United Nations Conference on Trade and Development

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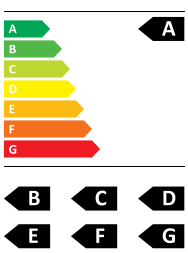
for Asia and the Pacific

Trade regulations for climate action?

New insights from the global non-tariff measures database



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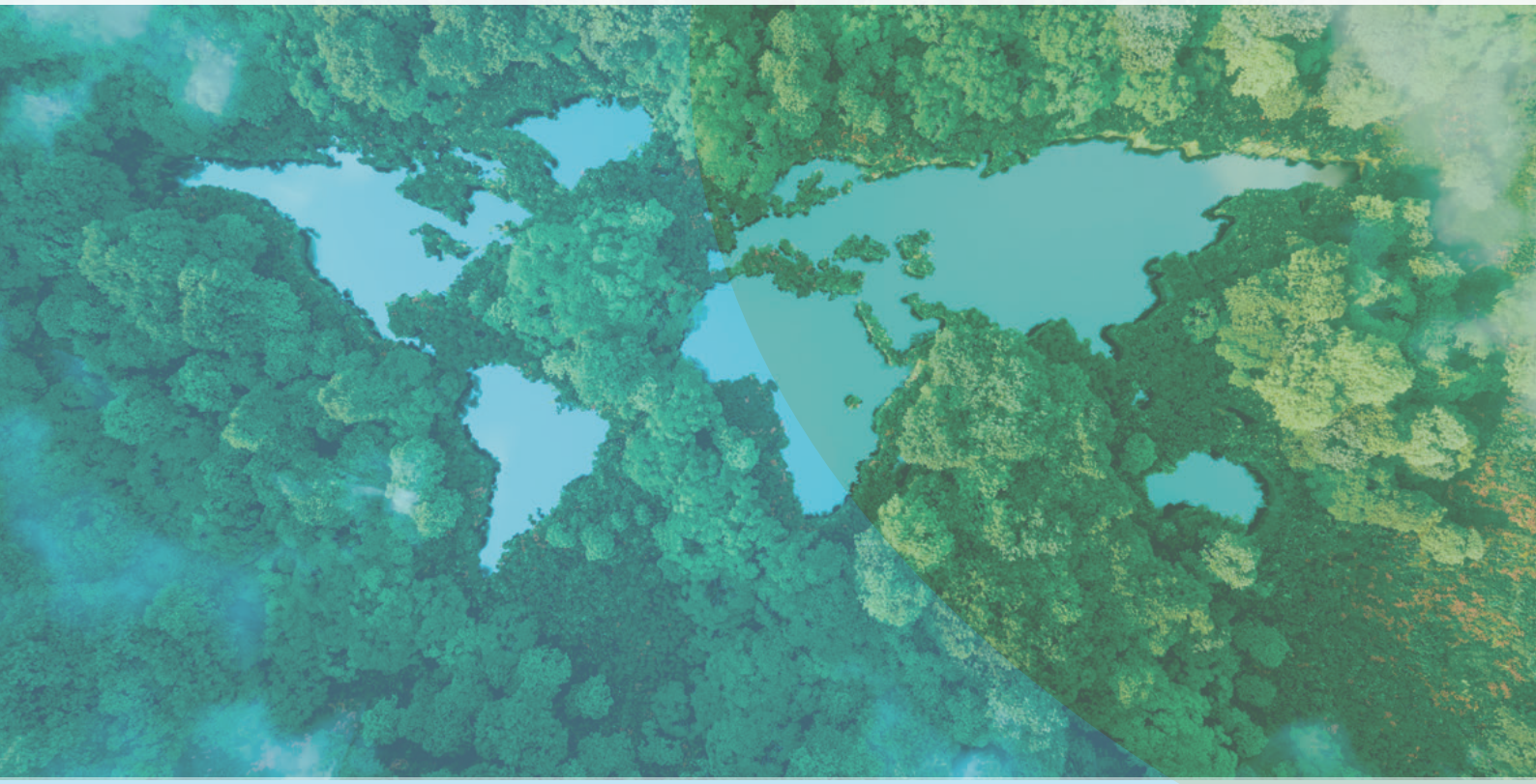

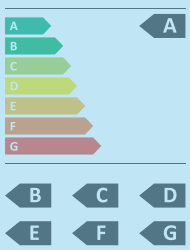

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Abbreviations and acronyms

GHG	Greenhouse gas
ISO	International Organization for Standardization
NDCs	Nationally determined contributions
NTM	Non-tariff measure
SDG	Sustainable Development Goal
SIDS	Small Island Developing States
SPS	Sanitary and Phytosanitary
TBT	Technical barriers to trade
TRAINS	Trade Analysis Information System
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

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Executive summary

This report examines the use of trade-related regulations, known as non-tariff measures (NTMs), in support of domestic and international climate change mitigation efforts. The analysis can help policymakers and other stakeholders better understand the linkages between trade and climate policies and make more informed decisions to use trade as a driver for climate action.

NTMs cover a wide array of policy tools which can be directly linked to climate action or be imposed primarily for safety, health and broader environmental protection purposes. The International Classification of NTMs allows a detailed categorization of NTMs and a systematic and globally comparable NTM data collection. UNCTAD's Trade Analysis Information System (TRAINS) NTMs database, which was the main data source for this report, covers nearly 150 countries, over 95 per cent of world trade, 20'000 different regulations and close to 90'000 distinct measures.

UNCTAD and UN ESCAP developed a methodology to link NTMs to climate change mitigation and Sustainable Development Goal 13. An algorithm combines the mapping of potentially relevant NTMs and product code combinations with a keyword search in the measure descriptions of the NTMs database.

Based on this method, a total of 2'366 climate change-related NTMs were identified. This represents:

- 2.6 per cent of the 87'969 measures captured in the NTMs database,
- 3.5 per cent of all potentially tradable goods, and
- 26.4 per cent of world trade, representing US$ 6.5 trillion.

Climate change-related measures target the world's largest traded and most CO2 intensive sectors. For example, 83 per cent of global trade in motor vehicles, which equates to trade worth US$2.3 trillion, is regulated with objectives related to climate change. Other commonly regulated sectors with large trade volumes are electricity and heat generation devices (48 per cent of sectoral global trade are regulated), motor fuel (37 per cent), commercial and industrial machinery (19 per cent), household appliances and electronics (44 per cent). Other highly regulated sectors are: single use plastics and microplastics; timber, pulp, paper and furniture; other transport devices (trains, airplanes, ships); and lighting products. For all remaining sectors, the coverage ratio is still a significant 9 per cent, amounting to almost US$ 1.7 trillion or 4.9 per cent of global trade.

Climate change-related NTMs cover a higher share of trade in high income and industrialized middle income countries, as they are the largest traders in these CO2 intensive sectors. Low income economies' import baskets feature less CO2 intensive goods and their NTMs therefore have a smaller impact on global trade. But low income countries make no fewer regulatory efforts in combating climate change through NTMs. In fact, the share of climate change-related NTMs among countries' total number of NTMs is highest in low income countries. Particularly, Small Island Development States (SIDS), which face very tangible risks from climate change, tend to take above-average action against it.

Technical Barriers to Trade (TBT) account for more than 61per cent of all identified climate change-related NTMs. This finding is consistent with the conclusions from UNCTAD's first analytical report on NTMs and climate change (UNCTAD 2022) which highlighted the role, importance, legal and political acceptability of TBT as a tool to promote climate change mitigation through trade. The identified TBT cover 18.6 per cent of global trade. We can therefore assume that a similarly significant share of global production is affected by climate change-related regulations. Other common NTMs are quantitative restrictions (16 per cent) and export-related measures (17 per cent) that also often take the shape of quantitative and technical measures. In comparison with a compilation of WTO members' notifications

(WTO, 2021), we see that subsidies and countervailing measures are also an important element for trade-related climate action.

While broader types of relevant NTMs are similar across countries, there is significant divergence in the details and specific requirements that hints at lacking international coordination and causes unnecessary trade costs. More international cooperation and coordination can reduce trade costs as well as regulatory efforts through sharing of best practices.

The overall economy-wide costs of climate change-related NTMs are relatively small. Based on existing studies, we extrapolate an average cost of 0.22 per cent of global manufacturing trade. However, costs are not negligible everywhere. Where NTMs are indeed applied, they have an impact. According to Knebel and Peters (2019), each individual technical measure in the manufacturing sector has a cost increasing impact of 3.4 per cent and each quantitative restriction a cost of 2.9 per cent.

While NTMs are generally applied in a non-discriminatory manner, they have a disproportionate effect on developing and least developed countries (Nicita and Seiermann, 2017), micro, small and medium-sized enterprises (Fugazza, 2017) and women traders (UNCTAD, 2022c). Inter alia, this is due to the inherent fixed costs of NTMs, constraints in technical and logistical infrastructure, high cost and limited access to finance for initial investments, the lack of transparency and technical complexity of requirements. Furthermore, the complexity of the requirements appears to be increasing with the level of development of economies adopting them.

1 INTRODUCTION

With consecutive record-breaking months for global sea and surface temperatures in 2023 and the consequences of the associated heatwaves in various parts of the globe, there is a growing global consciousness on the environmental, social and economic impact of climate change. Changes in temperature, sea levels and increasing extreme weather events already affect more and more people. The awareness is rising that the impacts are becoming more tangible and will very likely increase.

Governments worldwide are enacting policies and regulations aimed at mitigating climate change. Countries seek to reduce their carbon footprint, promote sustainable practices, impose carbon tariffs or other trade restrictions on goods that do not meet environmental standards, or provide subsidies to support a green transition. These policies often directly influence international trade.

Policy measures other than tariffs that can affect international trade are called non-tariff measures (NTMs) (UNCTAD, 2010). They comprise technical measures for safety, health and, particularly, environmental protection as well as measures traditionally used as instruments of commercial policy such as price and quantity measures. The policies implemented to mitigate climate change that can affect trade are therefore NTMs. Such policies are strictly regulated by multilateral and regional trade agreements. Four important questions arise for the assessment of the potential of NTMs and the identification of most effective NTMs to mitigate climate change.

1. Which trade related national regulations are in line with international trade and environmental laws?
2. What is the universe and actual use of such climate change-related NTMs?
3. What is the effectiveness of specific climate change-related NTMs to mitigate climate change?
4. How can countries identify for their specific circumstances the best climate change-related NTMs and how can they be implemented?

UNCTAD (2022) addresses the first question and identifies the potential of trade regulations, and of technical regulations in particular, to make trade an engine for climate action. The report provides a detailed analysis of the applicable legal international trade and climate change framework for the formulation of compliant

and fair climate change-related technical regulations. The international legal framework relevant for climate change-related NTMs comprises both international climate change law and international trade law. WTO agreements, aiming at preventing discrimination and ensuring that technical regulations do not create unnecessary trade barriers, are binding commitments for the design of climate change-related NTMs. Still, WTO members have the right to establish regulations and standards in the interest of environmental protection and climate change mitigation.

This report on NTMs and climate change addresses the second question and provides a detailed overview of the current use of climate change-related NTMs, except subsidies. It is based on a comprehensive mapping of NTMs from UNCTAD's global NTM database TRAINS comprising detailed information on trade related regulations from over 142 countries accounting for over 95 per cent of global trade. More than 2000 climate change-related NTMs in various forms have been adopted by both developed and developing countries to address Sustainable Development Goal 13 to 'take urgent action to combat climate change and its impacts'.

We find that over 26 per cent of global trade is affected by climate change-related NTMs. Trade in the most CO2 intensive goods and the largest CO2 emitting economies is regulated. This pattern, however, is largely driven by the CO2 intensive import baskets of high income countries. The share of climate change-related NTMs as an indicator of regulatory efforts slightly decreases as per capita income rises.

The following sections of this report are organized as follows. Section 2 provides an introduction to the concept of NTMs and an overview of the methodology used for the identification of climate change related NTMs. Section 3 identifies the main types of climate change-related NTMs currently in force, the affected sectors and the intensity of countries' regulatory efforts by income level, region, CO2 emissions and climate risk. Section 4 concludes the report.

2 DATA AND METHODOLOGY

2.1 Collecting comprehensive non-tariff measures data

UNCTAD has actively worked on NTMs since the 1980s and established a Group of Eminent Persons and a Multi-Agency Support Team (MAST) in 2006[1]. This led to the development of the *International Classification of NTMs*, which was updated in 2019 (UNCTAD, 2019). This "common language" facilitates collection, analysis and dissemination of data on NTMs, with the final objective to increase transparency and understanding about NTMs.

The International Classification of NTMs (2019) has 16 chapters of different measure categories (left side of Table 1). Technical measures comprise Sanitary and Phytosanitary (SPS) and TBT measures and related pre-shipment requirements (chapters A, B and C). These measures are imposed for objectives that are not primarily trade-related: for example, human, plant and animal health, and the protection of the environment. Even if equally applied to domestic producers, they nevertheless affect international trade and are thus considered NTMs. This does not, however, imply any *a priori* judgement about their impact and legitimacy. Non-technical measures cover a wide array of policies, including "traditional" trade policies such as quotas, licences (chapter E), price controls and para-tariff measures (chapter F). The full list is presented in Table 1. Chapters J to O are currently not collected. These include subsidies (Chapter L), which is not covered in this report.

Each chapter is further broken down into more detailed measure types. the right side of Table 1 shows the disaggregation of TBT measures, which are the most commonly used measures for climate-change mitigation. The "tree structure" allows for a rather fine-grained classification of measures. For example, the TBT chapter (B) consists of 24 NTM codes at the finest level of detail.

Based on this classification, UNCTAD leads an international effort to collect comprehensive data on NTMs together with national governments as well as regional and international partners. The database now

[1] Multi-Agency Support Team: UNCTAD, WTO, World Bank, UNIDO, FAO, ITC and OECD.

covers nearly 150 countries, over 95 per cent of world trade, 20,000 different regulations and almost 90,000 distinct measures.[2]

Table 1. UNCTAD-MAST classification of non-tariff measures

Import-related measures	Technical measures	A	Sanitary and phytosanitary (SPS) measures
		B	Technical barriers to trade (TBT)
		C	Pre-shipment inspections and other formalities
	Non-technical measures	D	Contingent trade-protective measures
		E	Non-automatic licensing, quotas, prohibitions and quantity-control measures
		F	Price-control measures, including additional taxes and charges
		G	Finance measures
		H	Measures affecting competition
		I	Trade-related investment measures
		(...)	(...)
Export-related measures		P	Export-related measures

Tree structure -- for example:

B Technical Barriers to Trade

B1 Import authorization/licensing related to TBT
- B14 Authorization requirements for importing certain products
- (…)

B2 Tolerance limits for residues and restricted use of substances
- (…)

B3 Labelling, marking, packaging requirements
- (..)

B4 Production or post-production requirements
- (…)

B6 Product identity requirements

B7 Product quality, safety or performance requirements

B8 Conformity assessment
- B81 Product registration/approval
- B82 Testing requirement
- B83 Certification requirement
- B84 Inspection requirement
- B85 Traceability requirement
  - B851 Origin of materials and parts
  - B852 Processing history
  - (…)
- B89 Other conformity assessments

B9 TBT not elsewhere specified

Source: UNCTAD illustration, based on UNCTAD (2019).

2.2 Identifying climate change-related non-tariff measures

In 2019, ESCAP and UNCTAD developed a methodology to link NTMs to the Sustainable Development Goals (SDGs) (United Nations, 2019; Kravchenko *et al,* 2019). The insight for such linkages was derived from:

1. Targets and indicators (including metadata documentation) within each SDG, which helped determine which internationally traded products play a role in the relevant Goal's achievement and what regulations imposed on such products may have an impact on them (United Nations, 2023).
2. NTM data and descriptions as reflected in the UNCTAD TRAINS database, which helped discern stated or implied objectives of NTMs implemented by the national regulators.

[2] The data is freely and publicly accessible through three dissemination portals that share the same data but are designed for different users: the UNCTAD TRAINS portal (https://trainsonline.unctad.org) for policymakers, the Global Trade Help Desk (https://globaltradehelpdesk.org) for the private sector, and the World Integrated Trade Solution (https://wits.worldbank.org) for researchers.

As the result of this work, a matching matrix was developed linking SDGs to NTM codes and HS product codes. The original matrix was able to establish linkages between NTMs and 9 out of 16 SDGs: SDG 2 on ending hunger, SDG 3 on health, SDG 6 on water, SDG 7 on energy, SDG 11 on cities and human settlements, SDG 12 on sustainable consumption and production, SDG 14 on life below water, SDG 15 on life on land, and SDG 16 on peace and crime (United Nations, 2019).

Notably, Goal 13 on climate change was not prominently included in that matching matrix, as its SDG targets or indicators could not be matched unambiguously with combinations of NTM codes and product codes. Furthermore, many climate change-related issues can be addressed by actions under a few other SDGs. Therefore, some of such NTMs were located elsewhere in the concordance matrix (Kravchenko *et al,* 2019).[3] This issue of linking NTMs to climate change issues was partially addressed in the Asia-Pacific Trade and Investment Report (ESCAP, 2021).

In the context of ever-growing urgency of climate change mitigation and adaptation actions, a more nuanced methodology has now been developed. First, a review of literature and NTM entries in the TRAINS database was conducted to identify possible types of climate change-related NTMs. These can be grouped as follows:

1. Regulations that directly and indirectly address the issue of GHG emissions:
    a. Regulations on emissions of GHGs and other relevant air pollutants that can be generated at any point in a product's life cycle.
    b. Regulations on trade in timber, pulp, paper, furniture, other plant-based forest products for reasons of sustainable forest management, since preservation of forests is crucial for CO2 absorption and loss of forests results in land-use change which contributes to CO2 emissions (Merz et al, 2007; IPPC, 2020).
    c. Regulations on trade in low-density single-use non-biodegradable or non-recyclable plastic or microplastics to mitigate emissions associated with its production and disposal, as well as to reduce its impact on marine ecosystems. The latter may interfere with the oceans' capacity to absorb and sequester CO2 (Shen et al, 2019; Ford et al, 2022), and increase risks and severity of flooding in urban areas (McVeigh, 2023).
2. Regulations that address the issue of energy efficiency:
    a. Regulations on energy performance of appliances, machinery and vehicles that use electricity or fuel during their operation, and regulations on energy efficiency of production processes for a wide range of commodities.
    b. Restrictions on trade in incandescent lamps.
3. Regulations that may contribute to GHG emission reduction by promoting cleaner energy sources or by increasing energy efficiency of conventional energy sources:
    a. Regulations on use of alternative combustible fuels.
    b. Regulations on use of alternative energy sources for electricity and heat generation.
    c. Restrictions on trade in old vehicles, machinery, equipment, since older vehicles and machinery tend to be less energy efficient and more polluting both for the reason of conforming to

[3] For example, the reduction of GHG emissions can be achieved through NTMs regulating CO2 and other pollutant emissions and energy performance in various sectors (SDG 7 and SDG 12). Adaptation to climate change can be achieved by using sustainable practices in agriculture and by making cities resilient (SDG 11 and 15). Mitigation can be contributed to by protecting on-land and marine ecosystems, as some changes may lead to release of greenhouse gases, such as methane, and to degradation of natural carbon sinks (SDG 14 and 15).

outdated technical specifications, and for the reason of reduced performance efficiency due to accumulated wear and tear during their service life.

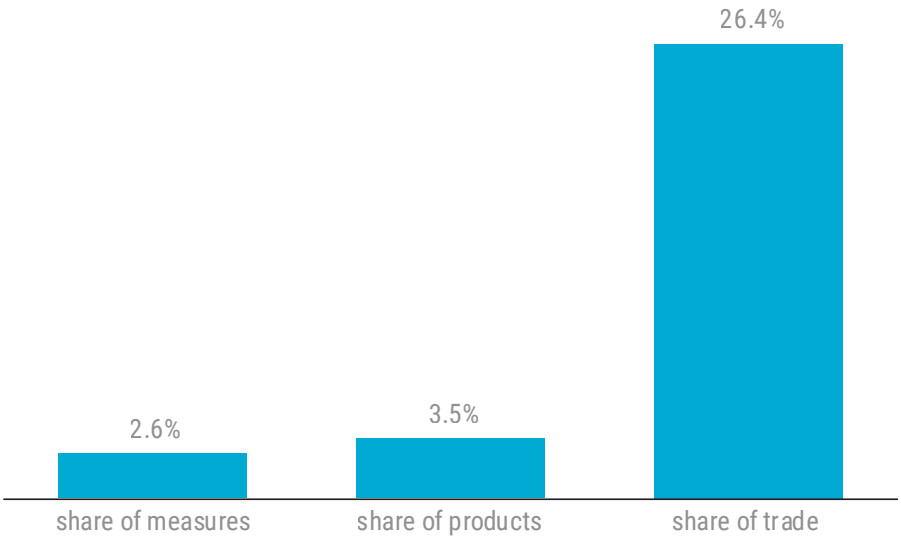
Second, the matching matrix was improved to combine the mapping of potentially relevant NTM and product code combinations with a keyword search in the measure descriptions that are also captured during the NTM data collection process. For example, an NTM is marked as climate change-related if it applies to lamps (as identified by HS codes under 8539 in the TRAINS database) and the measure description in the database mentions keywords like “energy saving”. Jointly, this eliminates most of the uncertainty in establishing a clear link to climate change. Third, the matrix was then merged, using the statistical software *R,* with the TRAINS database to check each of almost 90’000 entries in the database for climate change-related NTMs.

3 RESULTS

3.1 How relevant are climate change related non-tariff measures?

Globally, 2'366 climate change-related NTMs were identified. This represents 2.6 per cent of the 87'969 measures captured in the UNCTAD TRAINS database (see Figure 1). This *share of measures* may reflect the level of attention that regulators afford to the topic of climate change. However, this share does not provide much insight into the relevance of these measures.

Figure 1. Global share of climate change related non-tariff measures



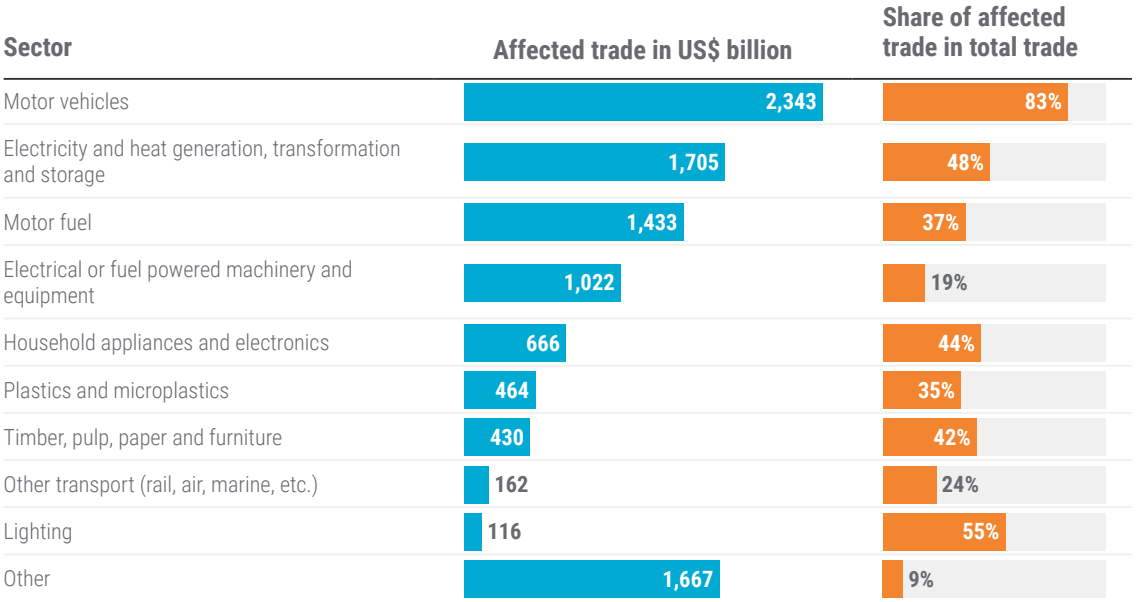
Source: UNCTAD calculations, based on the TRAINS database.

NTMs differ widely in terms of product coverage. Some may affect only one product whereas others may cover many products. Therefore, a first step towards understanding the relevance of climate change-related measures is to assess the *share of products* (also called 'frequency index'). As the basis for this calculation, we take the ubiquitous Harmonized System which classifies all tradable goods into over 5'000 6-digit codes. It turns out that 3.5 per cent of all potentially tradable goods are regulated by climate change-related NTMs (see Figure 1).

Still, the economic relevance of products in terms of trade value also differs widely. For example, while cars only represent 0.26 per cent of the product spectrum (14 of 5300 HS 6-digit codes), they represent 3.1 per cent of global trade. Cars are also commonly regulated to reduce CO2 emissions. The total *share of trade* affected by climate change-related NTMs is a remarkable 26.4 per cent (see Figure 1). In nominal terms, this represents US$ 6.5 trillion worth of global trade.

To better understand how it is possible that relatively low shares of NTMs and affected products result in such a high trade coverage, we first look at the most commonly regulated sectors. We observe that the affected sectors are among the largest industrial and traded sectors in the world (see Figure 2). The motor vehicles sector accounts for 7.4 per cent of global trade and 83 per cent of it is regulated by measures that aim at mitigating climate change. Thus, through this sector alone, already over 6 per cent of global trade is regulated for climate action. Almost half of all trade in the electricity and heating devices sector is also regulated, accounting for 4.5 per cent of global trade. Motor fuels are also often regulated (37 per cent of its trade) and traded heavily. While only 19 per cent of the machinery and equipment sector is regulated, this represents over US$ 1'000 billion or 2.7 per cent of global trade. Forty-four per cent of the trade of household appliances and electronics is also regulated; as well as 35 per cent of single use plastics and microplastics; 42 per cent of timber, pulp, paper and furniture; 24 per cent of other transport devices (trains, airplanes, ships); and 55 per cent of lighting products. For all remaining sectors, the coverage ratio is still a significant 9 per cent, amounting to US$ 1667 billion or 4.9 per cent of global trade.

Figure 2. Trade affected by climate change related non-tariff measures, by sector



Source: UNCTAD calculations, based on the TRAINS database.
Note: Trade in the graphs is the sum of imports and exports and the average between 2017 and 2021.

The list of sectors affected by climate change-related NTMs corresponds to commitments from Nationally Determined Contributions (NDCs) adopted as part of the implementation of the Paris Agreement (United Nations, 2015). While trade is rarely explicitly mentioned in NDCs, the regulations to implement NDCs are often, de facto, trade-related. A mapping of trade related measures in NDCs of developing countries recently conducted by UNCTAD (2023b) shows the following key areas: renewable energy, energy efficiency and fuel efficiency, forestry, agriculture, construction material and industry. The coherence between the sectors affected by climate change-related NTMs and trade related measures in NDCs indicates that NTMs are used as a tool for implementing NDCs.

While the focus of this report is on NTMs with positive and direct impacts on climate change mitigation, NTMs can also be a cost factor that hampers trade in environmentally preferable goods whose consumption can lead to reduced CO2 emissions. Box 1, which builds on work conducted by UNCTAD as part of its Sustainable Manufacturing and Environmental Pollution Project (SMEP) (UNCTAD, 2023b) highlights the adverse effect of NTMs on plastic substitutes trade.

Box 1. NTMs and plastic substitutes

What are plastic substitutes?

Plastic substitutes are made of natural materials derived from minerals, plants, animals, the marine environment, or forestry resources, possessing comparable properties to plastics (e.g., strength, flexibility, lightness, and malleability). These do not include petroleum-based or synthetic polymers, bioplastics, and biodegradable plastics. Examples include hemp, bamboo, agricultural residues, seaweed, aluminium and glass. Plastic substitutes should demonstrate a reduced environmental footprint throughout their life cycle and should also either be biodegradable, compostable, or erodible, and compliant with definitions for reuse, recycling, or responsible waste disposal.

The impact of NTMs on plastic substitute trade

NTMs appear to have a significant impact on trade in plastic substitutes. Approximately 40 per cent of globally imported plastic substitute products must adhere to at least one NTM, representing roughly 80 per cent of the total value of these imports. On average, every imported product needs to comply with about two NTMs. The most highly regulated products are those of natural fibres – plant and tree-based materials, dedicated crops, and agricultural by-products – which are subjected to a higher number of NTMs. This is primarily due to the regulatory stringency applied to agro-forestry products, which often do not differentiate between products destined for food and non-food end-use.

An analysis into types of NTMs applied to plastic substitutes shows that TBT are most often used, requiring 30 per cent of the imported plastic substitutes to comply with at least one TBT. Consequently, TBT impact 60 per cent of global plastic substitutes related imports. Sanitary and phytosanitary (SPS) measures, which predominantly apply to food and agriculture products, impact 21 per cent of the global value of imports of substitutes to plastics and each imported plastic substitute product needs to comply with an average of six SPS measures, as opposed to three TBT measures.

When exporting plastic substitute materials, developing and least developed countries must therefore comply with regulations and processes that are often time-consuming and costly, impacting particularly small and medium-sized enterprises and preventing them from participating fully in global trade. Information regarding requirements, such as those related to SPS and TBT measures, is often limited, and administrative procedures are characterized by opacity and high costs.

Plastic products are currently benefiting from relatively low prices, but with the right policies, plastics could be partially replaced by material substitutes in many areas. By lowering the NTM compliance costs, global trade in substitutes could increase. As the most suitable substitutes are typically found among locally available materials with a high potential for reusability, such measures present an opportunity for developing countries to develop productive capacities, increase export, and generate jobs locally.

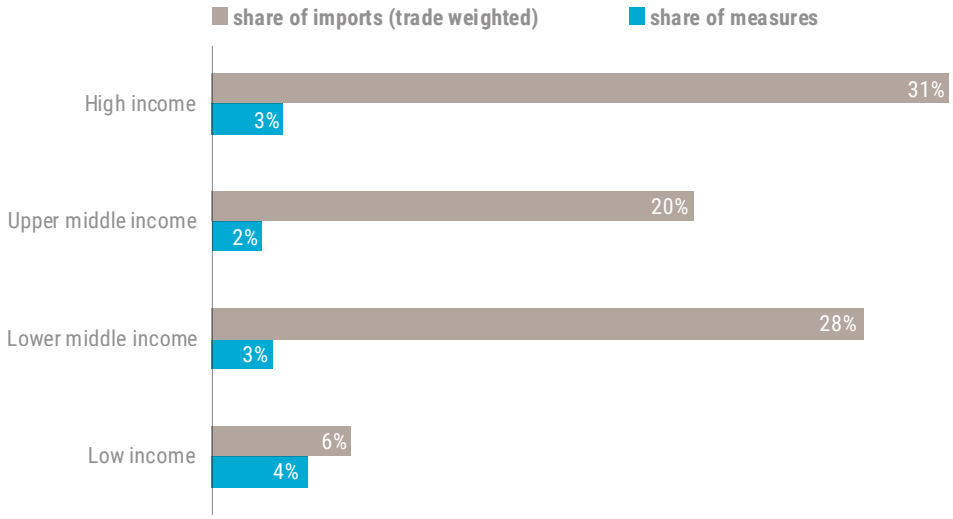
3.2 Which countries are regulating trade to combat climate change?

Trade-weighted averages by income groups show that high income countries have the highest coverage ratios in terms of import affected by climate change-related NTMs (Figure 3, grey bars). On the other hand, the share of measures that are climate change-related are relatively low with 3 per cent (Figure 3, blue bars). When considering the import basket of these countries, which heavily includes the most traded and most regulated sectors mentioned above, this is unsurprising. A typical example is the United States. While only 5 per cent of its NTMs are related to climate change mitigation, these NTMs cover key import sectors such as machinery, household appliances, electronics, cars and other vehicles and motor fuels. Hence, the United States' NTMs affect 32 per cent of the country's import value. Similarly, other high income economies have high import coverage ratios: the European Union with 31 per cent, Japan with 59 per cent, Canada and the Republic of Korea both with 35 per cent, and Australia with 55 per cent.

Middle income countries also exhibit high shares of trade affected by climate change-related NTMs. The import coverage ratios in Figure 3 (grey bars), however, are trade-weighted averages and can be a bit deceiving. In fact, the simple averages of affected imports in upper and lower middle income countries are only 10.2 and 9.3 per cent, respectively. The trade-weighted averages are driven up significantly by the largest economies in the respective groups: China as the largest upper middle income country has an import coverage ratio of 30 per cent and India, as the largest lower middle income country, an import coverage share of 41 per cent. Most other middle income countries have significantly lower shares of imports affected by climate change-related NTMs. Furthermore, the average share of measures that relate to climate change is only 2-3 per cent for middle income countries (Figure 3, blue bars).

While the import coverage ratio of low income countries is much lower, with an average of only 6 per cent (Figure 3, grey bars), they cannot be faulted for lack of regulatory effort or intent. In fact, remarkably, low income countries exhibit the highest share of NTMs that are climate change related: 4 per cent of their NTMs aim at combating climate change, whereas middle income and high income countries only have shares of 2-3 per cent (Figure 3, blue bars). However, the import baskets of low income countries are quite different and much less include climate change-related sectors such as machinery. Hence, the share of affected imports is diminished.

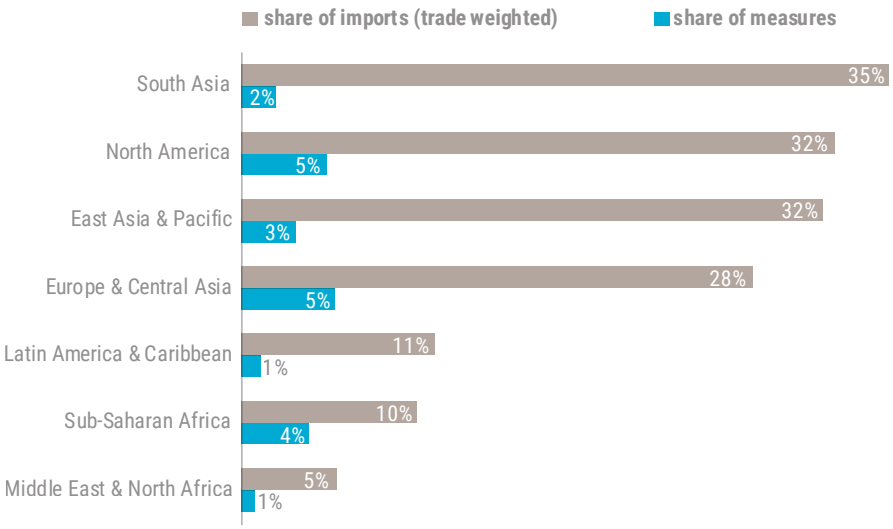
Figure 3. Share of climate change related non-tariff measures, by income group



Source: UNCTAD calculations, based on the TRAINS database.

Finally, we look at the same indicators by geographical region. As expected from the previous graph, the high income economies in North America and Europe have the highest shares of climate change-related NTMs across the three indicators. While most countries in Oceania apply above-average numbers of climate change-related NTMs (relative to their respective income groups), the import coverage ratio of the region is primarily driven by Australia (55 per cent). While trade coverage ratios of the largest economies in Asia are generally high (see economies mentioned above), the smaller and mid-sized economies tend to exhibit rather average shares across indicators. The results for South and Central America are low across indicators. The coverage ratios of the largest economies in the region are Brazil with 15 per cent, Mexico with 9 per cent and Argentina with 20 per cent. While the import coverage share of African countries is low, this is rather due to fewer imports of CO2 intensive goods. The share of measures at 3 per cent is relatively high for the average income of the region. While this is a simple indicator, it is a good measure of the attention and effort that regulators afforded to climate change action.

Figure 4. Share of climate change related non-tariff measures, by region



Source: UNCTAD calculations, based on the TRAINS database.

3.3 Which types of measures are used for climate action?

With more than 61 per cent of identified climate change-related NTMs, Technical Barriers to Trade (TBT, chapter B of the International Classification of NTMs) are by far the most commonly used measure type.[4] TBT comprise mandatory product characteristics, processes and production methods, and related conformity assessment procedures with objectives such as the protection of health or the environment. While these policies are called TBT in the context of trade and the WTO, they usually manifest as public policy regulations. This finding is consistent with the conclusions from UNCTAD's first analytical report on NTMs and climate change (UNCTAD 2022) which highlighted the role, importance, legal and political acceptability of TBT as a tool to promote climate change mitigation through trade.

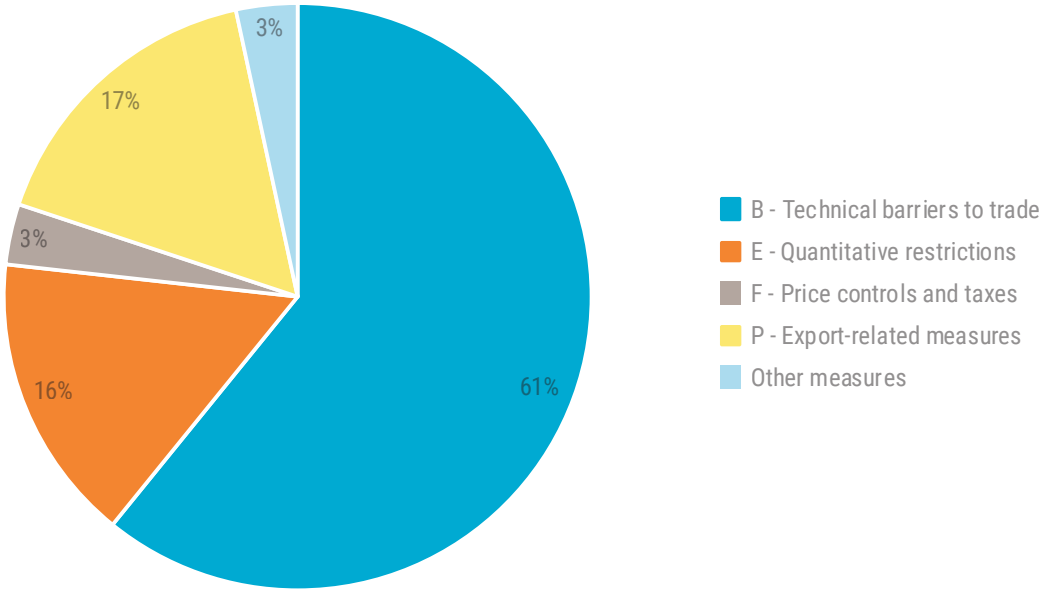
[4] When comparing our results to a WTO (2021) analysis of their members' notifications, we find both similarities as well as differences. The WTO analysis includes subsidies and countervailing measures in their database, which are not included in our data, and these turn out to be the most common type of policy with 45 per cent of measures. After that, the WTO finds technical regulations and quantitative measures to be the most common measure types. This is similar to our findings but seems to omit a significant number of export-related measures found in our data. An explanation could be that the use of export-related measures is strongly restricted under WTO rules.

An important attribute of TBT, following the respective WTO Agreement, is the principle of *national treatment*. It implies that imported products shall be treated the same ("no less favourable") as products of national origin. Practically, this usually means that the applied technical requirements are the same for all products on the domestic market – whether imported or produced nationally. We can therefore assume that the results of our analysis on climate change-related TBT not only hold for trade, but for production as well. Concretely, the identified TBT cover 18.6 per cent of global trade. We can therefore deduct that a similarly significant share of global *production* is affected by climate change-related regulations.

Quantitative restrictions and non-automatic licences (chapter E) make up 16 per cent of the identified measures. Chapter E of the International Classification of NTMs includes measures such as non-automatic licensing and prohibitions for environmental reasons.

Export related measures (chapter P) account for 17 per cent of climate change-related NTMs. These measures cover requirements applied by a country to its own exports. A more in-depth analysis of the specific types of Chapter P measures used in relation with climate change mitigation objectives shows that these measures are mostly linked to export prohibitions, non-automatic licencing and export related technical measures (see Figure 6).

Figure 5. Number of climate change related non-tariff measures, by measure type



Source: UNCTAD calculations, based on the TRAINS database.

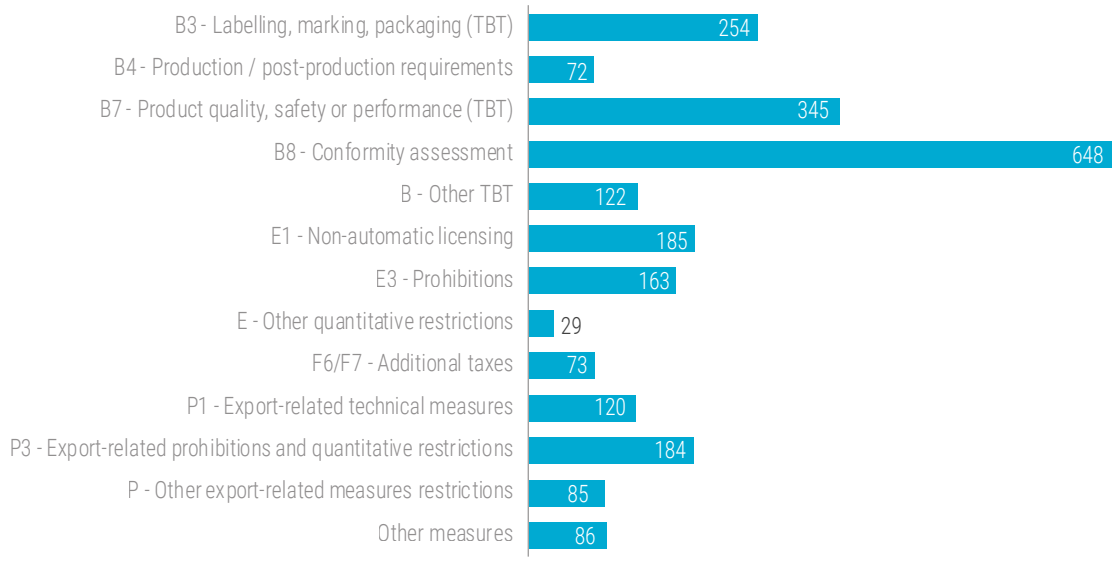
Two other chapters from the International Classification of NTMs, namely price control measures (chapter F) and pre-shipment inspection (chapter C), are also used in conjunction with climate change mitigation efforts.

The distribution of climate change related NTMs is largely similar to the distribution of NTMs in general. If SPS measures are excluded from the total,[5] 60 per cent of measures globally and across products are TBT. Furthermore, 18 per cent of measures are export related. These shares are almost identical to the

[5] While SPS measures are actually the most common type of NTMs, they are, by definition, not related to climate change objectives. They are aimed at the protection of human, animal or plant life or health arising from the introduction, establishment and spread of pests and diseases and from risks arising from additives, toxins and contaminants in food and feed.

shares of climate change-related measures (61 and 17 per cent, respectively). The use of quantitative restrictions, however, is more common for the purposes of climate change mitigation (16 per cent) than overall (9 per cent).

Figure 6. Number of climate change related non-tariff measures, by measure sub-type



Source: UNCTAD calculations, based on the TRAINS database.

Figure 6 shows a further breakdown of more specific measure types used to mitigate climate change. The three most commonly used measure sub-types all fall under TBT measures (Chapter B). *Conformity assessment* (B8) is the most used NTM in relation with climate action. Most conformity assessment requirements identified in the present mapping are *Testing requirements* (B82) and *Certification requirements* (B83). As illustrated in Table 2, such measures are typically used to prove that the level of emissions or energy efficiency associated with traded goods is in line with national requirements. Other commonly conformity assessment related measures used for climate action purposes include *Inspection requirements* (B84), *Traceability requirements* (B85), and *Product registration/approval requirements* (B81). Conformity assessment measures go hand in hand with technical requirements classified under various other codes of the International Classification of NTMs (UNCTAD, 2019).

Table 2. Example of conformity assessment measures

Country imposing	Non-tariff measure type and code, affected product and measure description
Sri Lanka	*B83 – Certification requirements* *Motor vehicles* No person shall import a motor vehicle that discharges exhaust emissions into the atmosphere in excess of the Vehicular Emission Standards set in Schedule III. Importers must produce a compliance certificate of Vehicular Exhaust Emission Standards for every motor vehicle imported, issued by a manufacturer or a vehicle emission testing centre authorized by the Government of the exporting country.

Technical regulations linked to *Product quality, safety or performance requirements* (NTM code B7) are the second most commonly used type of NTMs in relation with climate action. These measures seek to ensure that imported goods have the intrinsic characteristics to meet the environmental performance requirements set out by the regulating country. Quality and performance requirements can apply to the composition of the regulated product (e.g., use of reusable, repairable or recyclable components, or share of low carbon content). They can also apply to the environmental impact of the product during its use (e.g., CO2 emissions or energy consumption). Table 3 provides examples of quality and performance requirements for refrigerating equipment.

Table 3. Example of performance requirements and differences in their complexity

Country imposing	Non-tariff measure type and code, affected product and measure description
European Union	*B7 – Product quality, safety or performance requirements* *Refrigeration equipment* Energy efficiency requirements for refrigerating appliances with a direct sales function Refrigerating appliances with a direct sales function can only be placed on the European Union (EU) market if they fulfil the following efficiency requirements: Ecodesign requirements established by Regulation (EU) 2019/2024 (CELEX 32019R2024). This Regulation is an implementing measure of Directive 2009/125/EC (CELEX 32009L0125), which establishes a framework under which manufacturers of energy-using products (EuP) must, at the design stage, reduce the energy consumption and other negative environmental impacts that occur during the product's life cycle. (…)
Republic of the Congo	*B7 – Product quality, safety or performance requirements* *Refrigeration equipment* Import and placing on the market of obsolete or second-hand refrigeration and air-conditioning equipment containing ozone-depleting substances is also prohibited as of 31 December 2003

The examples in Table 3 also show how the complexity of the requirements can vary greatly within the same measures type. Both measures presented in Table 3 are *Product quality, safety or performance requirements* (NTM code B7) applying to refrigeration equipment. Both contribute to climate change mitigation. Nevertheless, the first measure requires producers to comply with a detailed regulation introducing comprehensive eco-design requirements covering the full life cycle of a product, whereas the second measure simply prohibits the import of second hand or obsolete equipment. As a result, their respective impact in terms of market access and in terms of climate change mitigation can be broadly different. Anecdotal evidence from our data suggests that the level of complexity of climate change-related NTMs is closely linked to the level of development of countries adopting them. A resource to promote more harmonized regulations are international standards, as presented in Box 2.

Box 2. ISO Standards for the decarbonization of the energy sector

As a result of current and planned policies, the share of modern renewable sources (excluding traditional uses of biomass) is expected to rise from 11.4 per cent of the global energy consumption in 2019 to 18 per cent by 2030. Additional efforts would therefore be needed to reach the 33 per cent global share of modern renewable sources needed in 2030 to remain on track with the International Energy Agency (IEA) Net Zero scenario (International Energy Agency, 2023).

ISO standards have an important role to play in the decarbonization of the energy sector and facilitate the transition to 'clean' energy sources. The standards developed by ISO, with input from 169 National Standards Bodies and in line with the WTO TBT principles for standards development, can provide technical guidance, help bring accountability and transparency in measuring and verifying GHG emissions of energy, build trust and facilitate trade in new clean energy generation equipment.

The work of the following ISO Technical Committees (TCs) could be of relevance in advancing the development of sustainable energy production and use:

ISO/TC 207/SC 7 Greenhouse gas and climate change management and related activities is responsible for the development of standards to manage and mitigate GHG emissions and to adapt to the effects of climate change in support of sustainability.

ISO Technical Committee 301 Energy Management and Energy Savings is developing standards and guidance in the field of energy management for improved energy performance and energy savings. This includes standards to help effectively measure, monitor, verify and validate energy savings due to decarbonization efforts related to energy. It has published 23 standards and is developing 4 projects.

ISO/TC 197 Hydrogen technologies is developing standards in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen. The committee has published 18 standards and is developing 19 projects.

Measures classified as *non-automatic import-licensing procedures* (NTM code E1) are the most common type of NTMs used for climate action purposes outside TBT. Most of these measures are specifically classified as *Licensing for the protection of the environment* (NTM code E123). Most commonly, they are based on the Montreal Protocol and used to control the importation of ozone-depleting substances which are potent greenhouse gases such as hydrofluorocarbons (HCFs). The following table provides an example of the use of NTM code E1.

Table 4. Example of import-related non-automatic licensing

Country imposing	Non-tariff measure type and code, affected product and measure description
Vanuatu	*E123 Licensing for the protection of the environment* *Ozone-depleting substances and products containing ozone-depleting substances* (1) A person who intends to import: (…) (b) HCFCs; or (c) HFCs; or (d) manufactured products where the controlled substance is a HFC (the controlled substance contained in the manufactured product or the controlled substance that the manufactured product was designed to use, is a HFC); (…) (f) (…) must apply to the Director for an import permit.

Export measures are most frequently *Export licences, export quotas, export prohibition* (NTM code P3) and *Export-related technical measures* (NTM code P1). The sub-types of measures are the export-related equivalents of the most common import-related NTM types, TBT and quantitative restrictions. Thus, TBT or non-automatic licenses and quantitative restrictions, applied to either imports or exports, are the most common type of climate-change related NTMs. Table 5 illustrates the use of such measures for export-related purposes. In conjunction with Table 4, it also highlights the similarities between *export-related* licensing requirements and *import-related* licensing requirements.

Table 5. Example of export-related non-automatic licensing

Country imposing	Non-tariff measure type and code, affected product and measure description
Bahamas	*P33 Licensing, permit or registration requirements to export* *Ozone-depleting substances and products containing ozone-depleting substances* The import and export of ozone-depleting controlled substances and goods containing such substances, as specified in Annexes A and B of the Schedule of the regulation, is subject to restrictions. Trade with signatories is subject to a registration requirement and trade with non-signatories is prohibited.

Additional taxes and charges levied in connection with services provided by the Government (NTM code F6) and *Internal taxes and charges levied on imports* (NTM code F7) belong to the *Price-control and additional taxes and charges* chapter of the International Classification of NTMs. F7 measures are often linked to carbon taxation which constitute an important lever of action against climate change. Table 6 provides an example of carbon tax introduced in 2012 by Japanese legislators. The tax, which targets hydrocarbons and coal, was introduced to mitigate climate change and the revenues it generates are used to finance measures to cut CO2 emissions by promoting renewable energy and energy-efficiency (Nachmany *et al.* 2015).

Table 6. Example of import tax on hydrocarbons and coal

Country imposing	Non-tariff measure type and code, affected product and measure description
Japan	*F73 Taxes and charges for sensitive product categories* From the perspective of promoting measures to combat global warming, the tax amount of petroleum, gaseous hydrocarbons, or coal (…) shall be calculated based on the following classifications and the tax rates (…).

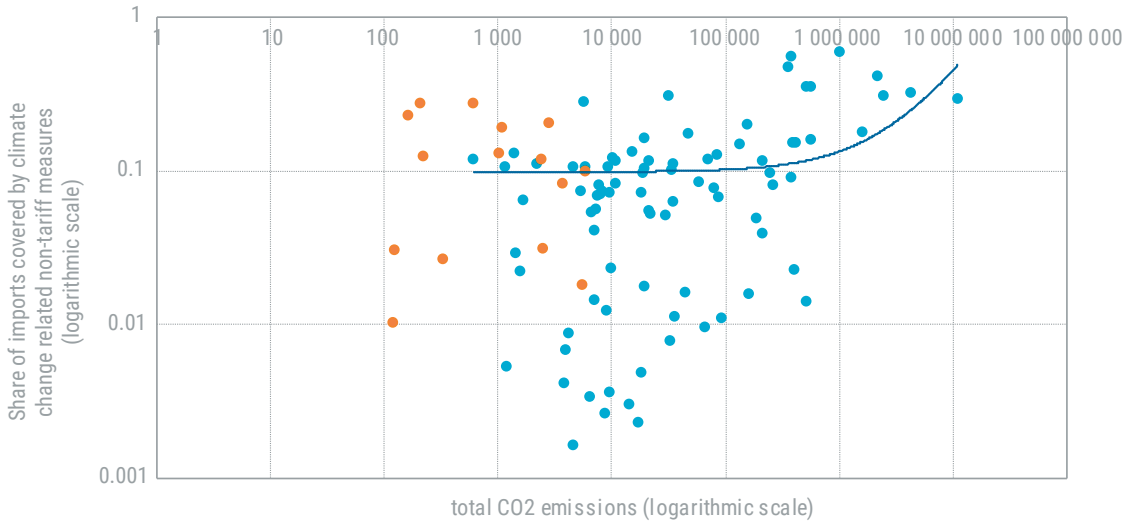
3.4 Which factors can explain countries' use of climate change-related non-tariff measures?

Figure 7 shows the correlation between total CO2 emissions on the X-axis and the share of imports regulated by climate change-related NTMs on the Y-axis. It shows that most of the top polluting nations are indeed taking action that has the most significant impact on global trade. While this seems to send an encouraging message, it is also partly misleading. The share of affected imports is heavily influenced by the structure of countries' imports: the imports of the largest industrial nations, and top CO2 emitters, are skewed towards climate change-related products. Therefore, the upward trend is rather a reflection of trade patterns than countries' increased efforts to combat climate change. Still, it does indeed indicate that global trade of the most critical climate change-related products by the largest countries is regulated by NTMs to reduce their impact on climate change.

If, instead, we look at the simple share of the countries' NTMs that are climate change-related the correlation becomes insignificant. This would indicate that the biggest CO2 emitters do not make significantly more regulatory efforts to combat climate change.

It is notable that SIDS, as highlighted by orange markers, are mostly situated above the trendline. This shows that these countries, which face tangible risks from climate change, take above-average action against it. This is despite their small size and limited ability to influence global warming.

Figure 7. Relation between total CO^2 emissions and trade covered by climate change related NTMs



Source: UNCTAD calculations, based on the TRAINS database.
Note: SIDS are marked in orange.

Analysing the correlation between per capita income and the share of climate change-related NTMs shows an inconclusive and even slightly downward trend. Thus, there is no evidence that higher income countries are making more efforts to combat climate change. When, instead, using the share of affected trade, we observe a slight upward trend. However, these results are again rather driven by the import and consumption patterns of high income countries that heavily feature CO2 intensive goods. We therefore consider the indicator of share of NTMs to be more relevant as an indicator of regulatory efforts.

3.5 How costly are non-tariff measures that combat climate change?

While an econometric estimation of the cost impacts of climate change-related NTMs is beyond the scope of this report, we can approximate their costs from results of existing studies. UNCTAD and World Bank (2018) estimate the average costs of technical and non-technical NTMs across the agriculture, manufacturing and natural resources sectors. We multiply these broad estimates with the small shares of climate change-related NTMs for the respective measures types and sectors. This simple extrapolation would imply that the total costs of climate change-related NTMs in the manufacturing sector are 0.22 per cent with 0.11 accruing to technical measures and also 0.11 to non-technical measures. The overall costs in other sectors are negligible with a total of 0.03 per cent in natural resources and 0.02 per cent in

agricultural sectors.[6] These sector-wide estimates are extremely low because they include all the product-and-country combinations where no NTMs are applied and costs are therefore zero. This is the vast majority. As such, this extrapolation represents a lower bound of the overall economic costs.

However, costs are not negligible everywhere. Where NTMs are indeed applied, they have an impact. According to Knebel and Peters (2019), each individual technical measure has a cost increasing impact of 3.4 per cent in manufacturing and 1.2 per cent in agriculture. Each quantitative restriction, on average, increases costs by 2.9 per cent in manufacturing.[7] For the more heavily regulated products and countries, the impact of climate change-related NTMs can therefore easily reach the range of 5-10 per cent.

NTMs have a disproportionate effect on lower income countries, particularly least developed countries (Nicita and Seiermann, 2017). While measures are generally applied in a *de jure* non-discriminatory manner, the *de facto* ability to comply is reduced in developing and least developed countries, for example, due to constraints in technical and logistical infrastructure. Furthermore, micro, small and medium-sized enterprises (Fugazza, 2017) and women traders (UNCTAD, 2022c) struggle most with NTMs due to fixed costs. For them, among others, the high cost and limited access to finance for initial investments, the technical complexity of requirements and the lack of transparency can be prohibitive.

[6] In the manufacturing sector, the simple average ad-valorem equivalent costs of all NTMs are 2.4 per cent for technical measures (predominantly TBT) and 1.7 per cent for non-technical measures. In agriculture, the estimated costs are 16.6 and 4.3 per cent, respectively; and for natural resources they are 0.7 and 0.4 per cent, respectively. The respective shares of climate change-related NTMs are: in manufacturing, 4.6 per cent of technical measures and 6.3 per cent of non-technical measures; in agriculture, 0.0 per cent and 0.2 per cent, respectively; and for natural resources 3.1 per cent and 2.7 per cent respectively. The respective values are simply multiplied with each other.

[7] The estimated impact of non-technical measures in agricultural sectors is statistically insignificant in Knebel and Peters (2019).

4 CONCLUSION

Considering the significant impact that trade and the production of traded goods have on CO2 emissions and climate change, the national policies governing them have remained largely obscure. A new search algorithm applied to the largest database of trade-related regulations now sheds some light on the global policy landscape.

Out of 87'969 measures in the TRAINS NTM database, 2'366 measures are related to climate change mitigation. While this only represents 2.6 per cent of all measures, they are highly concentrated on the most traded goods, such as cars and vehicles, machinery, fuels, household appliances and electronics, wood-based products and plastics. Consequently, a substantial share of 26.4 per cent of global trade is covered by climate change-related NTMs.

These sectors of CO2 intensive goods also feature heavily in NDCs adopted under the Paris Agreement (United Nations, 2015). This shows how climate agreements manifest in trade policy. As also indicated in UNCTAD (2022), this result also suggests that the international trade community should be more involved in climate change negotiations.

It is also encouraging to observe that the trade of the biggest CO2 emitting economies is among the most regulated. Six out of the ten biggest CO2 emitters apply climate change-related measures to more than 30 per cent of their imports. Eight out of these ten economies face climate change-related NTMs for between 25 and 67 per cent of their exports. Middle and low income countries are also actively regulating, but with lesser impact on trade. These results, however, are largely driven by the more CO2 intensive composition of import baskets of higher income countries and large, industrialized middle income countries. A more sobering view emerges when looking at regulatory efforts (as measured by the share of climate change related NTMs among all NTMs), which is not increasing with per capita income.

We also observe significant divergence in the measures used to mitigate climate change with a lack of international coordination and entailing unnecessary trade costs. The general types of measures used to address climate change are concentrated on TBT, quantitative restrictions, and additional taxes. However, within each category, measures diverge substantially. The *national* focus of NDCs seems to entail an inward looking approach. Regulatory heterogeneity of measures increases trade costs (Knebel and Peters, 2019) and hinders economic development. Developing and least developed countries are disproportionately affected (Nicita and Seiermann, 2017). More international cooperation and coordination would not only reduce trade costs but can also reduce regulatory efforts through sharing of best practices.

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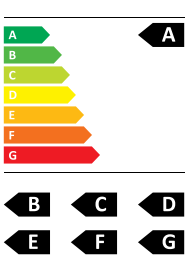

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