For example, applied tariffs more than double in the case of the category named Water-Use Efficiency and Access to Safe Water where para tariffs add up to more than the normal customs duty.
iv) The study reports that regulatory duties are applied to only 27 products but can vary between 1 and 50 percent.

Category	Average Tariffs Fy24 (%)	Average Para-Tariffs FY24 (%)
Electric Vehicles	24.6	5.1
Renewable Energy Equipment	9	4.2
Energy Saving Equipment	10.7	4.1
Air Pollution Control	11.9	4
Water-Use Efficiency and Safe Drinking Water	10.4	16.5
Wastewater Treatment	9.1	3.5
Solid Waste Management	4.6	2.5
Environmentally Preferred Products	11.1	5.9
Miscellaneous Product Categories	7.3	3.5
All Environmental Goods	11.4	5

Table 2.2: Tariffs applicable to environmental goods (PREIA study)

[21] See Annex B for list of sectors and firms consulted.

The PREIA study concludes that the structure of tariffs and para tariffs on environmental goods contain enough variation to justify further rationalization. This would be consistent with Pakistan's goal of reducing its overall carbon footprint in line with international commitments. Since the category of Electric Vehicles attracts the highest average tariff, the study makes specific recommendations for reductions here. The study also recommends tariff cuts on specific items in the category of Energy Saving Equipment, such as insulation materials, heat exchange units, solar water heaters, heat pumps, and submersible motors. A third category where cuts are considered worthwhile is Air Pollution Control products.

In addition, the PREIA study makes two useful procedural recommendations. One proposal calls for the classification system for environmental goods to be integrated within the current tariff structure. This will make it easier to distinguish environmentally friendly products and facilitate future rounds of assessments and tariff modifications. A second proposal is for new tariff headings to be developed to distinguish between environmentally friendly products and other similar products. The current system sometimes misclassifies such products because it does not consider the environmental aspect.

Additional Perspectives

In this section, we look at Pakistan's trade in EGs using a different source of information than that used for the World Bank and PREIA studies. Our study includes the combined list of environmental goods used by the OECD, presented in Sauvage (2014), and the list of products defined as EGs for the IMF Climate Change Indicators Dashboard. The source for trade data is the CEPII's BACI dataset which can be used to aggregate information on trade flows and fill gaps in trade data where governments may not have reported official data.[22] While there is much overlap, the categories of EGs do not correspond precisely to those used by the World Bank and PREIA studies. For example, one category, MISC, refers to a miscellaneous set of EGs not counted at all in the World Bank study. This includes the list of products defined as environmental goods for the IMF Climate Change Indicators Dashboard but does not overlap with the list of the goods defined as environmental goods by the OECD. Table 2.3 shows the various categories used in this study while Annex C provides the full set of goods at the 6-digit level. Although the original list of products is presented using HS 2007, we convert the product codes into HS 2017 to match the product codes in the BACI dataset.

[22] CEPII refers to the Centre d'Etudes Prospectives et d'Informations Internationales. BACI refers to Base pour l'Analyse du Commerce Internationale.

Acronym	Examples of goods included in category
WAT	Waste water management and portable water treatment
SWR	Clean up or remediation of soil and water
SWM	Management of solid and hazardous waste and recycling systems
REP	Renewable energy plant and equipment
NVA	Noise and vibration abatement
NRP	Natural resources protection
MON	Environmental monitoring, analysis and assessment equipment
HEM	Heat and energy management
EPP	Environmentally preferable products based on end use or disposal characteristics
CRE	Cleaner or more resource efficient technologies and products
APC	Air pollution control
MISC	Miscellaneous items

Table 2.3: Categories of Egs

Table 2.4 shows total Pakistani exports and imports of EGs estimated from BACI. The biggest export category is MISC or miscellaneous, and the biggest import category is REP or renewable energy plant and equipment. The fact that MISC is 16 percent of total EG imports, the second largest category imported into Pakistan, suggests that it would be useful to examine tariffs applicable to this category since this may reveal a picture different from that provided by the World Bank study.

EG Category	Exports (US$ '000)	Share of total EG exports (%)	Imports (US$ '000)	Share of total EG imports (%)
WAT	113,585	12.62	684,134	11.86
SWR	709	0.08	31,960	0.55
SWM	30,280	3.23	392,050	6.65
REP	32,311	3.42	2,249,941	38.08
NVA	1,961	0.21	235,718	4.02
NRP	578	0.06	6,857	0.12
MON	8,452	0.93	288,947	5.05
MISC	701,640	75.17	911,990	15.70
HEM	18,763	2.11	244,896	4.19
EPP	11,239	1.23	66,718	1.14
CRE	4,278	0.46	196,320	3.40
APC	3,427	0.38	547,344	9.27
Total	927,222	100	5,856,874	

Table 2.4: Imports and Exports of EGs for Pakistan

Note: The figures reported are the average of the trade values reported in 2021 and 2022.

EG tariffs from a comparative perspective.

Figure 2.1 shows tariff rates applicable to EGs in Pakistan and some comparative countries using BACI dataset. The data on import tariffs is extracted from the World Bank's World Integrated Trade Solution (WITS). Three observations emerge from the Pakistan data. First, as in the World Bank and PREIA studies, there is considerable variation in tariffs across categories. Second, the average tariff is around 11 percent, which is lower than the 15.7 percent reported by the World Bank study and close to the 11.7 percent reported by the PREIA study. The large difference with the World Bank study average may be due to the inclusion of a large category of Miscellaneous items that is not included in the former. Third, the average tariff for EGs (solid red line) is higher than that for non-EGs (dashed line). This last observation strengthens the case for further reducing the average tariff on EGs. The lower average tariff on non-EGs is incompatible with the objective of changing the composition of production and consumption towards a more environmentally sustainable mix.

The case for EG import tariff reduction is also supported by reference to the cases of neighbors and other comparators. Figure 2.1 shows relevant comparisons for Pakistan with Bangladesh, China, India, and Vietnam, for individual categories as well as for averages across all categories. It is clear from this chart that Pakistan applies the highest average tariffs for all EGs in comparison to the other countries. The average tariffs applied to EGs by China and Vietnam are less than half those applied by Pakistan while those applied by India and Bangladesh are closer, though still lower. Reducing the average tariff on EGs to the 8 percent applied by India would be a good initial move for Pakistan to consider.

We also consider whether other developing countries have been reducing tariffs on EGs in recent years. Some evidence for this is available from country-specific Trade Policy Reviews summarized in a recent WTO report (see WTO, 2023).[23] This cites 53 examples of EG tariff reductions during 2018-2022. The most popular actions have been related to renewable energy technology, electric vehicles, and low carbon emission items. Pakistan has identified renewable energy and electric vehicles as two high priority areas for action to reduce greenhouse gas emissions. Trade policy measures, such as the reduction of tariffs on EGs, can help in this regard.

[23] The report is Trade Policy Tools for Climate Action (World Trade Organization, 2023) and the relevant section on tariffs may be accessed at: https://www.wto.org/english/res_e/booksp_e/tptfca_05_05_import_tariffs_e.pdf.

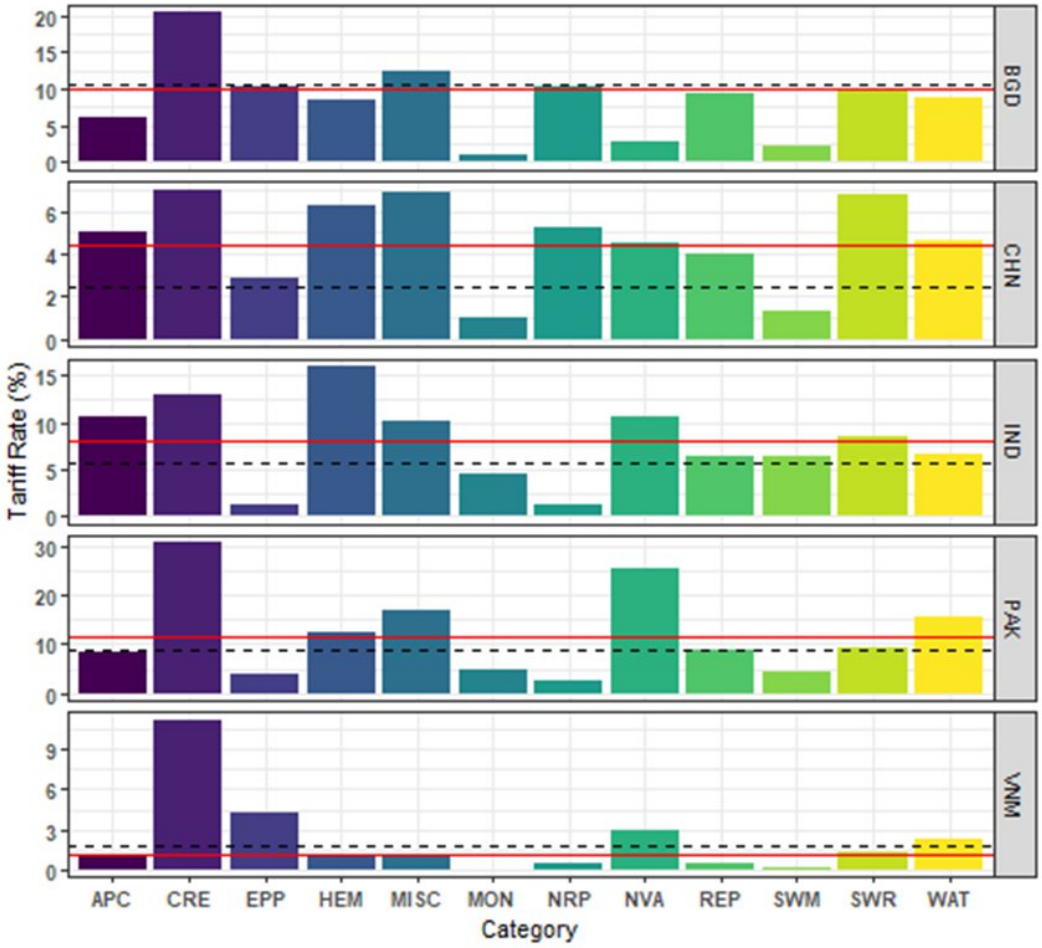

Figure 2.1: Average tariffs on EGs for Pakistan and selected comparators[24]

Additional imports from tariff reduction

Finally, we consider the potential impact of tariff reductions on EGs on total imports, also known as the trade creation impact. Using a popular analytic model, we estimate the additional imports that would result from reducing tariffs on EGs to 8, 4 and 0 percent. The results are shown in Figure 2.2. Note that reducing all tariffs on EGs to zero will create close to $2.6 billion in additional imports per annum or about 4 percent of the approximately $60 billion average annual import bill for 2019-21.[25]

[24] Import tariffs from World Bank's WITS and are trade weighted average rates. Trade volumes are from CEPII's BACI dataset. Tariff year is 2021. Dashed black line is average tariff rates on imports of non-environmental goods. Solid red line is average tariff rate on imports of environmental goods.

[25] Utoktham et al. (2020) provides the technical notes for the calculation of the import demand elasticities.

Can Pakistan sustain such an increase in imports of EGs given its generally precarious balance of payments position? Two points should be kept in mind. First, some of the increase in imports of EG items will eventually feed into additional exports as Pakistani goods will find it easier to comply with the emerging sustainability standards being applied in the developed countries. The CBAM framework is a prominent example of this. Second, tariff reductions can be applied in a revenue-neutral manner if selective increases in tariffs are imposed simultaneously on carbon-intensive imports. One example could be raising tariffs on gasoline-based cars while reducing tariffs on EVs. The overall impact on the balance of payments position can thus be managed without sacrificing the sustainability goals to which Pakistan is now committed. Indeed, this example of rebalancing tariffs across high and low carbon intensity items has the great benefit of reducing carbon emissions as well.

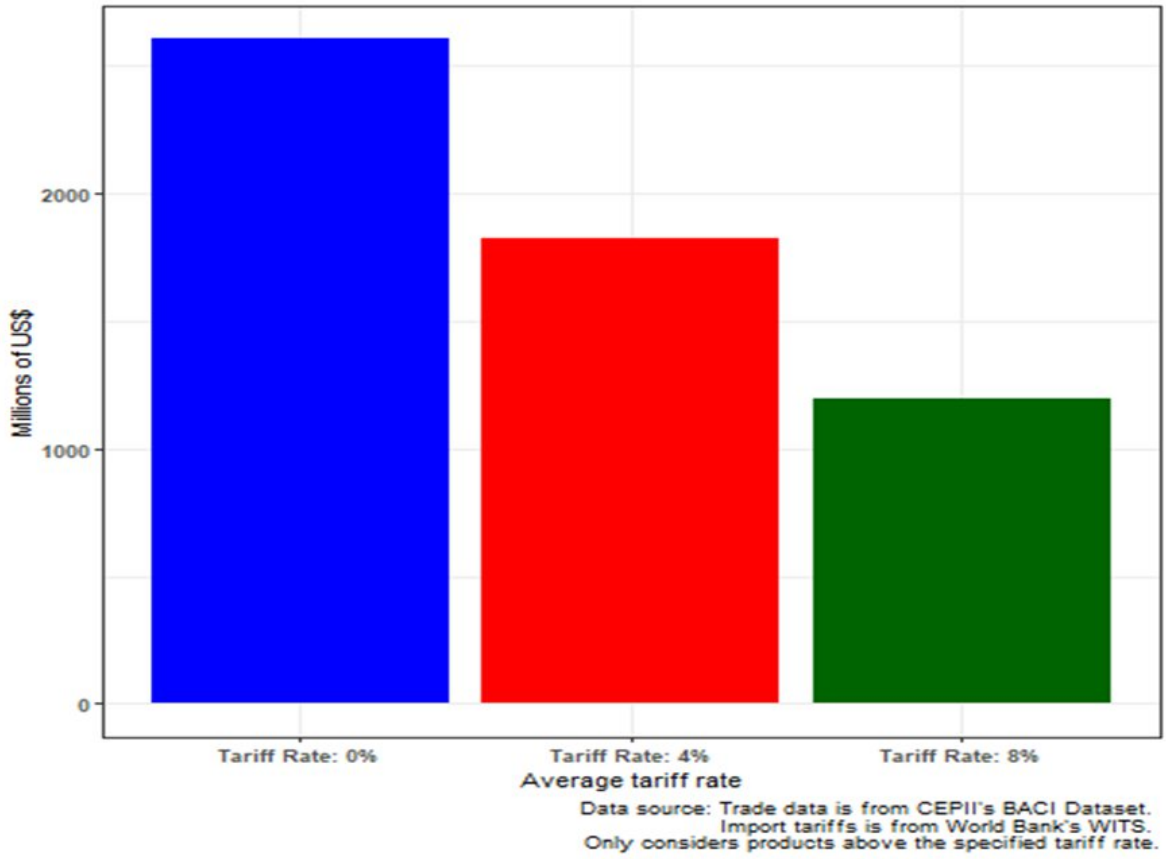

Figure 2.2: Additional imports due to reduction of tariffs on EGs

Our data also allow us to determine additional imports by category of EG as well as source of export. This information is shown in Figure 2.3 for data from the period 2019-21. China, Germany, Japan, and the US are the top four exporters of EGs to Pakistan. If tariffs on EGs are reduced to 0 percent, the largest increase in imports, in the amount of $1 billion, will be in the REP category which covers equipment related to renewable energy. The second largest increase in imports, around $300 million, will be in the WAT category (wastewater management and water treatment), followed by $171 million in the MISC category.[26]

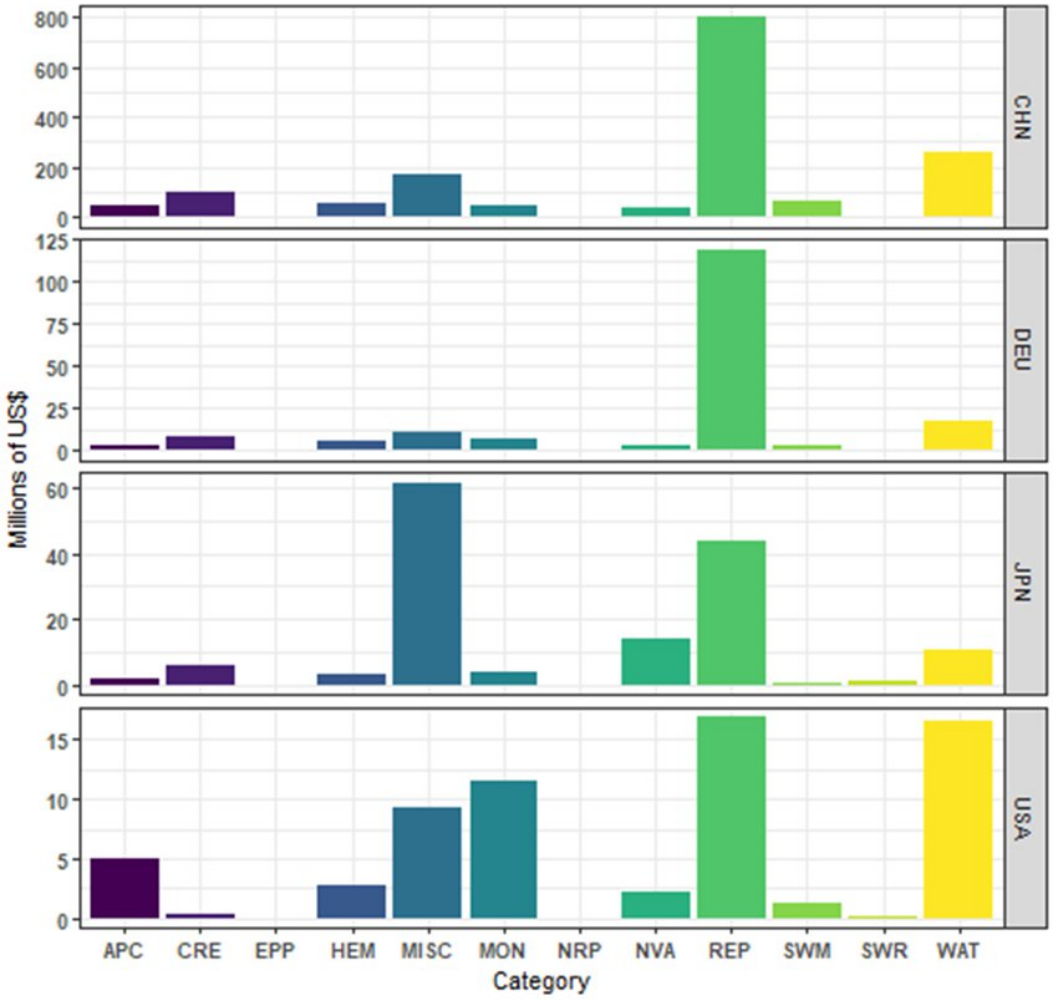

Figure 2.3: Increase in imports by category and exporting country[27]

[26] Calculation of export trade creation projections requires sector specific information on the importance of the relevant EGs to specific export supply chains.

[27] The authors are grateful to the researchers at the Trade Policy and Facilitation Section, Trade, Investment and Innovation Division, United Nations ESCAP for providing the key formulas to calculate the values for trade creation and trade diversion.

Recent experience with EG imports.

What can we learn from recent trends in EG imports into Pakistan? Figure 2.4 shows that EG imports increased sharply from around $2.7 billion in 2013 to around $5.9 billion in 2016, more than doubling over this period. For a few years after 2016, there was a decline in import levels, but the value returned to around $5.7 billion in 2021.

What explains this pattern? Three factors were likely of most importance. First, 2013 saw the beginning of an IMF stabilization program which typically implies higher electricity prices for industries and households due to program conditions requiring higher revenues and lower subsidies. So, in anticipation of higher prices, more consumers may have switched to solar panels and more businesses to energy efficient equipment. Indeed, when the IMF program was completed in 2016, the pressure on domestic electricity prices was relaxed and imports of EGs began to decline. Second, tariff changes appear to have boosted imports. Figure 2.5 shows a sharp decline in import tariffs (of about 4 percentage points) in 2014-16. This would have supported the observed increase in EG imports over this period. Third, for the period after 2016, a sharp increase in the rupee price of imports (due to devaluation of the rupee) acted to curtail the increase in import demand.

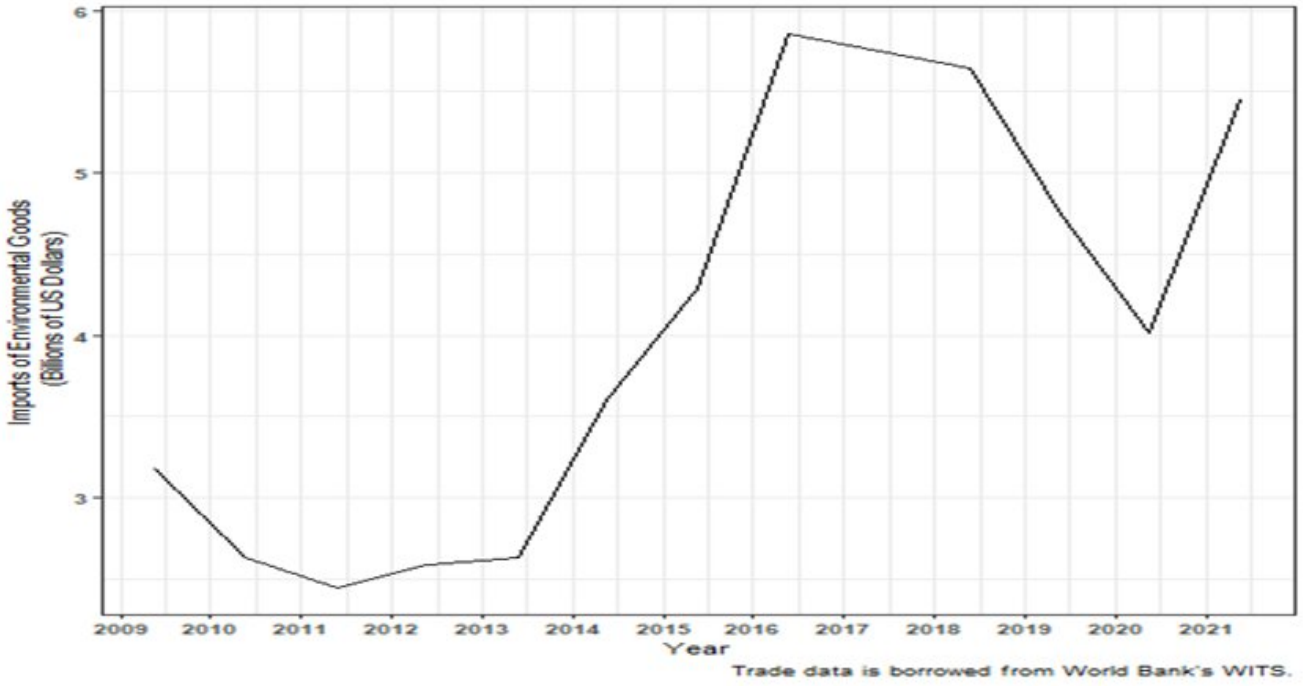

Figure 2.4 EG trade volumes, 2009-2021

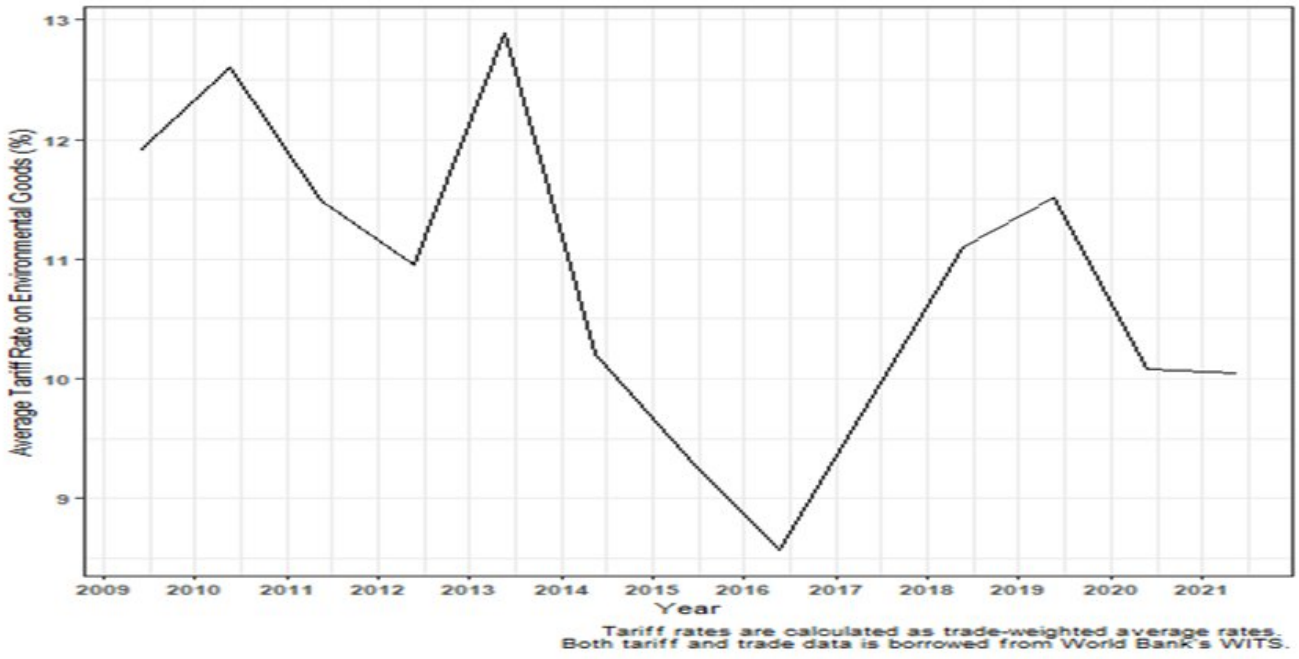

Figure 2.5: Average tariffs on EGs, 2009-2021

The above story is reinforced when we consider the case of solar panels, an important EG which Pakistani consumers and industries have used to reduce their energy costs. Figure 2.6 shows a sharp increase in the import of photosensitive devices (mostly solar panels) after 2013 while Figure 2.7 suggests that this was partly due to a reduction in the tariff applicable to photosensitive devices from 5 percent in 2014 to 0 percent thereafter. Solar panel imports increased from $114 million in 2013 to $550 million in 2016. Thus, a lesson that emerges from recent experience is that consumers will respond to price incentives and Pakistan can promote a switch towards lower carbon intensity sources of energy through tariff adjustments. This may impact the government's fiscal and balance of payments position, but it will clearly improve consumer welfare as well as the country's environment. As already noted earlier, one way to offset the projected impact on the fiscal and external position is to raise tariffs on high carbon intensity imports.

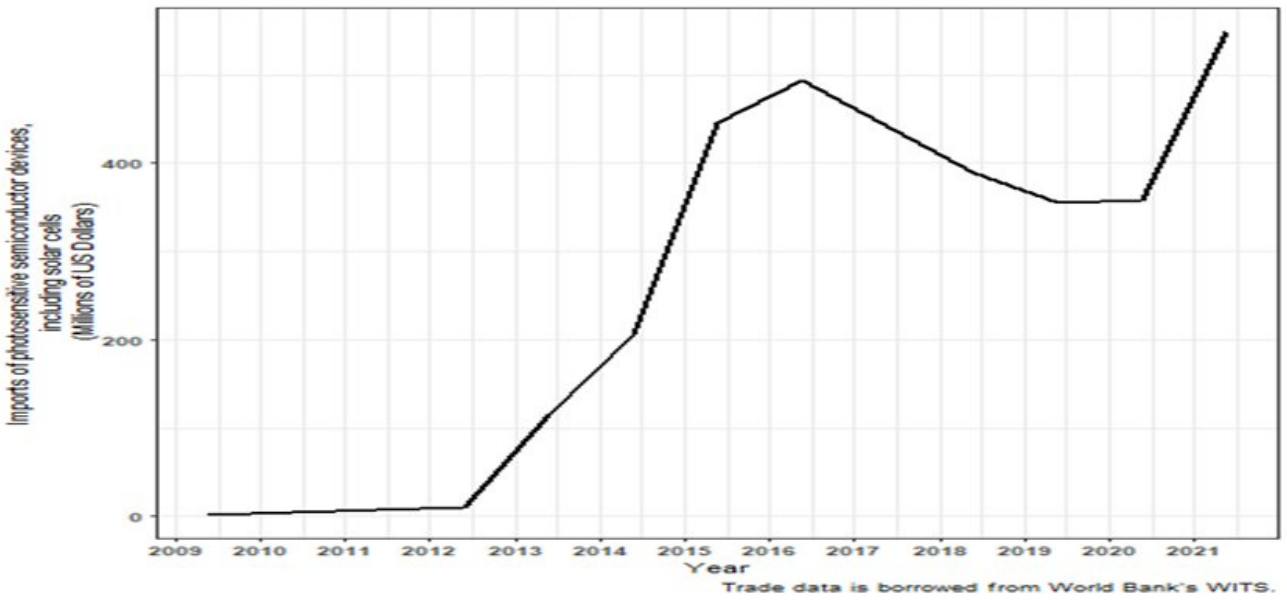

Figure 2.6: Total imports of Photosensitive devices (2009 to 2021)

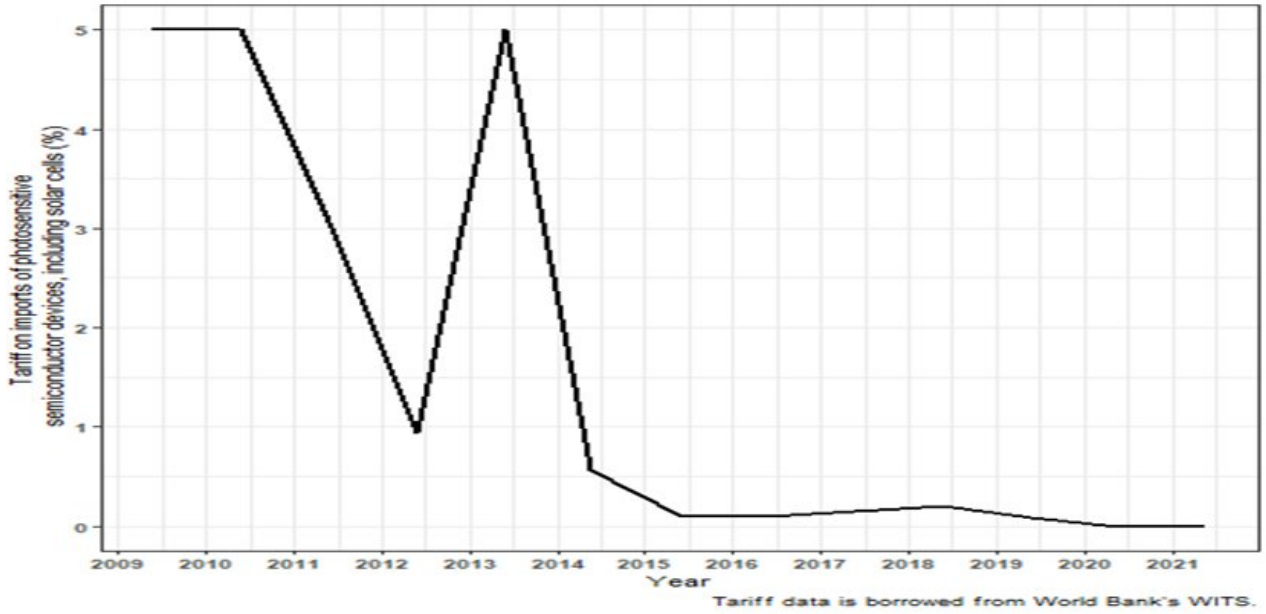

Figure 2.7: Average tariffs on Photosensitive devices (2009-2021)

Anomalies in unit values of EG imports.

Table 2.5 shows EG imports for which unit values are below the global average (top panel) or above it (bottom panel). Two anomalies stand out: Pakistan imports solar panels at 62 percent below, but wind powered electric generating sets at far above (more than ten times) the global average unit value. To determine the reasons for such divergence requires far more detailed information than we have from our trade data. One reason could be quality differences. It is possible that Pakistan imports solar panels of lower quality than the world average. This is certainly possible as solar panels have become popular even among middle income households in the country as the price of fossil-fuel-based electricity has risen significantly in recent years. For wind turbines, a somewhat different explanation is offered by importers. Pakistan must import all parts and equipment related to wind turbines since it does not produce any critical part locally. So, the mix of items covered by this broad import category is different and more expensive for Pakistan than that for other countries (such as India) where there is some domestic capacity to produce relevant parts and equipment. Nevertheless, the excessive deviation in unit value for this category suggests that it would be useful to commission a special study to investigate the matter through a more disaggregated analysis of the relevant trade data and a more intensive survey of the relevant importing firms.

Top imports into Pakistan of environmental goods (above $500 million between 2019 and 2022)

Product code	Description	Category	Total Imports ('000 US$)	Unit Value (% Diff with world average)	Rank (1 = lowest unit value)
854140	Electrical apparatus: photosensitive, including photovoltaic cells, whether or not assembled in modules or made up into panels, light-emitting diodes (LED)	REP	2,022,463	-61.55	12
841430	Compressors: of a kind used in refrigerating equipment	APC	758,720	-16.85	67
850440	Electrical static converters	REP	696,038	-52.16	57
850423	Electrical transformers: liquid dielectric, having a power handling capacity exceeding 10,000kVA	REP	685,983	-11.04	84
730890	Iron or steel: structures and parts thereof, n.e.c. in heading 7308	REP	636,148	-55.48	10

Product code	Description	Category	Total Imports ('000 US$)	Unit Value (% Diff with world average)	Rank (1 = lowest unit value)
840991	Engines: parts, suitable for use solely or principally with spark -ignition internal combustion piston engines (for other than aircraft)	NVA	502,902	-41.22	45
Top imports into Pakistan of environment goods reporting higher unit value than world average (above $100 million between 2019 and 2022)					
841989	Machinery, plant and laboratory equipment: for treating materials by change of temperature, other than for making hot drinks or cooking or heating food	WAT	406,911	29.86	198
850220	Electric generating sets: with spark-ignition internal combustion piston engines	HEM	301,457	33.88	189
841199	Turbines: parts of gas turbines (excluding turbojets and turbo-propellers)	REP	243,597	6.44	114
903289	Regulating or controlling instruments and apparatus: automatic, other than hydraulic or pneumatic	REP	235,176	4.10	146
850231	Electric generating sets: wind-powered, (excluding those with spark-ignition or compression-ignition internal combustion piston engines)	REP	231,146	1061.03	191
290511	Alcohols: saturated monohydric, methanol (methyl alcohol)	IMF	222,765	171.74	125
850490	Electrical transformers, static converters, and inductors: parts thereof	REP	212,936	57.84	181

Product code	Description	Category	Total Imports ('000 US$)	Unit Value (% Diff with world average)	Rank (1 = lowest unit value)
848340	Gears and gearing: (not toothed wheels, chain sprockets and other transmission elements presented separately): ball or roller screws: gear boxes and other speed changers, including torque converters	REP	166,271	11.77	123

Table 2.5: Unit Value Comparisons for EG imports

CHAPTER 2:

NON-TARIFF MEASURES APPLIED TO EGs

Review of NTMs applicable to EGs in Pakistan

Tariffs are one trade policy tool available to countries to manage the scale and content of their imports. Non-tariff measures (NTMs) are another. Typically, technical NTMs cover such practices as labelling, inspection, certification, pre-shipment measures, testing and packaging for selected imports. In this section we review the application of NTMs on the import of EGs into Pakistan. We use the CEPII BACI dataset to assess the coverage, frequency, and prevalence of NTMs. The coverage ratio is defined as the percentage of imports for which NTMs are reported. The frequency index is defined as the percentage of productions to which NTMs are applied. The prevalence score is defined as the average number of NTMs applied on each product. We employ a comparative perspective to assess Pakistan's use of NTMs.

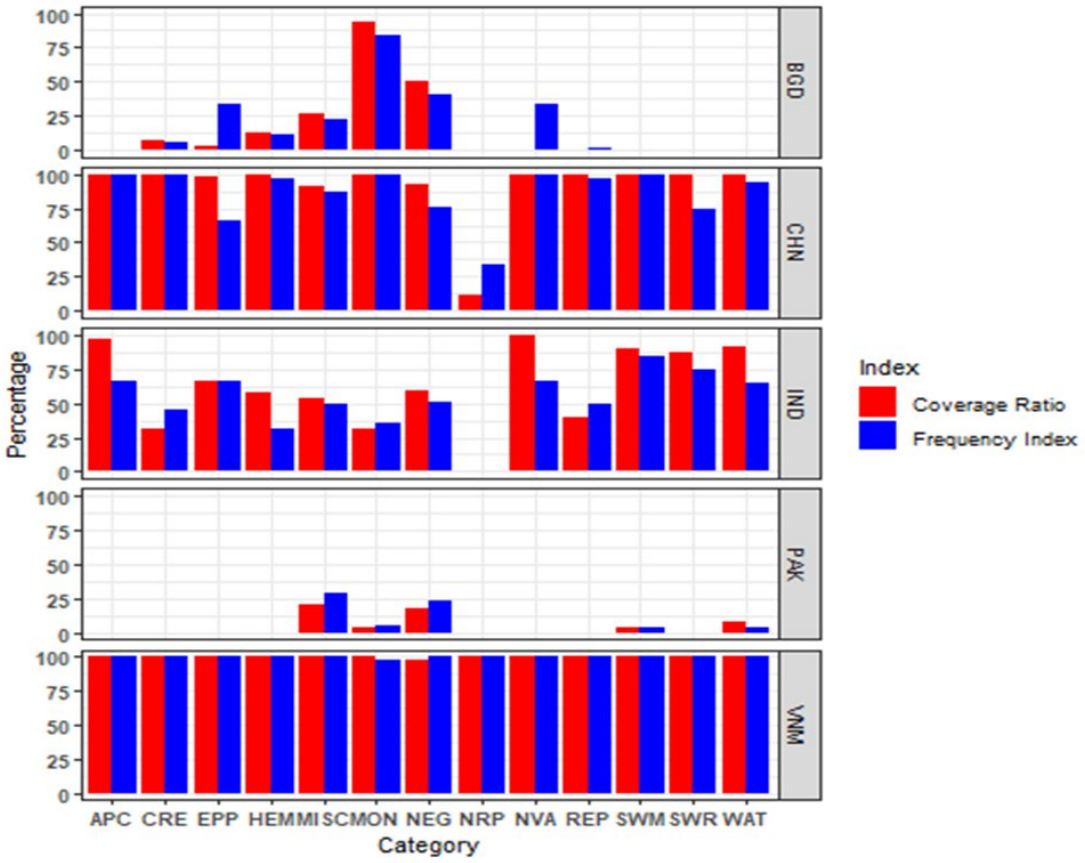

Figure 3.1: Coverage and frequency of NTMs on EGs[28]

[28] Trade data is from CEPII's BACI dataset. NTM data is from UNCTAD's NTM Hub.

Figure 3.1 shows the coverage ratio and the frequency index of the NTMs imposed on the imports of environmental goods for Pakistan and selected comparators. Non-environmental goods are labelled as NEG and shown in the figure for comparison purposes. Two results stand out: Pakistan reports the lowest coverage and frequency scores for NTMs (compare across vertical axis) and it applies NTMs to very few categories of EGs (compare across horizontal axis). The panel showing the results for Pakistan is striking for its relative emptiness compared to say China, Vietnam, and India.

The same assessment emerges when one considers the prevalence score, as shown in Figure 3.2. Together with Bangladesh, Pakistan features the lowest prevalence scores across the five countries. The panels for Pakistan and Bangladesh are relatively empty, with scores emerging for only a few categories. Indeed, the only significant score for Pakistan is for the MISC category. Together with the previous chart, this suggests that NTMs are not an actively applied trade policy tool for EGs in Pakistan.

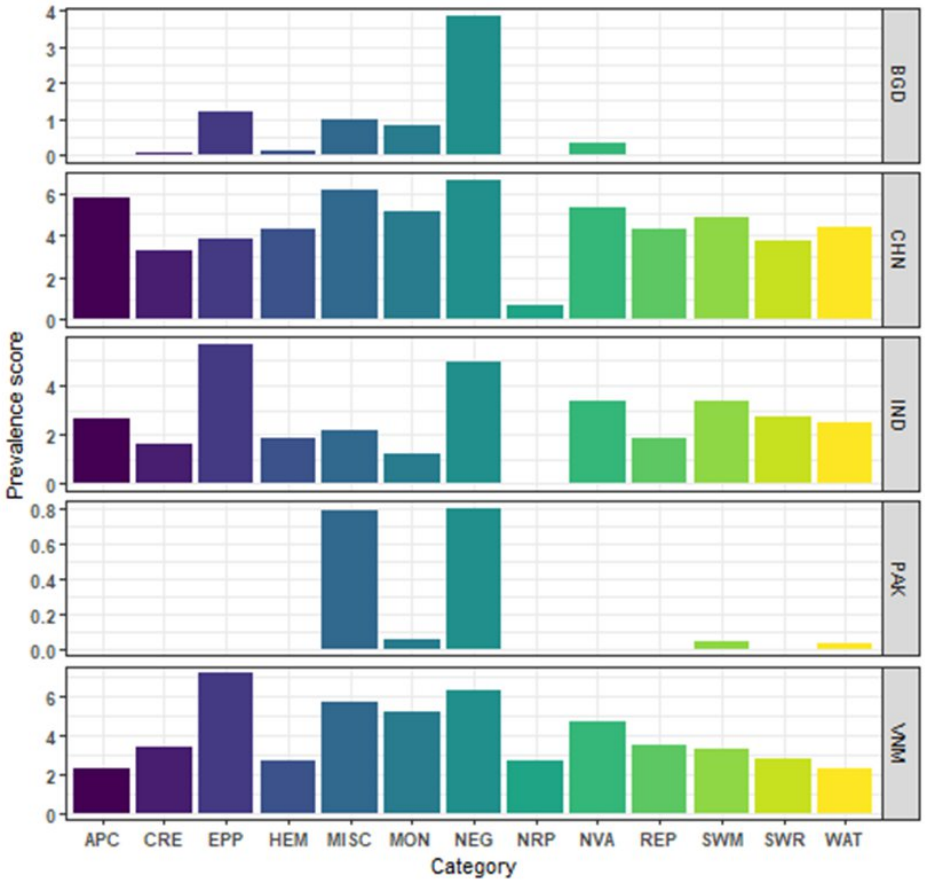

Figure 3.2: Prevalence scores for NTMs on EGs[29]

[29] Trade data taken from CEPII's BACI dataset. NTM data taken from UNCTAD's NTM Hub.

The lack of NTMs on EGs is emphasized again when we consider the most popular measures undertaken in Pakistan relative to comparators. This is shown in Figure 3.3. NTMs are applied in only one category, MISC, and only two measures are typically applied, namely, packaging and labelling. This stands in sharp contrast to the practices applied by comparators which often require testing and certification actions across a wide range of EGs.

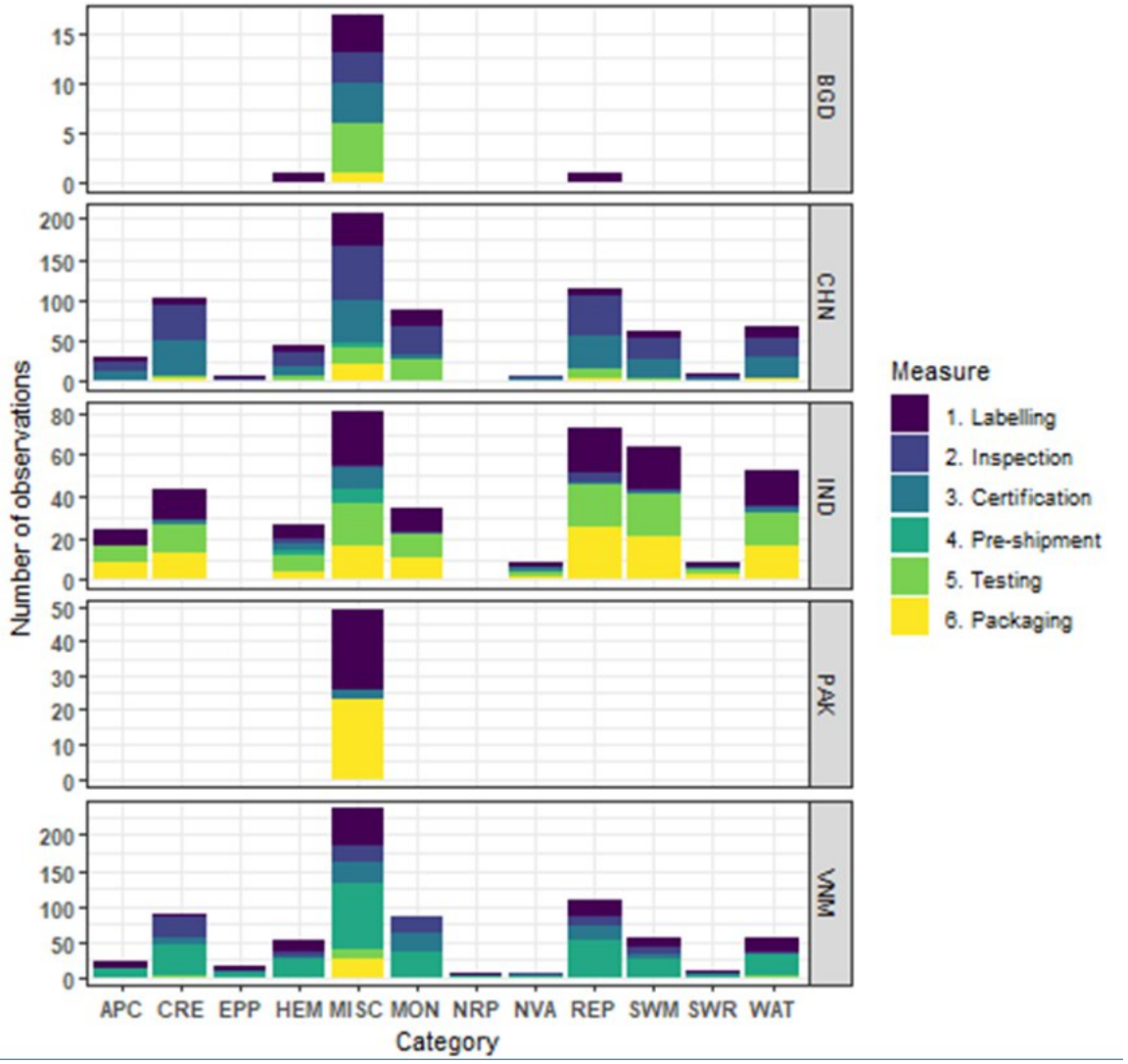

Figure 3.3: Comparison of NTM measures across selected countries

Emulating other countries, both developed and developing, Pakistan should adopt a more active NTM policy to achieve its decarbonization goals. Pakistan should apply NTMs across a wider range of EGs and in greater frequency. In terms of specific NTMs, Pakistan should adopt labelling and certification requirements for a broad range of EGs and adopt energy efficiency standards for EG imports in line with its goals of reducing its overall carbon footprint. The emission value of carbon intensive imports should be clearly identified by the producer or exporter to help Pakistan meet its carbon reduction goals. In this effort, Pakistan can be guided by the practices in place in other developing countries like India, Bangladesh, China, and Vietnam. Historically, Pakistan has not used technical NTMs related to production and processing characteristics with the goal of improving the quality of its imports; instead, it has mostly used non-technical NTMs, such as special customs procedures, which have the effect of impeding imports without raising quality. Pakistan should expand the use of technical NTMs on EGs to ensure that the impact is on quality rather than on trade volume. Pakistan's exports will benefit from quality enhancing NTMs on imports as it will become better able to meet the standards of its principal trade partners.[30]

Import of coal

In its 2021 NDC commitment, Pakistan has indicated that it intends to ban the import of coal for the generation of electricity by 2030. A ban qualifies as a NTM and so this proposed measure is discussed here. Depending on how this measure is implemented, it could have a notable impact on Pakistan's carbon emissions. However, in recent years, coal usage for electricity has been rising, albeit from a relatively low share in comparison to neighbors such as India. Five coal fired plants set up by IPPs have added 4290MW of generation capacity since 2016 that could emit up to 19 million tons of carbon dioxide per year.[31] While a moratorium on imported coal has been in place since 2020, some coal plants that were in the pipeline prior to 2020, are advancing to completion. Not all the coal fired generation capacity put in place since 2016 relies on imported coal, of course. Nevertheless, while banning the import of coal is easy enough to conceptualize, the replacement of imported coal for the plants that use it requires a lot more preparation and financial planning than is presently evident. Indeed, it may require buying out the private owners of the plants and mothballing them which would in turn require the Government to have access to a substantial source of funds.[32] Finally, it needs hardly be said that the replacement of imported coal by domestic coal would not reduce emissions of greenhouse gases.

30 It is not easy to quantitatively assess the impact of NTMs on imports and exports from trade data alone. The additional costs involved for each NTM must be assessed through industry specific surveys.

31 See footnote 7 in CDPR/IGC (2022) for details of calculation.

32 A strategy for accessing climate financing is described and discussed in CDPR/IGC (2022).

CHAPTER 3:

TRADE IN ENVIRONMENTAL SERVICES

Services have tended to be among the least open sectors in international trade and this is true of environmental services as well. A recent WTO report notes that only 59 WTO members have reported commitments in one or more of the seven ES subsectors (WTO, 2023). The same report notes that (a) trade in environmental services is usually affected by limitations on foreign ownership, number of foreign employees, and the number and location of subsidiaries and (b) simplifying administrative procedures applicable to domestic services can facilitate trade in the relevant services as well. We illustrate the relevant challenges and solutions through a case study of waste management in Pakistan.

In recent years, Pakistan has imported services for waste management at least twice, once in Sindh and once in Punjab. The Sindh Solid Waste Management Board (SSWMB) had an agreement with a Chinese company (Changyi Kangjie Sanitation Engineering and Hangzhou Jinjiang) to collect garbage from different parts of Karachi, focusing on commercial and industrial areas. The agreement also consisted of a plan to use mechanical sweepers in various areas of Karachi. A similar initiative was taken in Lahore, Punjab where the Lahore Waste Management Company (LWMC) contracted for services with two Turkish companies Albayrak and OzPak. The second initiative ran for longer than the first and was assessed in 2016. Our write-up is based on that assessment and an interview carried out with a senior officer of the LWMC.

The Lahore Waste Management Company Case

In 2010, the Lahore Waste Management Company (LWMC) was set up by the concerned local government body to address urban waste management in the city. The waste collection process in Lahore involved two stages: primary collection, which included door-to-door waste collection by informal and formal bodies, and secondary collection, which involved the collection of waste from designated container sites across the city.

LWMC outsourced waste collection and management to two Turkish companies, Albayrak and Ozpak, for a period of seven years, with a total contract value of USD 20 million. The contractors were tasked with lifting 4700 tons of waste per day, using around 500-600 imported vehicles (see Haydar et al., 2016).[33] The compensation for waste collection, according to independent estimates stood at around USD 25 per ton of the

[33] The LWMC case assessment by Haydar et al. (2016) can be accessed at https://ppaspk.org/index.php/PPAS-B/article/view/321/265

waste collected, which was criticized for being on the higher side; however, it was less than the cost of waste collection in Mumbai and Chennai which stood at USD 44 per ton and USD 33 per ton respectively (see Rakhi, 2006).[34]

Following the introduction of private contractors, respondents in service areas reported an improvement in cleanliness. Infrastructure for waste collection, including cleaning vehicles and maintenance workshops, was developed. Additionally, systems were implemented for monitoring waste collection vehicles, weighing collected waste (with minimal human intervention), and generating regular analysis reports. Compost recycling and refuse derived fuel plants were also established.

Despite improvements, there were inherent challenges and inequities. Service delivery was affected by variations in existing infrastructure, leading to variations in service quality across different income areas. Satisfaction with cleanliness was higher in affluent neighborhoods compared to low and average-income areas. The state of infrastructure significantly influenced the contractor's performance in different income group areas.

In 2018, a change in government policy disrupted the outsourcing contract, leading to corruption investigations and the confiscation of LWMC vehicles. Subsequent attempts by LWMC to run operations independently resulted in increased operating costs and subpar service delivery. Efforts to re-outsource waste collection in 2021 faced challenges as Turkish investors were unwilling to invest, highlighting difficulties in attracting large investments in the sector.

Lessons from the LWMC case

The LWMC case described briefly above illustrates some typical challenges of trade in services. The first challenge is that many local stakeholders feel that local companies are better placed to provide the necessary service. Unless the service involves deep technical knowledge, local politicians and contractors seek to discredit the award of the service contract to foreign companies from the very beginning. This bias can overcome business facts such as lower costs and faster delivery performance. Due to corruption in many domestic procurement processes, locally sourced contracts can end up being more expensive than contracts to foreign service providers, who typically do not have deep connections to local politicians and bureaucrats. In the LWMC case, once the Punjab government changed hands in 2018, various legal issues were brought up to discredit what had been in practice, reasonably successful performance compared to past domestic awards.

34 The Mumbai case (Rakhi, 2006) can be accessed at: https://pubmed.ncbi.nlm.nih.gov/16288861/

In recent years, the private sector has shown a lack of interest in reinvesting in the solid waste management sector. Concurrently, local authorities have struggled to enhance their capacity for efficient solid waste management. While the domestic private sector can handle waste collection, it lacks the necessary facilities for waste treatment. Thus, to effectively treat and dispose solid waste, the government must collaborate with foreign companies and develop a comprehensive strategic policy framework for this purpose.

In addition, local administrative procedures and ancillary infrastructure services are currently not geared towards successful execution of waste management awards. In some cases, the delivery of local waste management services can benefit from community participation in design and siting. This usually improves both cost and governance aspects of the service and ensures accountability regardless of who the service provider is.[35]

35 Rakhi (2006) notes that the cost per ton of waste management in Mumbai was highest if the service was delivered entirely by the local government authority in Mumbai, lower if a private partner was involved and lowest if there was community participation.

CHAPTER 4:

BEYOND TRADITIONAL TRADE POLICY TO INDUSTRIAL POLICY

Traditional trade policy instruments are one part of a toolkit to shape the path and content of economic development. Other tools can also be useful. Some of these, such as trade facilitation measures, are directly related to the trading process. Still others go beyond trade to industrial policy which influences a wider range of economic activity. We discuss both trade-related and broader industrial policies in this section.[36] To contain the discussion within a reasonable span, we propose to illustrate the requirements and challenges of green industrialization in three sectors: textiles, electric vehicles, and renewable energy.

The remainder of this chapter is divided into four sections. The first section notes some trade related actions beyond tariffs and NTMs that could have positive outcomes for green growth. The second section provides a discussion of how green goals are likely to be approached in Pakistan's textile, electrical vehicles, and renewable energy sectors. The third section provides some evidence from China on how green industrialization may be supported. The fourth section concludes with selected recommendations.

Trade instruments beyond tariffs and NTMs

As noted in the introductory section, Pakistan has set several green goals for itself in its national development plans and in international discussions relating to climate change and related matters. Conventional trade policy, focusing on tariffs and NTMs, can help achieve some of these goals. Other trade-related measures can also help. These include measures with respect to trade facilitation, government procurement, and trade finance.

Trade facilitation

Trade facilitation refers to the simplification of processes involved in importing and exporting. Generally, these concerns arise in the customs process, the port handling process and in the transportation of goods between ports and factories or other production sites. If such processes can be made simpler and more efficient, transactions costs involved in trade can be lowered with economy-wide benefits. An international agreement known as the WTO Trade Facilitation Agreement (TFA) became operational

[36] Indeed, one could consider an even wider range of actions than covered by industrial policy. For example, the elimination of rice stubble burning in the Punjab would noticeably reduce Pakistan's greenhouse gas emissions. It would also potentially protect access to global rice markets if those were affected by emission standards in the future. On this, see CDPR/IGC (2022).

in 2017. While we do not have specific information on the projected impact of TFA measures on Pakistan, evidence from other countries suggests potentially high impact. For example, studies suggest full implementation of TFA measures could reduce trade costs by 15 percent and increase trade by $1 trillion, with poor countries deriving relatively greater benefits. (WTO, 2023). The digitalisation of trade documents can help reduce carbon emission, calculated to be by as much as 63 percent by one study for Finland (Tenhunen and Pentinen, 2010). Reducing truck waiting times at borders and at port facilities can also reduce carbon emission (Reyna et al., 2016). One initiative to reduce waiting (and truck idling) times at one border crossing between the US and Mexico was found to reduce greenhouse gas emissions by 85 percent (WTO, 2023).

Government procurement

Government procurement averages around 13 percent of GDP across the world and is even higher in many developing countries (WTO, 2023). This amount of buying power can substantially shape national progress towards reducing carbon emissions. If governments adopt green policies and targets for their own spending, whether this be on domestic goods or imports, they can have significant impact. For example, if a national government decides to use only EVs going forward, this can influence the rate at which the composition of the national transportation fleet changes across low and high carbon emitting vehicles. The same is true of governments adopting targets related to the use of renewable energy in government buildings and related facilities. Many governments foster small business development through setting aside purchase quotas for such businesses. The objective of reducing the national carbon footprint could be approached in a similar manner, by specifying green targets in procurement tenders.

Trade finance

A substantial proportion of international trade relies on the availability of trade finance. In developed countries, this proportion can be as high as 80 percent while in developing countries the proportion is usually smaller. Nevertheless, for both groups, the availability and terms of trade finance can have a big influence on the scope and content of trade and this link can be used to facilitate progress towards green growth objectives. Examples include better terms for low as opposed to high carbon intensity goods in trade. Thus, in recent years, some credit and guarantee agencies have cut back funding for unabated coal projects while offering subsidies for renewable energy projects. Relevant international protocols have been or are being revised so that such features are not considered objectionable interventions in trade. The scope for government action to support climate objectives through trade finance is growing.

Sector specific trade and industrial policy

Much of the information used in this section was derived from sessions with groups representing various sectors of relevance to the goal of decarbonization. One common issue that all were concerned about was the shortage of foreign exchange and the administrative management by the State Bank of Pakistan of letters of credit that characterised Pakistan's economy during 2022-23. This was a source of great disruption to established business processes and relationships. Businessmen were more worried about the uncertainty introduced by the new administrative processes than by the level of tariffs and para tariffs applicable to their imports. The subsections below provide additional information about specific issues faced by three subsectors: textiles, electric vehicles, and renewable energy.

Textiles

The textile sector is an important component of the national economy. It accounts for about 9 percent of output, 38 percent of employment and 60 percent of exports. The production technologies and processes used in the sector historically have involved heavy use of fossil fuels and have generated significant air and water pollution. The vast spread of the geographical distribution of cloth in both domestic use and exports means that the sector is also a heavy user of transport vehicles. The sector has a few hundred large units (just over 500 textile mills) and thousands of small units (with about 400,000 looms).[37]

The following are some observations on the likely transition path of the textile sector over the next ten to twenty years in relation to Pakistan's environmental commitments:

i) Larger units are likely to transition faster towards environmental goals than smaller units since they are likely to have more resources to invest in the new technology and processes that are called for.

ii) Exporting units are likely to transition faster than units selling mostly to the domestic market because the former will soon have to meet CBAM requirements while the latter do not face similar regulatory pressure or enforcement actions.

iii) The higher speed of transition expected of large exporting units is also due to their already having invested in a range of environmentally friendly actions. Many such units already have wastewater treatment facilities that enable them to discharge clean water. Many also meet a range of environmental and safety certifications required by their foreign customers. Their experience to date will help them meet future challenges more effectively.

[37] Information for this section was partly obtained from interviews with senior staff of selected textile and garment firms and partly from presentations made at a conference organized in October 2023 by UNCTAD and the Social Protection Resource Center (SPRC) in Islamabad, accessed at Green Industrialization in Pakistan: Integrated Policy Strategies for a Sustainable Future | UNCTAD.

iv) While some large units have partly shifted to solar and wind energy already, challenges remain. Solar and wind energy output and distribution is not growing fast enough to meet industry needs for full compliance with environmental goals. Individual units cannot invest in their own solar and wind units above a certain level because of the geographical distribution of such resources. For example, in Faisalabad, a major center for textile mills, solar energy can only be tapped for five hours a day. Other areas where textile mills are established do not have enough wind. The supply of renewable energy must be managed largely through the national grid rather than through individual company investments.

v) Despite challenges, the large-scale exporting segment of the textile sector has taken a positive approach to helping meet Pakistan's environmental goals. 22 of the 23 firms that have signed up for the Net Zero Pakistan initiative are from the textile sector.[38] The sector also participates in a recent initiative of the Ministry of Climate Change and the Ministry of Commerce called "Decarbonizing Textile Manufacturing."Under this initiative the sector is committed to mitigating 345,000 tons of carbon over five years (2022-2027).[39]

vi) The textile sector also faces the challenge of digital tracing or ensuring that all transactions along the supply chain from cotton procurement to, say, cloth production, can be certified for compliance with sustainability objectives. Digital tracking of inputs will require intervention all along the supply chain to generate transaction certificates for each incidence of purchase. This is expensive as input suppliers charge higher prices to provide clean transaction certificates. And some suppliers, such as cotton growers, may not be organized or motivated to provide such certificates.[40] Since VAT is not applied in Pakistan, there is no tradition of issuing transaction bills at each stage of sale.

viii) We do not consider the impact on land use here but note that it is important for environmental sustainability. The textile supply chain impacts land use at two points, the growing of cotton and the disposal of clothes. Fifteen percent of arable land is used for cotton production in Pakistan while 80 percent of worn clothes ends up in landfills.

38 The Net Zero Initiative commits firms to net zero targets, to measure and disclose sources of greenhouse gas emissions, and to decarbonize value chains.

39 See presentation on the textile sector by Abid Raza Khan accessible at: GIC_presentation_Abid_Raza_Khan.pdf (unctad.org)

40 Around half a million cotton growers in Pakistan are licensed by the Better Cotton program. This could provide a point of entry for a future certification program. Information on the Better Cotton program may be accessed at: https://bettercotton.org/where-is-better-cotton-grown/better-cotton-pakistan/

Electric Vehicles

Electric Vehicles (EVs) have been specifically noted in Pakistan's commitments to the global effort to reduce carbon emissions. By 2030, Pakistan expects to have 30% of its vehicle fleet (covering four, three and two wheelers) powered by electrical sources with only 70% running on fossil fuels.[41] The World Bank and PREIA studies discussed earlier have singled out EVs for tariff reduction since they presently attract high customs and related duties. Focus group discussions with selected importers and manufacturers of EVs suggest that ancillary items that are necessary for EVs to function, such as batteries and chargers, should also be assigned low tariffs so that the full package is attractive to potential investors in the EV business.[42]

Other actions should also be taken to promote the EV sector. In particular, the charging infrastructure needs to be activated. This can be done by the private sector provided certain risks faced by early movers are covered. At present, the petrol distribution infrastructure is operated by both public and private companies under price and quality regulations. This network of petrol stations can be used for EV charging as well. Private investments in the EV charging infrastructure could be supported through favorable tax treatment and the provision of credit.

An additional area of concern is the availability of EV charging stations in remoter areas. EV-based traffic to and through such areas may be subject to range anxiety as vehicle operators may feel they could get stuck along the road. This could be handled through a Universal Service Fund arrangement like that used by US telecommunication companies to cover investments in designated areas funded by small contributions from member company earnings.[43]

Focus group participants noted that, despite the importance of EVs to the country's decarbonization objectives, many impediments continue to be experienced by investors. At present, government attention seems to be focused on large visible items like buses even though much of the benefit from EVs will come through the conversion of smaller but more numerous items like motorbikes and rickshaws. But it is still not possible to even register an electric rickshaw. The relevant rules and processes are either not in place or not being implemented. The familiar bias against small-scale operations affects this business as well. Rickshaws cannot get insurance for their batteries; the private

41 The transport sector accounts for close to a quarter of Pakistan's carbon emissions at present. Total emissions are expected to grow to 80 metric tons carbon equivalent by 2030.

42 Focus group participants pointed out that batteries are treated as final products and not as intermediate products and are accordingly subject to higher customs duties. They suggest that EV batteries be treated as intermediate inputs and assigned lower tariffs.

43 Information on such funds may be accessed at: https://www.fcc.gov/general/universal-service-fund

insurance market has not yet developed appropriate policies. As far as public services are concerned, much more needs to be done to streamline licensing and registration procedures for small scale operators.[44]

Renewable Energy

Solar power has already gained traction as a source of electricity for households and industries. Solar power generation equipment, such as solar panels, are assigned low tariffs and have been imported for at least two decades now, their market having grown considerably over this period. While tariffs applied to panels are low, ancillary items such as lithium-ion batteries and circuit breakers and inverters, are assigned higher tariffs and para-tariffs. Focus group participants thought that an across-the-board reduction of tariffs on items specific to the solar equipment business would be useful.

Wind energy is not treated in a similar fashion. Wind turbines feature a higher tariff as they are not distinguished from other turbines (such as gas turbines). It would be useful to introduce such a distinction at the level of HS or NTL codes.

Even more than tariffs, the implementation of a common net metering policy would impart much needed momentum to solar and wind energy projects. Furthermore, while large renewable energy companies can get connected to the national grid by qualifying as Independent Power Producers, small companies cannot. In the long run, policies must be developed to allow surplus renewable energy from any source (including households and small-scale generators) to participate in an active net metering scheme. At present, there appears to be some resistance to net metering, both from the established fossil fuel-based electricity generating companies and the government. Unfortunately, the revenue needs of the government often conflict with environmental objectives.[45]

China's approach to green industrialization

Since 2000, China's manufacturing output has grown by leaps and bounds. This growth has been accompanied by high levels of (air, water, and solid waste) pollution and low levels of economic and energy productivity. The two outcomes are connected. The incentive framework characterising much of the manufacturing sector and the processes and technologies prevailing there, have resulted in both economic inefficiency and high levels of environmental damage. Mindful of this aspect of its industrial growth,

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[44] There are 20 to 30 million motorcycles registered in Pakistan and about 1 million rickshaws. They operate on two stroke engines that generate a lot more carbon per unit vehicle weight than engines in cars and buses.

[45] The present situation of oversupply from fossil fuel based IPPs makes the government reluctant to take additional supply from other sources since they are locked into take-or-pay contracts with the IPPs. A recent newspaper item suggests that government may make net metering schemes more restrictive in the future on the grounds that they help the rich not the poor since it is only the former who can afford to install home solar panels. This perspective fails to account for the incentive value of net metering for industries. See Govt hints at cutting tariff for solar net metering - Business - DAWN.COM

China has introduced remedial measures such as carbon emission trading, green finance from its banks and capital markets, public investments in renewable energy, and legal initiatives supportive of green development. More recently (in 2015) the Government went a step further and announced a national industrial plan called Made in China 2025 emphasising five principles: green development, innovation, quality, structural optimisation, and skills development.

Of these principles, the first two are of direct importance to our concerns as they involve innovation leading to green development. Thus, the plan aims for the manufacturing sector to move towards energy-saving and environmentally friendly technologies following a phased schedule for reducing energy consumption and pollution in specific industries. This involves promoting the use of technologies that consume less energy per unit output, that are lightweight and that can be easily recycled. This in turn involves more spending on R&D at the national, local and industry level. The plan provides incentives for enterprises to develop green technologies and green products.

Since this national initiative has been in operation for over five years now, some results and lessons are available with respect to green innovation. These suggest that the most effective drivers of green innovation are resources available to firms, environmental subsidies offered, and the level of corporate social responsibility exhibited. Firms with more resources at hand can more easily bear the cost of green innovation. Environmental subsidies or tax incentives conditional on green investment free up cash for the firm to undertake the innovative investment, compensate for uncertain returns from untested technologies, and partly compensate the innovating firm for the positive externalities of the innovation. Finally, corporate social responsibility works off the perception among firms that they can derive reputational benefits from behaving in a manner that key stakeholders, such as investors, customers, workers, and social activists, consider to be socially and environmentally responsible.[46] At the same time, variations are likely to be observed depending on firm ownership type. Publicly owned firms are more likely to follow national goals and ministerial instructions and may even be able to obtain more resources to devote to the same.

[46] A study shows that listed firms in China generated more green patent applications after 2015 than before the higher their assets; the higher the environmental protection subsidy offered; the higher their level of corporate social responsibility activities; and if they were in eastern China which has better infrastructure and higher human capital endowments. See Lanxiang, Xu, (2022). Towards green innovation by China's industrial policy: Evidence from Made in China 2025. Frontiers in Environment Science, Volume 10.

CHAPTER 5:

SELECTED RECOMMENDATIONS

The context for policy reform in Pakistan has been changing gradually over the past two decades to give greater prominence to the objective of green growth or growth that is consistent with the reduction of carbon emissions. Two recent developments have made this context even more salient. First, Pakistan has committed to reducing its projected carbon emissions by 50 percent by 2030. Second, the EU has initiated a Carbon Border Adjustment Mechanism under which imports are expected to converge with internal EU-wide carbon emission standards. A similar measure has been imposed by the UK as well. Since the EU and the UK are large trade partners for Pakistan, such initiatives clearly affect its export prospects.

International agencies have developed lists of EGs that facilitate the assessment of environmental outcomes of trade policy. Using such lists, we have reviewed how standard trade instruments, such as tariffs and non-tariff measures, currently apply to EGs in Pakistan. We have also considered the experience with trade in environmental services through a case study of solid waste management. Finally, we have reviewed how a broader set of instruments, commonly designated as industrial policy, may be deployed in three sectors, textiles, electric vehicles, and renewable energy, to meet Pakistan's environmental and export objectives.

Recommendations relating to tariffs on EGs

Recent assessments (see Chapter 2) of the tariffs applicable to EGs in Pakistan have concluded that they ought to be reduced to help achieve Pakistan's decarbonisation goals and enable the export sector to comply with emerging decarbonisation standards in major global markets. The PREIA study specifically recommends tariff cuts in the category of Electric Vehicles which presently attracts the highest average tariffs. It also recommends tariff cuts on specific items in the category of Energy Saving Equipment, such as insulation materials, heat exchange units, solar water heaters, heat pumps, and submersible motors. A third category where cuts are considered worthwhile is Air Pollution Control products.

Our assessment is similar. Tariffs on EGs in Pakistan are presently higher on average than those on non-EGs. They should be brought much below the latter. The case for EGs import tariff reduction is also supported by reference to the cases of neighbors and other comparators. We show (see Figure 2.1) that Pakistan applies the highest average tariffs for all EGs in comparison to regional countries. The average tariffs applied to EGs by China and Vietnam are less than half those applied by Pakistan while those applied by

India and Bangladesh are closer, though still lower. Reducing the average tariff on EGs to below the 8 percent applied by India would be a good initial move for Pakistan to consider. The prospective impact on the current account balance can be offset by rebalancing tariffs across high and low carbon intensity products. For example, tariffs on EVs can be set very low while those on gasoline-powered vehicles can be set higher than is the case at present. This can offset adverse impacts on the current account balance.

Recommendations relating to NTMs on EGs

Emulating other countries, both developed and developing, Pakistan should adopt a more active NTM policy to achieve its carbon emission targets. In this effort, Pakistan can be guided by the practices in place in other developing countries like India, Bangladesh, China, and Vietnam. Pakistan should apply NTMs across a wider range of EGs and in greater frequency (see Tables 3.1 and 3.2). In terms of specific NTMs, Pakistan should adopt labelling and certification requirements for a wide range of EGs and adopt energy efficiency standards for EG imports in line with its goals of reducing its overall carbon footprint.

Recommendations relating to ESs

We have three main recommendations regarding an appropriate framework for trade in environmental services. First, the decision to award contracts for such services should be based on cost and quality and should not be affected by domestic political and business considerations. Second, contracts for services should be accompanied by terms of performance that are clear and measurable. Third, local administrative procedures and ancillary infrastructure services must be geared towards the successful execution of the contracts rather than serving as impediments. Of course, these recommendations apply just as well to domestic contractors for environmental services as to international contractors.

Recommendations for industrial policy actions

There are several considerations which require thinking beyond trade policy to a wider set of instruments. First, some goals require the private sector to make substantial investments. Trade policy may not be sufficient to activate such investments and tax and financial incentives may be required. Second, some goals require substantial investments in infrastructure or changes in regulations that can only be made by the public sector. Third, some goals can be more easily met if the public sector, which is usually a substantial economic actor in many markets, adopts these goals directly in public procurement actions.

Encouraging the private sector to make appropriate investments

If industries are to be encouraged to switch from fossil fuel-based energy to renewable sources in a big way, certain incentives can help. Traditional instruments to encourage private investment take the form of modified taxes and financial incentives. For example, firms could be offered tax adjustments against investments in solar or wind farms. Or they could be offered easier financial terms (lower interest rates, longer maturities) on loans taken to make the investments. It is also possible that some actions could be incentivized through "sticks" such as a carbon tax. A recent WTO report (WTO, 2023) notes that more than a hundred countries are investigating carbon taxes to reduce their carbon emissions, along with other measures such as emission trading schemes.

Public investments and regulations

Many companies may be interested in making large investments in generating renewable energy if there were adequate transmission facilities to carry their output into the national grid. Public investments in such facilities can catalyze investments on the generation side from the private sector.

Some companies could be enticed into making renewable energy investments if they could be promised net metering rules that allow them to sell surplus energy into the national grid. While net metering rules exist in Pakistan, they are not available to all potential investors in renewable energy. Broadening access to more players will require a modification of the relevant regulations.

Another area where new or modified regulations can help is in digital tracing. The CBAM will eventually require all exporters to provide evidence of carbon intensity in all segments of their supply chain. For example, textile exporters will be required to show the carbon use characteristics of even the cotton growers who supply them. This can be facilitated if cotton growers are required to submit pertinent data for attestation by a relevant government body. Introducing a value added tax system can help document transactions along the supply chain. Such a system could be used not just for revenue but also for carbon certification purposes.

Public procurement

Governments are usually large economic players in most developing countries and can use their economic strength to facilitate progress towards national goals. For example, if a national government decides to use only EVs going forward, this can influence the rate at which the composition of the national transportation fleet changes across low and high carbon emitting vehicles. The same is true of governments adopting targets related to the use of renewable energy in government buildings and related facilities. Many

governments foster small business development through purchase quotas for such businesses. The objective of reducing the national carbon footprint could be approached in a similar manner, by specifying green targets in procurement tenders.

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ANNEX A:

USE OF ENVIRONMENTAL CONDITIONS IN TRADE AGREEMENTS

This annex shows how environmental provisions are being incorporated within Regional Trade Agreements (RTAs) to bolster international environmental commitments and promote sustainability.

The figures provided below indicate that prevailing environmental provisions predominantly entail exemptions from trade obligations concerning domestic measures aimed at preserving natural resources. Conversely, the least prevalent provisions prioritize the non-derogation of environmental measures to stimulate investment. Similarly, the number of environmental clauses in the trade regime are constantly increasing, showing an increase in the importance of environmental concerns in global trade.

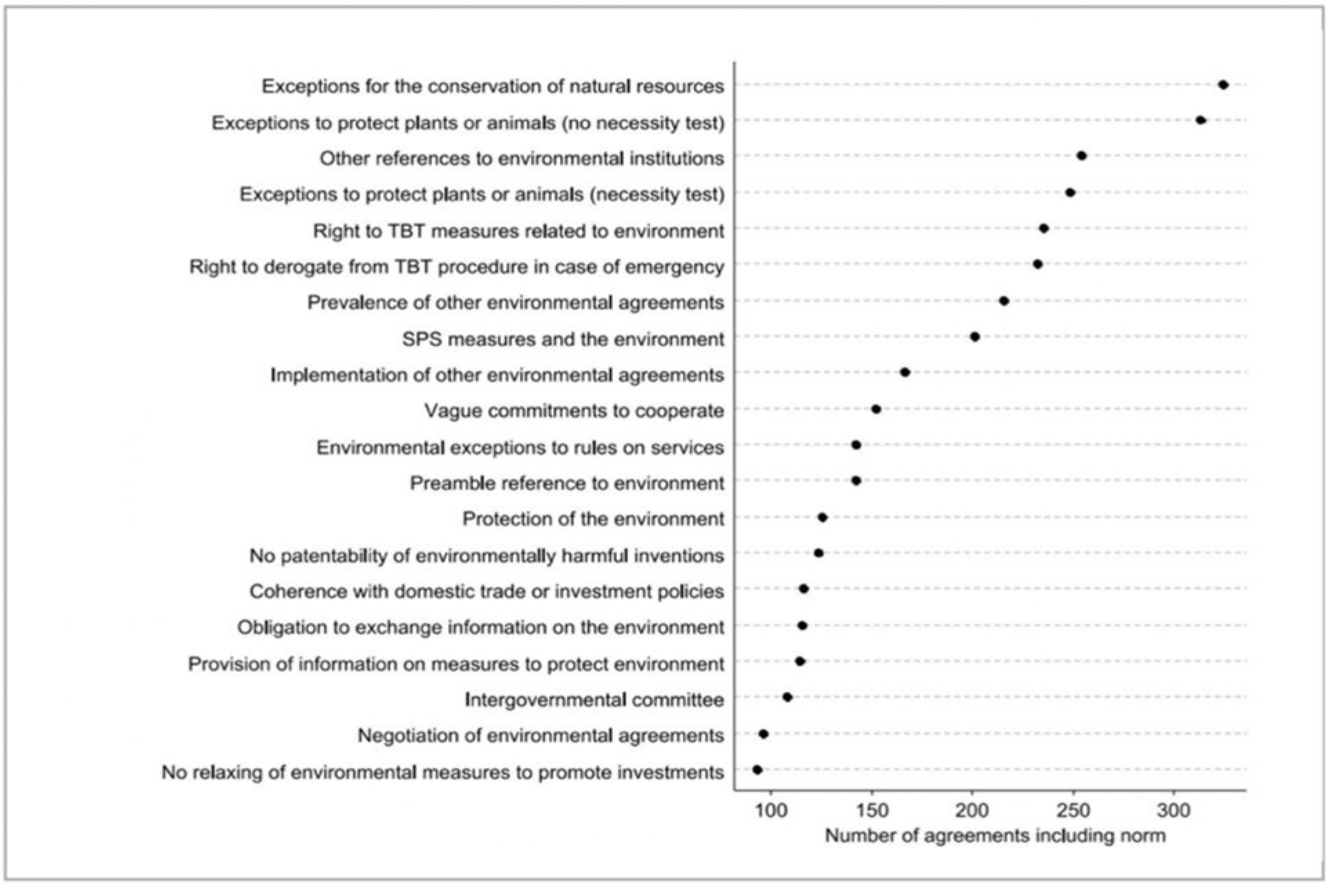

Figure A.1: The Most Widely Used Environmental Norms in Trade Agreements[47]

[47] Graph taken from Handbook on Provisions And Options for Inclusive and Sustainable Development in Trade Agreements: https://www.unescap.org/kp/2023/handbook-provisions-and-options-inclusive-and-sustainable-development-trade-agreements

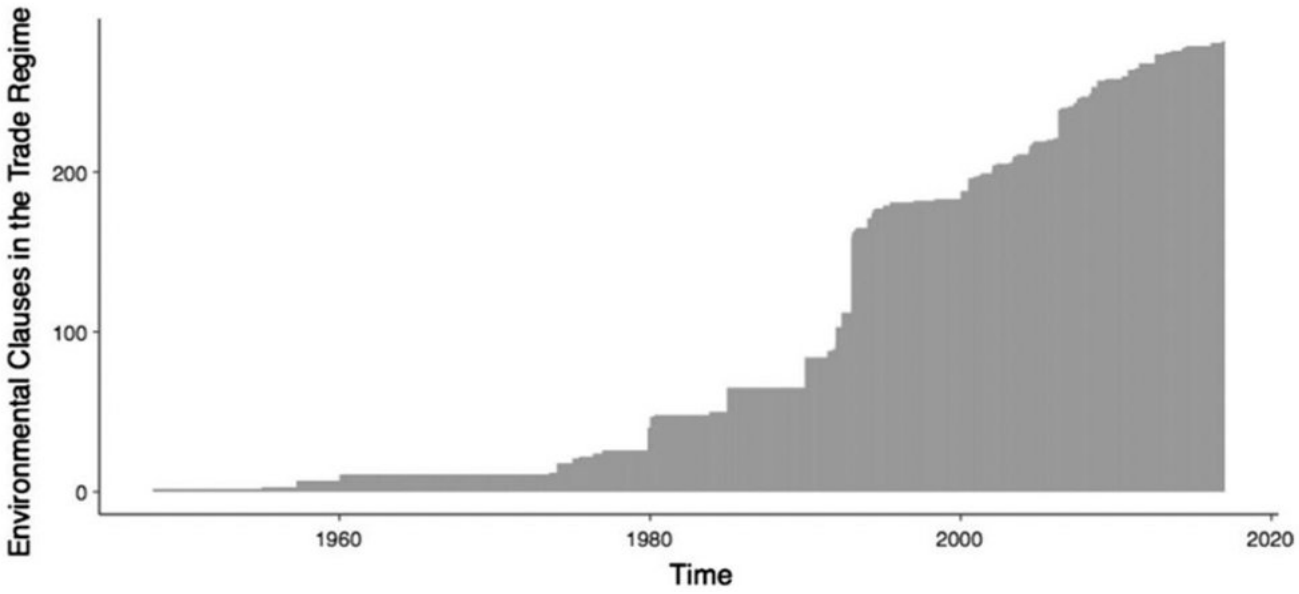

Figure A.2: Environmental Clauses in the Trade Regime Over Time[48]

RTAs are now a vehicle for positive harmonisation through environmental policies pushing for greater social benefits; however, not all RTAs include environmental provisions, and most RTAs with environmental provisions are North-South Agreements. The extent to which a trade agreement can positively influence environmental sustainability will be dependent upon the nature of RTA environmental provisions. This section presents a few prominent regional trade agreements and how they frame and deal with environmental concerns.

The EU - Southern African Development Community (SADC) Economic Partnership Agreement (EU-SADC EPA), initiated in 2019, marks a pivotal step towards bolstering the resilience of Southern African Development Community (SADC) Member States[49] against the challenges posed by climate change. Through the Intra-African, Caribbean and Pacific (ACP) Global Climate Alliance Plus (GCCA+) Programme, jointly launched by the SADC Secretariat and the European Union (EU), efforts are underway to enhance the capacity of SADC nations in both climate adaptation and mitigation strategies.[50] Within the framework of the EU-SADC EPA, there exists a profound acknowledgment of the critical role that development finance plays in advancing climate-related endeavors.

48 Graph taken from Handbook on Provisions And Options for Inclusive and Sustainable Development in Trade Agreements: https://www.unescap.org/kp/2023/handbook-provisions-and-options-inclusive-and-sustainable-development-trade-agreements

49 SADC include the following countries: Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, United Republic of Tanzania, Zambia and Zimbabwe

50 The climate change strategy plan can be accessed at: https://www.sadc.int/sites/default/files/2021-11/SADC_Climate_Change_Strategy_and_Action_Plan-English.pdf

Rather than mandating the establishment of novel institutional frameworks, the agreement strategically leverages existing commitments articulated within the ambit of the Cotonou Agreement.

Meanwhile, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)[51] emerges as a beacon of multilateral cooperation in environmental governance. Encompassing a diverse array of provisions, the CPTPP places significant emphasis on fostering public awareness regarding environmental laws and policies.[52] By ensuring transparency in enforcement and compliance procedures, the agreement endeavors to cultivate a culture of environmental stewardship among its signatory nations. Furthermore, the CPTPP underscores the importance of international collaboration in addressing pressing environmental challenges. Through cooperative projects and dialogue in international forums, parties to the agreement strive to facilitate the liberalisation of trade in environmental goods and services, thereby fostering sustainable development on a global scale.

In a similar vein, the United States-Mexico-Canada Agreement (USMCA) embodies a commitment to sector-specific cooperation in environmental matters. Notably, the agreement features provisions that address environmental concerns within specific industries, such as medical devices and pharmaceuticals. Additionally, the USMCA establishes designated contact points to facilitate ongoing consultations on environmental issues, thereby fostering a robust framework for cross-border collaboration and exchange.[53]

Moving to the realm of bilateral trade agreements, the European Union-Singapore Free Trade Agreement (EU-Singapore FTA) underscores the imperative of conservation and sustainable management of natural resources. By incorporating obligations related to fish stock conservation, the agreement demonstrates a concerted effort to promote responsible stewardship of marine ecosystems. Moreover, the EU-Singapore FTA underscores the importance of harmonizing energy efficiency standards based on internationally recognized norms.[54]

In summary, these trade agreements represent significant milestones in the global effort to address environmental challenges and can be emulated in trade agreements and arrangements involving Pakistan.

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51 Countries signatory to CPTPP include Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Vietnam

52 The details of the CPTPP agreement can be accessed at: https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/tpp-ptp/text-texte/20.aspx?lang=eng

53 The details of the USMCA can be accessed at: https://ustr.gov/sites/default/files/IssueAreas/Environment/USMCA_Environment_Chapter_24.pdf

54 Handbook on provisions and options for inclusive and sustainable development in trade agreements

ANNEX B:

LIST OF SECTORS AND COMPANIES CONSULTED

Sector	Company	Representative	Designation
Textile	Crescent Textile Mills	Sher Ali	Chief Sustainability Officer
		Junaid Babar	Vice President
	MG Apparel	Ali Zain	Manager, Compliance
	Nagina Group	Shaukat Elahi	Director
	CottonWeb	Waseem Khan	Director
Leather	Pakistan Leather Garment Manufacturers & Exporters Association (PLGMEA)	Amanullah Aftab	Chairman
	Hafiz Tanneries		Chief Executive Officer
Solar & Wind	Multiline Engineering	Zubair Khaliq	CEO / Owner
	Global Industry Suppliers	Hussain Ibrahim	CEO / Owner
	Perfekt energy	Muhammad Saeed	CEO / Owner
	Hadron Solar	Waqas Moosa	CEO / Owner
	Grace Solar	Nouman Khan	CEO / Owner
	Haroon Brothers	Asim Rashid	CEO / Owner
	Longi Solar	Ali Majid	Country Manager
Electric Vehicles	Road Prince	Shahrukh Naseem	Chief Operating Officer
	Hyundai	Sohail Nawaz	Senior Vice President
	Treet Group	Farhan Athar	Group Head, Supply Chain

Sector	Company	Representative	Designation
Batteries	Daewoo	Sheriar Hasan	General Manager, Marketing and Sales
		Waqas	Head of Finance & Investment Planning
Waste Management	Lahore Waste Management Company (LWMC)	Khalid Majeed	Ex-Chairman
Air Purifiers	IForest air purifiers	Hassan Zaidi	CEO / Owner
	Zebsol	Jahanzeb Ahmed	CEO / Owner
	Pak Air Quality	Abid Omar	CEO / Owner
Academia	LUMS Energy Institute	Dr Abubakar Muhammad	Researcher
Government	Ministry of Commerce	Sarah Saeed	Secretary
		Mudassir Raza Siddiqi	Director General Textile
	Ministry of Climate Change	Dr. Mazhar Hayat	Deputy Secretary
Intergovernmental Organization	World Trade Organization	Ali Sarfraz	Ambassador of Pakistan to World Trade Organization
		Ahmed Fasih	Deputy Secretary

ANNEX C:

DESCRIPTION OF ENVIRONMENTAL PRODUCTS AND THEIR CATEGORIES

HS Code	Description	Category
220110	Waters: mineral and aerated, including natural or artificial, (not containing added sugar or other sweetening matter nor flavoured)	MISC
220710	Undenatured ethyl alcohol: of an alcoholic strength by volume of 80% vol. or higher	MISC
220720	Ethyl alcohol and other spirits: denatured, of any strength	MISC
252100	Limestone flux: limestone and other calcareous stone, of a kind used for the manufacture of lime or cement	MISC
252220	Slaked lime: excluding calcium oxide and hydroxide of heading no. 2825	MISC
252390	Cement: hydraulic kinds n.e.c. in heading no. 2523	MISC
253090	Mineral substances: n.e.c. in chapter 25	MISC
271020	Petroleum oils and oils from bituminous minerals, containing biodiesel, not crude, not waste oils; preparations n.e.c, containing by weight 70% or more of petroleum oils or oils from bituminous minerals	MISC
280110	Chlorine	MISC
280519	Alkali or alkali-earth metals: other than sodium and calcium	MISC
281410	Ammonia: anhydrous	MISC
281511	Sodium hydroxide (caustic soda): solid	MISC
281512	Sodium hydroxide (caustic soda): in aqueous solution (soda lye or liquid soda)	MISC
281610	Hydroxide and peroxide of magnesium	MISC
281830	Aluminium hydroxide	MISC

HS Code	Description	Category
282010	Manganese dioxide	MISC
282090	Manganese oxides: excluding manganese dioxide	MISC
282410	Lead: lead monoxide (litharge, massicot)	MISC
282520	Lithium oxide and hydroxide	MISC
282690	Fluorides: fluorosilicates, fluoroaluminates and other complex fluorine salts, n.e.c. in heading no. 2826	MISC
282739	Chlorides: other than of ammonium, calcium, magnesium, aluminium and nickel	MISC
283210	Sulphites: of sodium	MISC
283220	Sulphites: other than of sodium	MISC
283510	Phosphinates (hypophosphites) and phosphonates (phosphites), whether or not chemically defined	MISC
283522	Phosphates: of mono- or disodium, whether or not chemically defined	MISC
283524	Phosphates: of potassium, whether or not chemically defined	MISC
283525	Phosphates: calcium hydrogenorthophosphate (dicalcium phosphate), whether or not chemically defined	MISC
283526	Phosphates: of calcium n.e.c. in item no. 2835.25, whether or not chemically defined	MISC
283529	Phosphates: (other than of mono- or disodium, other than of potassium or of calcium hydrogenorthophosphate (dicalcium phosphate) and excluding other phosphates of calcium), whether or not chemically defined	MISC
283691	Carbonates: lithium carbonate	MISC
284700	Hydrogen peroxide: whether or not solidified with urea	MISC
285310	Inorganic compounds: cyanogen chloride (chlorcyan)	MISC

HS Code	Description	Category
290511	Alcohols: saturated monohydric, methanol (methyl alcohol)	MISC
320910	Paints and varnishes: based on acrylic or vinyl polymers, dispersed or dissolved in an aqueous medium	MISC
320990	Paints and varnishes: (based on polymers other than acrylic or vinyl), dispersed or dissolved in an aqueous medium	MISC
380210	Carbon: activated	WAT
380290	Chemical products: activated natural mineral products, animal black, including spent animal black	MISC
381511	Catalysts, supported: reaction initiators, reaction accelerators and catalytic preparations, with nickel or nickel compounds as the active substance, n.e.c. or included	MISC
381512	Catalysts, supported: reaction initiators, reaction accelerators and catalytic preparations, with precious metal or precious metal compounds as the active substance, n.e.c. or included	MISC
381519	Catalysts, supported: reaction initiators, reaction accelerators and catalytic preparations, with an active substance other than nickel or precious metals or their compounds, n.e.c. or included	MISC
381590	Reaction initiators, reaction accelerators and catalytic preparations, unsupported, n.e.c. or included	MISC
382600	Biodiesel and mixtures thereof: not containing or containing less than 70% by weight of petroleum oils or oils obtained from bituminous minerals	MISC
390690	Acrylic polymers: (other than polymethyl methacrylate), in primary forms	MISC
390940	Phenolic resins: in primary forms	HEM
391400	Ion-exchangers: based on polymers of heading no. 3901 to 3913, in primary forms	MISC
392010	Plastics: plates, sheets, film, foil and strip (not self-adhesive), of polymers of ethylene, non-cellular and not reinforced, laminated, supported or similarly combined with other materials	SWM
392020	Plastics: of polymers of propylene, plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials	MISC

HS Code	Description	Category
392030	Plastics: of polymers of styrene, plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials	HEM
392111	Plastics: plates, sheets, film, foil and strip, of polymers of styrene, cellular	HEM
392113	Plastics: plates, sheets, film, foil and strip, of polyurethanes, cellular	HEM
392321	Ethylene polymers: sacks and bags (including cones), for the conveyance or packing of goods	MISC
392490	Plastics: household articles and hygienic or toilet articles	MISC
392510	Plastics: builders' ware, reservoirs, tanks, vats and similar containers of a capacity exceeding 300 litres	REP
392690	Plastics: other articles n.e.c. in chapter 39	MISC
400259	Rubber: synthetic, acrylonitrile-butadiene rubber (NBR), (other than latex), in primary forms or in plates, sheets or strip	SWM
441873	Wood: assembled flooring panels, of bamboo or with at least the top layer (wear layer) of bamboo	EPP
450410	Cork: blocks, plates, sheets and strip, tiles of any shape, solid cylinders (including discs), of agglomerated cork (with or without a binding substance)	HEM
450490	Cork: articles of agglomerated cork (with or without a binding substance), n.e.c. in heading no. 4504	HEM
470620	Pulp: of fibres derived from recovered (waste and scrap) paper or paperboard	MISC
470710	Paper or paperboard: waste and scrap, of unbleached kraft paper or paperboard or corrugated paper or paperboard	MISC
470720	Paper or paperboard: waste and scrap, paper or paperboard made mainly of bleached chemical pulp, not coloured in the mass	MISC
470730	Paper or paperboard: waste and scrap, paper or paperboard made mainly of mechanical pulp (e.g. newspapers, journals and similar printed matter)	MISC

HS Code	Description	Category
470790	Paper or paperboard: waste and scrap, of paper or paperboard n.e.c. in heading no. 4707 and of unsorted waste and scrap	MISC
480524	Paper & paperboard: uncoated, testliner (recycled linerboard), weight 150g/m2, or less, in rolls or sheets	MISC
480525	Paper & paperboard: uncoated, testliner (recycled linerboard), weight over 150g/m2, in rolls or sheets	MISC
530310	Jute and other textile bast fibres: raw or retted, but not spun, (excluding flax, hemp (cannabis sativa L.), and ramie)	EPP
530500	Coconut, abaca (Manila hemp or Musa textilis Nee), ramie and other vegetable textile fibres n.e.c., raw or processed but not spun: tow, noils and waste of these fibres (including yarn waste and garnetted stock)	EPP
540500	Monofilament, synthetic: of 67 decitex or more and of which no cross-sectional dimension exceeds 1mm, strip and the like (e.g. artificial straw), of synthetic textile materials with width not over 5mm	HEM
560314	Nonwovens: whether or not impregnated, coated, covered or laminated, of man-made filaments, (weighing more than 150g/m2)	WAT
560721	Twine: binder or baler twine, of sisal or other textile fibres of the genus agave	EPP
560790	Twine, cordage, ropes, cables: of materials n.e.c. in heading no. 5607, whether or not plaited, braided or impregnated, coated, covered, or sheathed with rubber or plastics	EPP
560811	Twine, cordage or rope: fishing nets, made up, of man made textile materials	NRP
560890	Twine, cordage or rope: knotted netting, of other than man-made textiles	NRP
580190	Fabrics: woven pile and chenille, of textile materials n.e.c. in heading no. 5801, other than fabrics of heading no. 5802 or 5806	MISC
630510	Sacks and bags: of a kind used for the packing of goods, of jute or of other textile bast fibres of heading no. 5303	EPP

HS Code	Description	Category
680610	Slag wool, rock wool and similar mineral wools (including intermixtures thereof), in bulk, sheets or rolls	HEM
680690	Minerals: mixtures and articles of heat-insulating, sound-insulating or sound-absorbing mineral materials, other than those of heading no. 6811 or 6812 or of chapter 69	HEM
680800	Panels, boards, tiles, blocks and the like: of vegetable fibre, of straw, shavings, chips, particles, sawdust or other waste, of wood, agglomerated with cement, plaster or other mineral binders	HEM
681011	Cement, concrete or artificial stone: building blocks or bricks, whether or not reinforced	HEM
681019	Cement, concrete or artificial stone: tiles, flagstones and similar, (excluding building blocks and bricks) whether or not reinforced	HEM
681091	Cement, concrete or artificial stone: prefabricated structural components for building or civil engineering, whether or not reinforced	HEM
681099	Cement, concrete or artificial stone: articles (other than prefabricated structural components for building or civil engineering), whether or not reinforced, n.e.c. in heading no. 6810	MISC
691010	Ceramic sinks, wash basins, wash basin pedestals, baths, bidets, water closet pans, flushing cisterns, urinals and similar sanitary fixtures: of porcelain or china	WAT
700800	Glass: multiple-walled insulating units of glass	HEM
700991	Glass mirrors: unframed, excluding rear-view mirrors for vehicles	REP
700992	Glass mirrors: framed, excluding rear-view mirrors for vehicles	REP
701931	Glass fibres: non-woven products, mats	HEM
701939	Glass fibres: webs, mattresses, boards and similar non-woven products excluding mats and thin sheets	HEM

HS Code	Description	Category
701990	Glass fibres: n.e.c. in heading no. 7019	MISC
730210	Iron or steel, railway or tramway track construction material: rails	CRE
730230	Iron or steel, railway or tramway track construction material: switch blades, crossing frogs, point rods and other crossing pieces	CRE
730240	Iron or steel, railway or tramway track construction material: fish-plates and sole plates	CRE
730290	Iron or steel, railway or tramway track construction material: n.e.c. in heading no. 7302	CRE
730300	Cast iron: tubes, pipes and hollow profiles	WAT
730431	Iron or non-alloy steel (excluding cast iron): seamless, cold-drawn or cold-rolled, tubes, pipes and hollow profiles of circular cross-section	WAT
730490	Iron or steel (excluding cast iron): seamless, tubes, pipes and hollow profiles, seamless, n.e.c. in heading no. 7304	WAT
730630	Iron or non-alloy steel (excluding cast iron): tubes and pipes (not seamless), welded, of circular cross-section, n.e.c. in chapter 73	WAT
730690	Iron or steel (excluding cast iron): tubes, pipes and hollow profiles (not seamless), n.e.c. in chapter 73	WAT
730820	Iron or steel: structures and parts thereof, towers and lattice masts	REP
730890	Iron or steel: structures and parts thereof, n.e.c. in heading 7308	REP
730900	Reservoirs, tanks, vats and similar containers: for any material (excluding compressed or liquefied gas), of iron or steel, capacity exceeding 300l, whether or not lined or heat insulated	WAT
731010	Tanks, casks, drums, cans, boxes and similar containers, for any material (excluding compressed or liquefied gas), 50l or more capacity but not exceeding 300l	WAT

HS Code	Description	Category
731021	Cans: which are to be closed by soldering or crimping, for any material (excluding compressed or liquefied gas), less than 50l capacity, of iron or steel	MISC
731029	Tanks, casks, drums, boxes and similar containers for any material (excluding compressed or liquefied gas) less than 50l capacity, n.e.c. in item no. 7310.2, of iron or steel	WAT
732111	Cooking appliances and plate warmers: for gas fuel or for both gas and other fuels, of iron or steel	CRE
732119	Cooking appliances and plate warmers: for solid fuel and fuels other than gas or liquid, of iron or steel	REP
732189	Domestic appliances: non-electric, (other than cookers and plate warmers), for solid fuel and fuels other than gas or liquid, of iron or steel	REP
732190	Domestic appliances: non-electric, parts thereof, of iron or steel	CRE
732490	Iron or steel: sanitary ware and parts thereof, excluding sinks, wash basins and baths	WAT
732510	Iron: articles of non-malleable cast iron	WAT
732690	Iron or steel: articles n.e.c. in heading 7326	WAT
761090	Aluminium: structures (excluding prefabricated buildings of heading no. 9406) and parts of structures, n.e.c. in heading no. 7610, plates, rods, profiles, tubes and the like	REP
761100	Aluminium: reservoirs, tanks, vats and similar containers, for material (not compressed or liquefied gas), of a capacity over 300l, whether or not lined, not fitted with mechanical/thermal equipment	REP
761290	Aluminium: casks, drums, cans, boxes and the like for any material (not compressed or liquefied gas), 300l capacity or less, whether or not lined or heat-insulated, no mechanical or thermal equipment	SWM
780600	Lead: articles n.e.c. in chapter 78	MISC
830630	Photograph, picture or similar frames, mirrors: of base metal	REP

HS Code	Description	Category
840219	Boilers: vapour generating boilers, including hybrid boilers n.e.c. in heading no. 8402	SWM
840290	Boilers: parts of steam or other vapour generating boilers	SWM
840410	Boilers: auxiliary plant, for use with boilers of heading no. 8402 or 8403 (e.g. economisers, super-heaters, soot removers, gas recoverers)	APC
840420	Boilers: condensers, for steam or other vapour power units	APC
840490	Boilers: parts of auxiliary plant, for use with boilers of heading no. 8402 and 8403 and parts of condensers for steam or other vapour power units	APC
840510	Generators: producer gas, water gas, acetylene gas and similar water process gas generators, with or without their purifiers	APC
840681	Turbines: steam and other vapour turbines, (for other than marine propulsion), of an output exceeding 40MW	REP
840682	Turbines: steam and other vapour turbines, (for other than marine propulsion), of an output not exceeding 40MW	REP
840690	Turbines: parts of steam and other vapour turbines	REP
840991	Engines: parts, suitable for use solely or principally with spark-ignition internal combustion piston engines (for other than aircraft)	NVA
840999	Engines: parts for internal combustion piston engines (excluding spark-ignition)	NVA
841011	Turbines: hydraulic turbines and water wheels, of a power not exceeding 1000kW	REP
841012	Turbines: hydraulic turbines and water wheels, of a power exceeding 1000kW but not exceeding 10000kW	REP
841013	Turbines: hydraulic turbines and water wheels, of a power exceeding 10000kW	REP
841090	Turbines: parts of hydraulic turbines and water wheels, including regulators	REP

HS Code	Description	Category
841181	Turbines: gas-turbines (excluding turbo-jets and turbo-propellers), of a power not exceeding 5000kW	REP
841182	Turbines: gas-turbines (excluding turbo-jets and turbo-propellers), of a power exceeding 5000kW	REP
841199	Turbines: parts of gas turbines (excluding turbo-jets and turbo-propellers)	REP
841280	Engines: pneumatic power engines and motors, n.e.c. in heading no. 8412	REP
841290	Engines: parts, for engines and motors of heading no. 8412	REP
841320	Pumps: hand, fitted or designed to be fitted with a measuring device, for liquids, other than those of item no. 8413.11 or 8413.19	WAT
841350	Pumps: reciprocating positive displacement pumps, n.e.c. in heading no. 8413, for liquids	WAT
841360	Pumps: rotary positive displacement pumps, n.e.c. in heading no. 8413, for liquids	WAT
841370	Pumps: centrifugal, n.e.c. in heading no. 8413, for liquids	WAT
841381	Pumps and liquid elevators: n.e.c. in heading no. 8413	WAT
841410	Pumps: vacuum	APC
841430	Compressors: of a kind used in refrigerating equipment	APC
841440	Compressors: air compressors mounted on a wheeled chassis for towing	APC
841459	Fans: n.e.c. in item no. 8414.51	APC
841480	Pumps and compressors: for air, vacuum or gas, n.e.c. in heading no. 8414	APC
841490	Pumps and compressors: parts, of air or vacuum pumps, air or other gas compressors and fans, ventilating or recycling hoods incorporating a fan	APC

HS Code	Description	Category
841581	Air conditioning machines: containing a motor driven fan, other than window or wall types, incorporating a refrigerating unit and a valve for reversal of the cooling/heat cycle (reversible heat pumps)	REP
841780	Furnaces and ovens: including incinerators, non-electric, for industrial or laboratory use, n.e.c. in heading no. 8417	SWM
841790	Furnaces and ovens: parts of non-electric furnaces and ovens (including incinerators), of industrial or laboratory use	SWM
841861	Heat pumps: other than air conditioning machines of heading no. 8415	REP
841869	Refrigerating or freezing equipment: n.e.c. in heading no. 8418	REP
841911	Heaters: instantaneous gas water heaters, for domestic or other purposes	MISC
841919	Heaters: instantaneous or storage water heaters, non-electric, other than instantaneous gas water heaters	REP
841939	Dryers: for products n.e.c. in heading no. 8419, not used for domestic purposes	WAT
841940	Distilling or rectifying plant: not used for domestic purposes	SWM
841950	Heat exchange units: not used for domestic purposes	HEM
841960	Machinery: for liquefying air or gas, not used for domestic purposes	APC
841989	Machinery, plant and laboratory equipment: for treating materials by change of temperature, other than for making hot drinks or cooking or heating food	WAT
841990	Machinery, plant and laboratory equipment: parts of equipment for treating materials by a process involving a change of temperature	REP
842119	Centrifuges: n.e.c. in heading no. 8421, including centrifugal dryers (but not clothes-dryers)	SWR

HS Code	Description	Category
842121	Machinery: for filtering or purifying water	WAT
842129	Machinery: for filtering or purifying liquids, n.e.c. in item no. 8421.2	WAT
842139	Machinery: for filtering or purifying gases, other than intake air filters for internal combustion engines	APC
842191	Centrifuges: parts thereof, including parts for centrifugal dryers	SWR
842199	Machinery: parts for filtering or purifying liquids or gases	WAT
842220	Machinery: for cleaning or drying bottles or other containers	SWM
842290	Machinery: parts of machinery of heading no. 8422	SWM
842381	Weighing machines: having a maximum weighing capacity not exceeding 30kg (excluding balances of a sensitivity of 5cg or better)	MISC
842382	Weighing machines: having a maximum weighing capacity exceeding 30kg but not exceeding 5000kg	MISC
842389	Weighing machines: having a maximum weighing capacity exceeding 5000kg	MISC
842490	Mechanical appliances: parts of machines projecting, dispersing or spraying liquids or powders, whether or not hand-operated	MISC
842833	Elevators and conveyors: continuous-action, for goods or materials, belt type, n.e.c. in item no. 8428.20 or 8428.31	SWM
842940	Tamping machines and road rollers: self-propelled	SWM
845620	Machine-tools: for working any material by removal of material, operated by ultrasonic processes	MISC
845640	Machine tools: for working any material by removal of material: operated by plasma arc processes:	MISC
845650	Machine tools: for working any material by removal of material: operated by water-jet cutting machines	MISC

HS Code	Description	Category
846291	Machine-tools: presses for working metal or metal carbides, n.e.c. in heading no. 8462, hydraulic presses	SWM
846596	Machine-tools: for working wood, cork, bone, hard rubber, hard plastics or similar hard materials: splitting, slicing or paring machines	SWM
846599	Machine-tools: for working wood, cork, bone, hard rubber, hard plastics or similar hard materials: n.e.c. in heading no. 8465	SWM
846694	Machine-tools: parts and accessories, for the machines of heading no. 8462 or 8463, n.e.c. in heading no. 8466	SWM
847420	Machines: for crushing or grinding earth, stone, ores or other mineral substances	SWM
847439	Machines: for mixing or kneading mineral substances, excluding concrete mixers and machines for mixing mineral substances with bitumen	MISC
847780	Machinery: for working rubber or plastics or for the manufacture of products from these materials, n.e.c. in this chapter	MISC
847982	Machines: for mixing, kneading, crushing, grinding, screening, sifting, homogenising, emulsifying or stirring	SWM
847989	Machines and mechanical appliances: having individual functions, n.e.c. or included in this chapter	SWM
847990	Machines and mechanical appliances: parts, of those having individual functions	SWM
848110	Valves: pressure reducing, for pipes, boiler shells, tanks, vats or the like	WAT
848130	Valves: check (nonreturn) valves, for pipes, boiler shells, tanks, vats or the like	WAT
848140	Valves: safety or relief valves, for pipes, boiler shells, tanks, vats or the like	WAT
848180	Taps, cocks, valves and similar appliances: for pipes, boiler shells, tanks, vats or the like, including thermostatically controlled valves	WAT

HS Code	Description	Category
848190	Taps, cocks, valves and similar appliances: parts thereof	WAT
848340	Gears and gearing: (not toothed wheels, chain sprockets and other transmission elements presented separately): ball or roller screws: gear boxes and other speed changers, including torque converters	REP
848360	Clutches and shaft couplings (including universal joints)	REP
850161	Generators: AC generators, (alternators), of an output not exceeding 75kVA	REP
850162	Electric generators: AC generators, (alternators), of an output exceeding 75kVA but not exceeding 375kVA	REP
850163	Electric generators: AC generators, (alternators), of an output exceeding 375kVA but not exceeding 750kVA	REP
850164	Electric generators: AC generators, (alternators), of an output exceeding 750kVA	REP
850220	Electric generating sets: with spark-ignition internal combustion piston engines	HEM
850231	Electric generating sets: wind-powered, (excluding those with spark-ignition or compression-ignition internal combustion piston engines)	REP
850239	Electric generating sets: (excluding those with spark-ignition or compression-ignition internal combustion piston engines), other than wind powered	REP
850300	Electric motors and generators: parts suitable for use solely or principally with the machines of heading no. 8501 or 8502	REP
850421	Electrical transformers: liquid dielectric, having a power handling capacity not exceeding 650kVA	REP
850422	Electrical transformers: liquid dielectric, having a power handling capacity exceeding 650kVA but not exceeding 10,000kVA	REP
850423	Electrical transformers: liquid dielectric, having a power handling capacity exceeding 10,000kVA	REP

HS Code	Description	Category
850431	Electrical transformers: n.e.c. in item no. 8504.2, having a power handling capacity not exceeding 1kVA	REP
850432	Transformers: n.e.c. in item no. 8504.2, having a power handling capacity exceeding 1kVA but not exceeding 16kVA	REP
850433	Transformers: n.e.c. in item no. 8504.2, having a power handling capacity exceeding 16kVA but not exceeding 500kVA	REP
850434	Transformers: n.e.c. in item no. 8504.2, having a power handling capacity exceeding 500kVA	REP
850440	Electrical static converters	REP
850490	Electrical transformers, static converters and inductors: parts thereof	REP
850590	Magnets: electro-magnets, holding devices and parts n.e.c. in heading no. 8505	SWM
850650	Cells and batteries: primary, lithium	MISC
850680	Cells and batteries: primary, (other than manganese dioxide, mercuric oxide, silver oxide, lithium or air-zinc)	CRE
850710	Electric accumulators: lead-acid, of a kind used for starting piston engines, including separators, whether or not rectangular (including square)	MISC
850720	Electric accumulators: lead-acid, (other than for starting piston engines), including separators, whether or not rectangular (including square)	REP
850740	Electric accumulators: nickel-iron, including separators, whether or not rectangular (including square)	MISC
850750	Electric accumulators: nickel-metal hydride, including separators, whether or not rectangular (including square)	MISC
850760	Electric accumulators: lithium-ion, including separators, whether or not rectangular (including square)	MISC

HS Code	Description	Category
850780	Electric accumulators: other than lead-acid, nickel-cadmium, nickel-iron, nickel-metal hydride and lithium-ion, including separators, whether or not rectangular (including square)	MISC
850790	Electric accumulators: parts n.e.c. in heading no. 8507	MISC
850980	Electro-mechanical domestic appliances: with self-contained electric motor, other than vacuum cleaners of heading 85.08, n.e.c. in heading no. 8509	CRE
851410	Furnaces and ovens: electric, for industrial or laboratory use, resistance heated	SWM
851420	Furnaces and ovens: electric, for industrial or laboratory use, functioning by induction or dielectric loss	SWM
851430	Furnaces and ovens: electric, for industrial or laboratory use, other than those functioning by induction, dielectric loss or resistance heated	MISC
851490	Furnaces, ovens and heating equipment: parts of the industrial or laboratory equipment of heading no. 8514	SWM
851629	Heating apparatus: electric soil heating apparatus and space heating apparatus (excluding storage heating radiators)	SWR
853010	Signalling, safety or traffic control equipment: for railways or tramways (excluding those of heading no. 8608)	CRE
853080	Signalling, safety or traffic control equipment: for roads, inland waterways, parking facilities, port installations or airfields (excluding those of heading no. 8608)	CRE
853090	Signalling apparatus: parts of safety, traffic control equipment for railways, tramways, roads, inland waterways, airfields, parking facilities, port instalments (excluding those of heading no. 8608)	CRE
853120	Signalling apparatus: electric, sound or visual, indicator panels incorporating liquid crystal devices (LCD) or light-emitting diodes (LED), excluding those of heading no. 8512 or 8530	MISC

HS Code	Description	Category
853224	Electrical capacitors: fixed, ceramic dielectric, multilayer	MISC
853710	Boards, panels, consoles, desks and other bases: for electric control or the distribution of electricity, (other than switching apparatus of heading no. 8517), for a voltage not exceeding 1000 volts	REP
853720	Boards, panels, consoles, desks and other bases: for electric control or the distribution of electricity, (other than switching apparatus of heading no. 8517), for a voltage exceeding 1000 volts	REP
853921	Lamps: filament, (excluding ultra-violet or infra-red), tungsten halogen	HEM
853931	Lamps: discharge, (excluding ultra-violet), fluorescent, hot cathode	HEM
853932	Lamps: discharge, (excluding ultra-violet), mercury or sodium vapour lamps, metal halide lamps	HEM
853950	Lamps: light-emitting diode (LED) lamps	MISC
854140	Electrical apparatus: photosensitive, including photovoltaic cells, whether or not assembled in modules or made up into panels, light-emitting diodes (LED)	REP
854370	Electrical machines and apparatus: having individual functions, not specified or included elsewhere in this chapter, n.e.c. in heading no. 8543	WAT
854390	Electrical machines and apparatus: parts of the electrical goods of heading no. 8543	WAT
860110	Rail locomotives: powered from an external source of electricity	CRE
860120	Rail locomotives: powered by electric accumulators	CRE
860210	Rail locomotives: diesel-electric powered	CRE
860290	Rail locomotives and locomotive tenders: other than diesel-electric powered	CRE

HS Code	Description	Category
860310	Railway or tramway coaches, vans and trucks: self-propelled, powered from an external source of electricity (excluding those of heading no. 8604)	CRE
860390	Railway or tramway coaches, vans and trucks: self-propelled, powered other than from an external source of electricity (excluding those of heading no. 8604)	CRE
860400	Railway or tramway maintenance or service vehicles: whether or not self-propelled (e.g. workshops, cranes, ballast tampers, trackliners, testing coaches and track inspection vehicles)	CRE
860500	Railway or tramway coaches: passenger coaches, luggage vans, post office coaches and other special purpose railway or tramway coaches, not self-propelled (excluding those of heading no. 8604)	CRE
860610	Railway or tramway goods vans and wagons: tank wagons and the like, not self-propelled	CRE
860630	Railway or tramway goods vans and wagons: self-discharging, not self-propelled, excluding those of item no. 8606.10	CRE
860691	Railway or tramway goods vans and wagons: covered and closed, not self-propelled	CRE
860692	Railway or tramway goods vans and wagons: open, with non-removable sides of a height exceeding 60cm, not self-propelled	CRE
860699	Railway or tramway goods vans and wagons: n.e.c. in heading no. 8606, not self-propelled	CRE
860711	Railway or tramway locomotives or rolling stock: parts, driving bogies and bissel-bogies	CRE
860712	Railway or tramway locomotives or rolling stock: parts, bogies and bissel-bogies (excluding driving bogies and bissel-bogies)	CRE
860719	Railway or tramway locomotives or rolling stock: parts, axles and wheels, and parts thereof	CRE
860721	Railway or tramway locomotives or rolling stock: parts, air brakes and parts thereof	CRE

HS Code	Description	Category
860729	Railway or tramway locomotives or rolling stock: parts, brakes (other than air brakes) and parts thereof	CRE
860730	Railway or tramway locomotives or rolling stock: parts, hooks and other coupling devices, buffers and parts thereof	CRE
860791	Railway or tramway locomotives: parts n.e.c. in heading no. 8607	CRE
860799	Railway or tramway rolling stock: parts n.e.c. in heading no. 8607	CRE
860800	Railway or tramway track fixtures and fittings: mechanical (including electro-mechanical) signalling, safety or traffic control equipment for railways, tramways, roads, inland waterways, parking facilities, port installations or airfields: parts thereof	CRE
870220	Vehicles: public transport type (carries 10 or more persons, including driver), with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, new or used	MISC
870230	Vehicles: public transport type (carries 10 or more persons, including driver), with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, new or used	MISC
870240	Vehicles: public transport type (carries 10 or more persons, including driver), with only electric motor for propulsion, new or used	CRE
870340	Vehicles: with both spark-ignition internal combustion reciprocating piston engine and electric motor for propulsion, incapable of being charged by plugging to external source of electric power	MISC
870350	Vehicles: with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, incapable of being charged by plugging to external source of electric power	MISC

HS Code	Description	Category
870360	Vehicles: with both spark-ignition internal combustion reciprocating piston engine and electric motor for propulsion, capable of being charged by plugging to external source of electric power	MISC
870370	Vehicles: with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, capable of being charged by plugging to external source of electric power	MISC
870380	Vehicles: with only electric motor for propulsion	CRE
870892	Vehicle parts: silencers (mufflers) and exhaust pipes: parts thereof	MISC
871160	Motorcycles (including mopeds) and cycles: fitted with auxiliary motor, with electric motor for propulsion, with or without side-cars: side-cars	MISC
871200	Bicycles and other cycles: including delivery tricycles, not motorised	CRE
871410	Motorcycles (including mopeds): parts and accessories	CRE
871420	Carriages for disabled persons: parts and accessories thereof	CRE
871491	Cycles: frames and forks, and parts thereof	CRE
871492	Cycles: parts thereof, wheel rims and spokes	CRE
871493	Cycles: parts thereof, hubs (other than coaster braking hubs and hub brakes) and free-wheel sprocket-wheels	CRE
871494	Cycles: parts thereof, brakes, including coaster braking hubs and hub-brakes, and parts thereof	CRE
871495	Cycles: parts thereof, saddles	CRE
871496	Cycles: parts, pedals and crank-gear, and parts thereof	CRE
871499	Cycles: parts thereof, n.e.c. in item no. 8714.9	CRE
871639	Trailers and semi-trailers: (other than tanker type)	CRE

HS Code	Description	Category
890790	Floating structures: tanks, coffer-dams, landing stages, buoys and beacons	SWR
900190	Optical elements: lenses n.e.c. in heading no. 9001, prisms, mirrors and other optical elements, unmounted, of any material (excluding elements of glass not optically worked)	REP
900290	Optical elements: n.e.c. in heading no. 9002 (e.g. prisms and mirrors), mounted, being parts or fittings for instruments or apparatus, of any material (excluding elements of glass not optically worked)	REP
900580	Monoculars: other optical telescopes and astronomical instruments, excluding instruments for radio-astronomy	MON
901320	Lasers: other than laser diodes	MISC
901380	Optical devices, appliances and instruments: n.e.c. in heading no. 9013 (including liquid crystal devices)	REP
901390	Optical appliances and instruments: parts and accessories for articles of heading no. 9013	REP
901530	Surveying equipment: levels	MON
901540	Surveying equipment: photogrammetrical surveying instruments and appliances	MON
901580	Surveying equipment: articles n.e.c. in heading no. 9015, including hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances (excluding compasses)	MON
901590	Surveying equipment: parts and accessories for articles of heading no. 9015	MON
902511	Thermometers and pyrometers: liquid filled, for direct reading, not combined with other instruments	MON
902519	Thermometers and pyrometers: (other than liquid filled, for direct reading), not combined with other instruments	MON
902580	Hydrometers and similar floating instruments, barometers, hygrometers, psychrometers, thermometers, pyrometers: recording or not, any combination of these instruments (excluding thermometers and barometers not combined with other instruments)	MISC

HS Code	Description	Category
902610	Instruments and apparatus: for measuring or checking the flow or level of liquids	MON
902620	Instruments and apparatus: for measuring or checking pressure	MON
902680	Instruments and apparatus: for measuring or checking variables of liquids or gases (excluding pressure or the flow and level of liquids and those of heading no. 9014, 9015, 9028 and 9032)	MON
902690	Instruments and apparatus: parts and accessories for those measuring or checking the flow, level, pressure or other variables of liquids or gases (excluding those of heading no. 9014, 9015, 9028 or 9032)	MON
902710	Instruments and apparatus: gas or smoke analysis apparatus, for physical or chemical analysis	MON
902720	Chromatographs and electrophoresis instruments	MON
902730	Spectrometers, spectrophotometers and spectrographs: using optical radiations (UV, visible, IR)	MON
902750	Instruments and apparatus: using optical radiations (UV, visible, IR), (other than spectrometers, spectrophotometers and spectrographs)	MON
902780	Instruments and apparatus: for physical or chemical analysis, for measuring or checking viscosity, porosity, expansion, surface tension or quantities of heat, sound or light, n.e.c. in heading no. 9027	MON
902790	Microtomes and parts and accessories thereof	MON
902810	Meters: gas, supply or production meters, including calibrating meters thereof	MON
902820	Meters: liquid supply or production meters, including calibrating meters thereof	MON
902830	Meters: electricity supply or production meters, including calibrating meters thereof	HEM
902890	Meters: parts and accessories of gas, liquid, electricity supply or production meters, including calibrating meters thereof	HEM

HS Code	Description	Category
903010	Instruments and apparatus: for measuring or detecting ionising radiations	MON
903020	Oscilloscopes and oscillographs	MON
903031	Multimeters: for measuring or checking voltage, current, resistance or power, without a recording device	MON
903032	Multimeters: for measuring or checking voltage, current, resistance or power, with a recording device	MON
903033	Instruments and apparatus: for measuring or checking voltage, current, resistance or power, without a recording device (excluding multimeters)	MON
903039	Instruments and apparatus: for measuring or checking voltage, current, resistance or power, with a recording device (excluding multimeters)	MON
903084	Instruments and apparatus: n.e.c. in heading no. 9030, with a recording device	MON
903089	Instruments and apparatus: n.e.c. in heading no. 9030, without a recording device	MON
903090	Instruments, apparatus for measuring, checking electrical quantities, not meters of heading no. 9028: parts and accessories, for measuring or detecting alpha, beta, gamma, x-ray, cosmic and other radiations	MON
903110	Machines: for balancing mechanical parts	NVA
903120	Test benches	MON
903149	Optical instruments and appliances: for measuring or checking, n.e.c. in chapter 90	MON
903180	Instruments, appliances and machines: for measuring or checking n.e.c. in chapter 90	MON
903190	Instruments, appliances and machines: parts and accessories for those measuring or checking devices of heading no. 9031	MON
903210	Regulating or controlling instruments and apparatus: automatic type, thermostats	MON

HS Code	Description	Category
903220	Regulating or controlling instruments and apparatus: automatic, manostats	MON
903281	Regulating or controlling instruments and apparatus: automatic, hydraulic or pneumatic	MON
903289	Regulating or controlling instruments and apparatus: automatic, other than hydraulic or pneumatic	REP
903290	Regulating or controlling instruments and apparatus: automatic, parts and accessories	MON
903300	Machines and appliances, instruments or apparatus of chapter 90: parts and accessories n.e.c. in chapter 90	MON
940510	Chandeliers and other electric ceiling or wall light fittings: excluding those used for lighting public open spaces or thoroughfares	HEM
940520	Lamps, electric: floor-standing or for table, desk or bedside	HEM
940540	Lamps and light fittings: electric, n.e.c. in heading no. 9405	HEM
950720	Fish-hooks: whether or not snelled	NRP
960310	Brooms and brushes: consisting of twigs or other vegetable materials bound together, with or without handles	MISC
960350	Brushes: constituting parts of machines, appliances or vehicles	MISC
960390	Brooms, brushes, mops, feather dusters, squeegees, hand operated mechanical floor sweepers: (not motorized), prepared knots and tufts for brooms or brush making n.e.c.	MISC

ANNEX D:

METHODOLOGY FOR CALCULATION OF TRADE CREATION

Laird and Yeats (1986) provide a discussion of the steps that lead to the formulation of the equation below. Data with which to fill the equation are provided in the United Nations ESCAP User Guide and Explanatory Note for Trade Intelligence and Negotiation Advisor.[55]

The formula for trade creation is:

$$TC_{ijk} = \Delta t_{ijk} * \varepsilon_M * \frac{M_{ijk}}{t_{ijk}(1 + \frac{\varepsilon_M}{\varepsilon_S})}$$

where TC_{ijk} is the value of trade created if existing tariff rates are reduced to zero for exporter *i* by importer *j* for product *k*. t_{ijk} is the change in the tariff rate imposed by importer *j* on product k. t_{ijk} is the existing tariff rate, ε_M is the elasticity of imports with respect to domestic price and ε_S is the elasticity of export supply with respect to export price. The estimates for elasticity of import demand is provided by the United Nations ESCAP, while ε_S is set to an infinitely large number, 9.99×10^{15}

[55] The authors are grateful to the researchers at the Trade Policy and Facilitation Section, Trade, Investment and Innovation Division, United Nations ESCAP for providing the key formulas to calculate the values for trade creation and trade diversion.