



# Technology Transfer for Climate Change Adaptation

Bridging climate and trade policy perspectives

IISD REPORT



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### **Technology Transfer for Climate Change Adaptation: Bridging climate and trade policy perspectives**

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## Executive Summary

This paper explores how technology transfer for climate change adaptation has been understood and discussed at the intersection of climate and trade policy. It highlights that although both global climate policy, primarily under the United Nations Framework Convention on Climate Change, and trade policy, including through the World Trade Organization, recognize the significance of technology and its transfer in addressing climate change, these policy domains have largely evolved in isolation. This separation has led to siloed discussions on technology transfer and missed opportunities to facilitate the transfer of technologies for adaptation, especially to countries in the Global South.

The paper clarifies and critically discusses the concept of adaptation technology, understood as the application of technology to reduce vulnerability or enhance the resilience of natural and human systems to the impacts of climate change. It then highlights how both climate and trade policy discuss technology transfer for climate adaptation, drawing on key policy documents and milestones of the last decades. The paper then examines how countries in the Global South identify their adaptation technology needs through instruments like national adaptation plans and technology needs assessments.

The paper concludes that while both climate and trade frameworks recognize the crucial role of trade in international technology transfer, a stronger linkage between climate and trade policy is necessary to better leverage trade's potential in facilitating technology transfer for climate adaptation. It provides recommendations for trade and climate policy-makers, as well as development partners, to strengthen these connections and enhance the role of trade in adaptation technology transfer.



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## 1.0 Background

Climate change impacts are here, and they are here to stay. No country or region is spared from hurricanes, droughts, floods, or wildfires—extreme weather events that are becoming increasingly frequent and intense due to climate change. Adapting to these impacts is imperative, especially for the hardest-hit countries in the Global South. Technologies play a key role in this effort, helping countries and societies respond to a changing environment and managing both current and future climate risks.

Both trade and climate policy have a longstanding focus on technology and technology transfer—and the relevance of technologies in addressing climate change is gaining momentum. Technology transfer has been a feature of international trade negotiations since the founding of the World Trade Organization (WTO) (Brenton & Chemutai, 2021; WTO, 1994). Still, it remains unclear how such a transfer takes place in practice and how specific policy measures, including within the WTO, could encourage such flows of technology (WTO, 2025c).

Global climate policy, especially under the United Nations Framework Convention on Climate Change (UNFCCC), recognizes technology development and transfer as one of the three “means of implementation”<sup>1</sup> of climate action, making it a cornerstone of international climate policy. While climate policy acknowledges the role of international trade in facilitating technology transfer, there has been little discussion or research on how trade can specifically support the transfer of adaptation technology—or how countries’ adaptation technology priorities are connected to trade policy development.

In general, both trade and climate policy have historically developed separately from each other—and trade and climate adaptation policy, in particular, remain largely unconnected (Van Asselt 2017). Trade policies have so far not been sufficiently mainstreamed into adaptation strategies, including national adaptation plans (NAPs) and adaptation components of the nationally determined contributions (NDCs). This disconnect between trade and climate adaptation policy has resulted in separate discussions on technology transfer and missed opportunities to facilitate the transfer of adaptation technologies, particularly in countries of the Global South.

### 1.1 About This Paper

This paper aims to raise awareness among both trade and climate policy-makers by clarifying how technology transfer for adaptation is understood and discussed from both climate and trade policy perspectives. It discusses the concept of adaptation technology and sheds light on how countries are identifying their adaptation technology needs. It then explores how trade policy addresses the transfer of adaptation technologies and examines relevant trade

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<sup>1</sup> Means of Implementation (MOI), which also include finance and capacity building, refer to the resources and mechanisms necessary for countries, particularly developing nations, to achieve the goals of the UNFCCC, the Kyoto Protocol, and the Paris Agreement. MOIs are critical for countries to address climate change through reducing emissions (mitigation) and building resilience against its negative impacts (adaptation).



policy mechanisms. As such, the paper identifies ways in which trade and climate adaptation policy-makers can better align these separate discussions and strengthen the role of trade in facilitating technology transfer for adaptation.

Specifically, the paper targets trade policy-makers in the Global South and seeks to clarify the concept of and need for adaptation technologies while also showcasing the challenges, processes, and tools for identifying country-specific and context-relevant technology needs for adaptation. This understanding and identification are crucial for enabling the integration of adaptation technology transfer into relevant trade frameworks. The second key target audience is adaptation policy-makers in the Global South who are steering national adaptation processes and lead on technology needs assessment, as well as development partners and funders that support these efforts. The paper seeks to increase their knowledge and awareness of the role of international trade policy and existing trade policy mechanisms for accessing and transferring technology, and how trade considerations can be better integrated into national adaptation policies and action plans. This report draws from a review of literature, policy documents, and consultations with climate and trade policy experts.



## 2.0 Adaptation Technology Transfer in Climate Policy

### 2.1 Defining Adaptation Technology

The UNFCCC defines climate technology as “any equipment, technique, practical knowledge or skill needed to reduce greenhouse gas emissions or adapt to climate change” (UNFCCC, 2015b). Discussions on technology development and transfer within climate policy have historically focused on technologies that help countries reduce emissions—that is to say, mitigation technologies (Intergovernmental Panel on Climate Change [IPCC], 2022b). More recently, the concept of adaptation technologies—technologies that help countries adapt to climate change impacts—has been gaining momentum.

The UNFCCC (2005) defines technologies for adaptation as “the application of technology in order to reduce the vulnerability, or enhance the resilience, of a natural or human system to the impacts of climate change” (p. 5). The Technology Mechanism, established by the UNFCCC in 2010, along with other relevant reports prepared by or for the UNFCCC (e.g., Klein et al., 2005; UN Environment Programme [UNEP], 2024a; UNFCCC, 2015b), draws on a definition from the IPCC—the world’s leading authority on climate science. In its special report on *Methodological and Technological Issues in Technology Transfer*, technology is defined as “a piece of equipment, technique, practical knowledge or skills for performing a particular activity” (IPCC, 2000). Technology is further understood as consisting of: (1) hardware – the tangible component, such as equipment and products; (2) software – the implicit knowledge and processes associated with acquiring, modifying, producing, and using the hardware; and (3) orgware – the institutional framework, policies, rules, legislation, or organization involved in the adoption and diffusion process of a technology (UNEP, 2024a; UNFCCC Technology Executive Committee [UNFCCC TEC], 2014). Adaptation strongly relies on soft and locally specific technologies, such as Traditional Knowledge, community practices, capacity building, agronomic and resource management practices, and institutional support, contrasting with the large, standardized, capital- and hardware-intensive technologies typical of mitigation (UNFCCC, 2022; World Intellectual Property Organization [WIPO], 2022).

However, there are challenges related to defining a technology as an “adaptation technology”—a technology that supports adaptation to climate impacts. One challenge is that they are not necessarily novel and may have been used for other purposes, long before climate adaptation became a priority. For example, societies have used crop diversification and rotation to minimize the negative impacts of climate variability for centuries. Yet climate change requires the development, diffusion, and use of these technologies at a much faster pace and on a much larger scale. Technologies that were once effective in some contexts may no longer be suitable in light of evolving climate risks, while others that were previously unnecessary may now be essential to address emerging challenges.

Another challenge in defining adaptation technologies is that the extent to which a technology supports adaptation (or leads to maladaptation) depends on how, where, and when it is used.



For example, water-efficient irrigation technologies may help sustain agricultural practices and support food security in a drier climate. However, their efficiency may also incentivize farmers to expand the cultivation of water-intensive crops, leading to an overall increase in freshwater extraction and compounding vulnerability to drought conditions (Dekens et al., 2022; IPCC, 2022). Technology use may also generate adaptation benefits for some users while negatively impacting others. Evidence suggests that large-scale producers—who typically have better access to technologies—are more likely to benefit, often at the expense of small-scale producers (Gustafsson et al., 2024). Access to and adoption of technology are rarely equitable, often shaped by factors such as gender, class, and social status. As a result, the use of adaptation technologies can reinforce existing inequalities, supporting resilience for some while leaving others behind (WIPO, 2022).

Despite these challenges, several attempts to categorize adaptation technologies and develop specific taxonomies have been made—for instance, by the Climate Technology Centre and Network (CTCN, 2017), the UNEP Copenhagen Climate Centre in cooperation with the Korean Green Technology Center (UNEP, 2021), and the WIPO (2022). These efforts group technologies by sectors that feature most prominently in countries' adaptation priorities—for example, agriculture and livestock, water, forestry and land, health, etc.

### **Box 1. WIPO Green and adaptation technologies**

WIPO is a specialized UN agency established to promote the protection of intellectual property (IP) worldwide. It also has the mandate to facilitate technology transfer to developing countries (WIPO, 1974). Launched in 2013, the WIPO Green initiative has established a platform for green technology innovation and transfer (WIPO, 2024). It serves as an online marketplace for sustainable technology: as a platform connecting green technology providers with seekers, it includes a database featuring a list of 130,000 technology innovations.

The *WIPO Green Technology Book*, which also links to the database, serves as a practical guide for individuals, policy-makers, researchers, and businesses, offering insights into available technologies that can be implemented to combat climate change. By showcasing real-world solutions, it aims to bridge the gap between technological innovation and its application in addressing environmental challenges. In the edition focused on adaptation technologies, WIPO showcases over 200 adaptation technologies, which cover a wide range of sectors, including agriculture and forestry, water and coastal areas, and cities (WIPO, 2022). WIPO (2022) defines “technology” as a “physical entity or technique, with or without additional equipment, that is deployed to resolve a specific challenge” (p. 15). For the selection of adaptation technologies, WIPO draws on complex patent databases that divide patents into a detailed classification system. For instance, the European Patent Office has created a classification for patents that relate to climate change mitigation and adaptation. It released a new “YO2A” category in 2018 to identify all patents in its database pertaining to “technologies for adaptation to climate change” (Dechezleprêtre et al., 2020).



Lists, taxonomies, and categories of adaptation technologies can be very useful in helping adaptation policy-makers understand the wealth of existing technologies that could be used for adaptation. However, these global lists should always be assessed based on a country's context, as well as its enabling environment. For instance, WIPO's *Green Technology Book: Solutions for Climate Change Adaptation* features “selecting typhoon-resistant crops: Cassava and sweet potato” as one example of “proven technologies” (WIPO, 2022, p. 38). In the Philippines, growing cassava and sweet potato was found to substantially increase farmers' climate resilience against typhoons, given that below-ground crops sustained less damage than other crops, such as banana and maize. Tuber planting is therefore presented as a food security measure against extreme weather events and as “a measure that can be taken in any area where such crops can be grown” (WIPO, 2022, p. 39).

Cassava is often highlighted as a climate-resilient crop, given its adaptability to extreme weather conditions. However, studies emphasize that sustainable farming practices are needed to avoid the potential negative environmental impacts of the crop (e.g., Ajiboye & Omotayo, 2024). A study by the Food and Agriculture Organization of the United Nations and the International Fund for Agricultural Development (2001) indicated how cassava cultivation in Thailand resulted in high rates of soil erosion compared to other crops, especially in sandy and sloped terrain. Cassava production can also have negative effects on soil fertility through the removal of nutrients by the crop.

This example highlights the challenges of considering any single adaptation technology as a universally applicable solution. Any choice of technology needs to be based on contextualized climate risk assessments that consider the short-, medium-, and long-term climate risks. An adaptation technology also often needs to be embedded in a package of measures to be successful, including sustainable practices for how a technology is used, emphasizing again the need to consider not only the “hardware” but also software and orgware (i.e., needed skills, knowledge, and organizational structures) to deploy a technology successfully. WIPO Green's Acceleration Projects that aim to match technology needs and providers in a specific geographic area emphasize the local context and that locally adapted solutions are key for successful technology transfer (WIPO, 2025; WIPO representative, personal communication, July 2025).

A country-driven process to identify relevant context-specific and adapted technologies, as well as regular review of changing contexts and needs, is therefore crucial. As this paper shows, countries are already implementing such processes, guided by international climate policy frameworks.

## 2.2 Technology Transfer Under the UNFCCC

The most widely used definition of climate technology transfer in climate policy (see UNEP, 2024a) comes from the IPCC's special report on *Methodological and Technological Issues in Technology Transfer*, where it is defined as “a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change” (IPCC, 2000, p. 3). Technology transfer is the purposeful diffusion of climate technologies between and among countries, as well as their appropriate adaptation and implementation in local contexts



(Blanco et al., 2022). The UNFCCC emphasizes that effective technology transfer involves more than just the provision of equipment; it also includes capacity building, knowledge sharing, and financial support (UNEP, 2024a).

The focus on technology transfer has been a part of international climate negotiations since the first UNFCCC agreement in 1992. Several key milestones have shaped the evolution of technology transfer and adaptation within the UNFCCC. Table 1 describes four of these milestones.

**Table 1.** Global climate policy milestones in the context of adaptation technology transfer

Year	Milestone	Description
2001	Establishment of the Technology Transfer Framework and the Technology Needs Assessment (TNA) process	One of the flagship initiatives of the UNFCCC on technology transfer and development is the TNA. The TNA concept was formalized under the UNFCCC process with the establishment of the Technology Transfer Framework (UNFCCC, 2001). Mandated by the UNFCCC, the TNA process is implemented in partnership with UNEP and the UNEP Copenhagen Climate Centre (CCC). The first generation of TNAs (2001–2008) focused on supporting developing countries to develop a clearer understanding of their technological needs and priorities for reducing greenhouse gas emissions and adapting to climate change. Since 2009, the TNA project has placed greater emphasis on implementation, including translating the prioritized technology needs into implementation-ready programs and projects. The Global Environment Facility, with its implementing agencies, has been the primary provider of support to developing countries for undertaking TNAs. Since 2009, UNEP, through the UNEP CCC, has supported more than 100 developing countries in undertaking and/or updating their TNA.
2010	Establishment of the Technology Mechanism	The Technology Mechanism is the overarching framework established by the UNFCCC to enhance technology development and transfer to developing countries for climate change mitigation and adaptation. It consists of two main bodies: the UNFCCC TEC, which provides policy recommendations on technology issues, and the Climate Technology Centre and Network (CTCN), which assists countries in developing and implementing projects focused on accessing and using technologies for climate action (Blanco et al., 2022).
2010	Establishment of the NAP process	The NAP process is a national process that enables countries to identify medium- and long-term adaptation needs and develop strategies to address them in a coordinated manner (Hammill et al., 2019). The main goals of the NAP process are to reduce vulnerability to the impacts of climate change and systematically integrate climate adaptation considerations into development decision-making processes, including investments. It can help countries identify technological needs and gaps, which can inform technology transfer efforts for climate change adaptation.



Year	Milestone	Description
		<p>The technical guidelines for the development of NAPs developed by the Least Developed Countries Expert Group (LEG) encourage countries to consider and explicitly state technology needs and opportunities in their plans (LEG, 2012). The IPCC highlights NAPs as vehicles for identifying and implementing adaptation technologies (de Coninck et al., 2017, 2018; Least developed countries expert group [LEG], 2012). In 2024, all 57 submitted NAPs highlight technology use as one vehicle for adaptation across different sectors (UNEP, 2024a).</p>
2016	Ratification of the Paris Agreement	<p>The Paris Agreement establishes the Technology Framework and devotes Article 10 to the development and transfer of technology as a key pillar of global climate action (UNFCCC, 2015a). Under this provision, technology is seen as one of the agreement’s “means of implementation” for both improving resilience to climate change and reducing emissions. Its primary purpose is to provide overarching guidance to the work of the Technology Mechanism in promoting and facilitating enhanced action on technology development and transfer to support the implementation of the agreement. Through the Technology Mechanism, and guided by the Technology Framework, actions in support of TNAs and the implementation of their outcomes have remained at the core of the work on technology development and transfer under the UNFCCC (UNFCCC, 2025c).</p>
2023	Establishment of the Technology Implementation Programme	<p>The first global stocktake of the Paris Agreement resulted in the establishment of the Technology Implementation Programme, which is meant to support developing countries’ technology priorities (UNFCCC, 2023). It builds on earlier milestones, like the establishment of the Technology Mechanism in 2010 and the joint work programme of the UNFCCC TEC and CTN for 2023–2027. It aims to accelerate the implementation of climate technologies to meet the goals of the Paris Agreement, emphasizing both mitigation and adaptation actions at scale.</p> <p>Parties are currently negotiating the working mechanisms of the program, with a potential decision expected at the 30th UN Climate Change Conference (COP 30) (Earth Negotiations Bulletin [ENB], 2025d). In the ongoing negotiations, developing countries would like to see the program address finance and trade barriers, including intellectual property rights (IPRs), and ensure country-driven, gender-responsive implementation that supports traditional and indigenous technologies. Developed countries, who prefer a facilitative and dialogue-oriented approach based on existing mechanisms, are reluctant to include trade barriers and IPRs and advocate against establishing new quantified goals, mandates, financial, or institutional commitments (ENB, 2025a, 2025b, 2025c).</p>

Source: Author compiled.



The established processes focus on the need for developed countries to support technology transfer to developing countries. Trade has long been a contentious topic in climate negotiations, also affecting the discussions on technology transfer (Perrone, 2022). Though not being the primary obstacle to advancing negotiations in June 2025, divergences on trade also limited progress on negotiating the Technology Implementation Programme; priorities diverged between developed and developing countries, with the latter advocating for specific commitments linked to finance and IPRs and the former resisting any reference to trade in general and IPRs in particular (ENB 2025a, 2025b, 2025c). While recent research suggests that patents have limited impacts on climate technology transfer (Jee et al., 2024), the perception of IPRs as barriers remains a significant negotiating position for many developing countries (Abdel Latif et al., 2011; Haselip et. al., 2015).

While less discussed, technology transfer between developing countries is particularly relevant for adaptation. Many developing countries are experiencing the harshest realities of climate impacts and have developed innovative, context-specific technologies and practices to deal with these challenges. Technology transfer may be easier and more effective between and among countries that share similar institutional, socio-cultural, economic, and/or environmental contexts (UNFCCC, 2025b). The UNFCCC TEC therefore recognizes the role of South–South and triangular cooperation arrangements—most of which focus on the agriculture and water sectors—as good examples for adaptation technology transfer (UNFCCC, 2017). South–South cooperation refers to cooperation models between two developing countries, whereas triangular cooperation involves three different partners, mostly (i) a donor institution (developed country, UN agency, or development fund) facilitating the exchange and supporting capacity development; (ii) an emerging economy that contributes technology; and (iii) a developing country benefiting from the technology transfer (UNFCCC, 2017, 2025b).

## 2.3 Trade as a Driver of Adaptation Technology Transfer

The UNFCCC recognizes that international trade plays a key role in the transfer of technology for climate action (UNFCCC, 2006a). The IPCC states that technology transfers between countries can take place via three primary channels (IPCC, 2022, p. 1,678):

1. trade in goods, where technology is embedded in products;
2. foreign direct investment (FDI), where enterprises transfer firm-specific technology to foreign affiliates; and
3. patent licences, where third parties obtain the right to use technologies.

International trade serves as a channel through which innovative technologies can be introduced to new regions, facilitating the importation of physical technologies and increasing countries' exposure to new processes and practices essential for adapting to climate challenges.

The UNFCCC highlighted the role of trade in technology transfer as early as 2006 (UNFCCC, 2006a), through the documentation of several examples of South–South technology transfer in a technical paper on technologies for adaptation. One example illustrates how the West African Rice Development Association facilitated the transfer of a



drought-resistant rice variety between different African countries. The association “imported and adapted a community-based seed system (CBSS) developed in Senegal” to overcome shortages in seed supply (UNFCCC, 2006a, p. 84). The new system enabled the rapid dissemination of the new seed varieties to farmers in Côte d’Ivoire and later in Guinea. Another example in the paper is treadle pumps, developed in Bangladesh in the early 1980s, that were later commercially disseminated in Senegal and Mali (UNFCCC, 2006a).

Given this general recognition of the beneficial role of trade for adaptation technology transfer, the following section looks at how technology transfer for climate adaptation is discussed in trade policy forums.



## 3.0 Adaptation Technology Transfer in Trade Policy

### 3.1 Technology Transfer Under the WTO

The WTO does not provide a single, comprehensive, or fixed definition of “technology.” Instead, the WTO addresses the term through several agreements and initiatives focusing on how multilateral trade rules can support technology transfer. Its approach to technology is broad and evolving, including both physical products—as reflected in the discussions on environmental goods—and intangible elements such as knowledge, procedures, and rules, including the IP system.

As such, technology transfer, especially between developed and developing countries, has been part of international trade negotiations and discussions for decades. Currently, several bodies and committees discuss technology transfer, mostly in discussion and exchange forums rather than negotiations. Relevant policy milestones of the WTO’s approach to technology transfer are outlined below and include its agreements on technology transfer and initiatives on liberalizing trade in environmental goods and services.

**Table 2.** Global trade policy milestones in the context of adaptation technology transfer

Year	Milestone	Description
1995	Ratification of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement by WTO members	The Marrakesh Agreement Establishing the World Trade Organization was signed in 1994. It contains four annexes, one of which is the TRIPS Agreement, representing the most comprehensive multilateral agreement on IP (WTO, 2025e). The agreement aims to resolve trade disputes over IP while facilitating technology transfer for the welfare of all countries, particularly developing countries (WTO, 2025e). Article 7 (“Objectives”) of the TRIPS Agreement states that “the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations” (WTO 1994). Article 66.2 specifically requires developed country members to provide incentives for their companies to promote technology transfer to least developed countries (LDCs) (WTO, 1994).
1995	General Agreement on Trade in Services (GATS)	The GATS is another WTO agreement annexed to the Marrakesh Agreement. Article 19 acknowledges the importance of technology transfer as a means to facilitate the economic development of developing countries and to enable them to participate more effectively in international trade (WTO, 2025d).



Year	Milestone	Description
2001	WTO TRIPS Council Decision	The TRIPS Council established a mechanism for ensuring the monitoring and full implementation of developed countries' obligations under Article 66.2 to provide incentives for technology transfer to LDCs. Since then, countries have submitted regular reports on their technology transfer programs that target specific LDCs as beneficiaries, providing their own interpretation and understanding of the concepts of "technology transfer" and "incentive." In a review of submitted reports until 2020, the Council identified this lack of common understanding as a major barrier limiting substantive discussions and raising concerns among LDCs on the effectiveness of the mechanism (van Weelde et al., 2023).
2001	Establishment of a WTO Working Group on Trade and Transfer of Technology (WGTTT)	The WGTTT was mandated to examine the relationship between trade and technology transfer and make recommendations to the General Council on how to increase technology flows to developing countries (WTO, 2025f). It includes all WTO members, while the WIPO received observer status in 2024 (WTO, 2025f). It normally holds three formal sessions each year and produces annual reports presented to the General Council. Progress, especially on developing recommendations, has been slow due to divergent priorities between developed and developing countries. While developing countries propose reforms to transition to a negotiation-oriented approach and advocate for making technology transfer more efficient, developed countries see technology transfer as belonging to the private sector and emphasize the need to uphold and protect the IP system. The WGTTT therefore largely remains an exploratory discussion forum rather than a negotiation platform that generates new initiatives (Syam, 2024).
2014–2016	Negotiations on an Environmental Goods Agreement (EGA) (agreement not finalized)	<p>The EGA was a plurilateral initiative aimed at eliminating tariffs on a wide range of environmental goods. These goods included technologies that could help address climate change, such as clean and renewable energy equipment, energy-efficient products, and climate change adaptation technologies (WTO, 2022, 2025b). By reducing trade barriers, the agreement aimed to make environmental goods, including adaptation technologies, more accessible and affordable, especially for countries most vulnerable to extreme weather events.</p> <p>The negotiations stalled in 2016, as countries failed to reach an agreement. While there has been no successful attempt to revive the negotiations, the initiative informed progress on liberalizing trade in environmental goods and services at the bilateral and regional level.</p>

Source: Author compiled.

The WTO's work on technology transfer is reflected in several agreements and initiatives, including legally binding agreements, discussion forums, and sectoral working groups. While



the focus of that work is on building an enabling environment for technology transfer through the structures of the trade system, a lack of common understanding among members of the concepts of “technology transfer” and “incentive” in the TRIPS Agreement limits the substantiveness of discussions and progress (van Weelde et al., 2023).

As evident in the several proposals submitted by members in the WGTTC, developing countries understand both terms to imply proactive government measures, supportive policies, and the removal of trade obstacles to technology transfer (Syam, 2024). For instance, India, Pakistan, and the Philippines suggested establishing voluntary guidelines for governments to incentivize multinational firms to engage in technology transfer. They also proposed the development of guidelines to improve competition policies to monitor restrictive practices. Establishing mechanisms to assist countries in formulating and implementing technical standards was also put forward, recommendations that were later echoed in proposals by the African Group in the General Council and the TRIPS Council (Syam, 2024). Developed countries were reluctant to engage with these suggestions, highlighting their understanding of technology transfer as a market-driven mechanism, emphasizing the need for IPR protection, and rejecting the notion that trade rules can create barriers to technology transfer (Syam, 2024). Additionally, members disagreed on the mandate and rule-making power of the WGTTC. The limited competence of a working group in the WTO and its focus on discussions rather than negotiations have resulted in a modus focused on knowledge exchange and dialogue instead of rules and norm setting (Syam, 2024; van Weelde et al., 2023).

In recent years, WTO members expressed increased interest in the topic of technology transfer: Members like South Africa have submitted proposals that aim to revitalize discussions on technology transfer within various WTO bodies like the WGTTC, the Committee on Trade and Development, the TRIPS Council, and the Committee on Trade and Environment (van Weelde et al., 2023). Proposals from developing countries have suggested organizing discussions around specific themes, including technology transfer for agricultural resilience and climate change adaptation (Syam, 2024).

Based on a review of submitted progress reports from developed countries on their technology transfer programs that targeted LDCs as beneficiaries, van Weelde et al. (2023) conclude that, given the prevailing lack of a common understanding of technology transfer and incentives, an agreement on these concepts is unlikely to be reached soon. Going forward, the WTO could focus on common elements, such as countries’ agreement to develop a well-designed reporting format. A common reporting format could facilitate the work of reporting members, and it would help LDCs seeking to absorb, analyze, and provide feedback on the reported information. Members could then discuss and investigate good practices of technology transfer and incentives highlighted in the reports (van Weelde et al., 2023).

Van Weelde et al. (2023) also note that “further work may be needed to update and extend the identification of LDCs’ needs and priorities for technology transfer, to reinforce the correspondence between technology transfer programmes provided and these needs and priorities, and to ensure more systematic matching” (p. 49). They suggest that LDCs should more clearly identify priority areas for technology needs to help developed country members meet their obligations (van Weelde et al., 2023). When it comes to facilitating technology transfer for adaptation, the WTO should build on the work that countries are



already undertaking in identifying and reporting their technology needs. As highlighted in Chapter 4.1, developing countries are reporting climate technology needs through a variety of processes and frameworks. Instead of creating new arrangements under the WTO, members should build on countries' NAP or TNA processes, which can form a suitable basis for matchmaking and exchange on technology transfer. Higher awareness among trade policy-makers of this work in the adaptation space and vice versa would help make the link between adaptation and technology transfer discussions in trade forums.

## 3.2 Technology Transfer and Adaptation in Free Trade Agreements

Recent trade agreements are increasingly incorporating climate-related provisions, including on technology transfer, often going further than those covered under WTO frameworks. Cooperation on climate action is the most common type of climate change provision in regional trade agreements (WTO, 2021a). These agreements go beyond tariff reduction to include provisions for deeper cooperation on technology transfer between countries or regions: Provisions address areas such as general intentions to transfer technology, technical cooperation, IP, and joint research and development (Martínez-Zarzoso & Chelala, 2020). For example, both the EU–Japan Economic Partnership Agreement and the United States–Mexico–Canada Agreement (USMCA) include provisions for cooperation on clean energy technologies (Morin & Brand, 2024).

Some trade agreements incorporate provisions explicitly addressing climate change adaptation, including vulnerability and adaptation assessments (WTO, 2022). The Free Trade Agreement between the Republic of Korea and the Republic of Peru from 2011 includes Article 19.8 on climate change, with both parties recognizing concerns over climate change and committing to adopt “measures for evaluating the vulnerability and adaptation to climate change.”

Signed in November 2024 by Costa Rica, Iceland, New Zealand, and Switzerland, the Agreement on Climate Change, Trade and Sustainability (ACCTS) is a ground-breaking multinational trade agreement that integrates environmental and trade policies (Tipping et al., 2024). While it does not explicitly focus on adaptation technologies, it liberalizes trade in environmental goods and services that could include adaptation technologies. Parties commit to eliminating import and export duties on 360 listed environmental goods and 114 services that could be beneficial for resource management, climate change adaptation and mitigation, and environmental protection (ACCTS, 2024). For a number of these environmental goods, “climate change adaptation” is listed as an important environmental benefit and purpose. However, adaptation is not defined in the ACCTS and is often jointly listed with “climate change mitigation” to describe the same environmental purpose of a listed good. While many climate technologies have co-benefits for mitigation and adaptation—that is to say, they can be used to reduce both harmful greenhouse gas emissions and negative climate impacts—mitigation and adaptation technologies are not necessarily the same. By grouping mitigation and adaptation under one environmental characteristic, the ACCTS falls short of highlighting the adaptation benefit of technologies—and might even be misleading. In some cases, it is not clear what the adaptation benefit of a listed good should be, as the example of bicycles



below shows. In the description of the environmental benefits, only the mitigation benefit is explained, as in the example of aluminum and boilers. This highlights that adaptation goods are either not sufficiently understood by trade policy-makers or that their focus remains, as previously stated, on the role of trade in mitigating climate change.

**Table 3.** Examples of environmental goods from the ACCTS

<b>Subheading (HS 2022)</b>	<b>Description</b>	<b>Additional product specifications</b>	<b>Environmental benefits and environmental purposes</b>
4011.50	New pneumatic tyres, of rubber. - Of a kind used on bicycles		Bicycles and their parts provide an environmentally friendly, low-carbon mode of transportation, contributing to lowering greenhouse gas emissions in the transport sector as well as reducing air pollution.  They serve environmental protection purposes (ambient air and noise, light and vibration abatement) and climate change adaptation and mitigation purposes.
4013.20	Inner tubes, of rubber. - Of a kind used on bicycles		
7610.90	Aluminum structures (excluding prefabricated buildings of heading 94.06) and parts of structures (for example, bridges and bridge-sections, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, balustrades, pillars and columns)	Wind turbine towers and parts specially designed for wind turbine towers	Components of wind turbines for the generation of renewable energy. They serve environmental protection, climate change adaptation, and mitigation purposes.
8402.11	Steam or other vapour-generating boilers (other than central heating hot water boilers capable also of producing low-pressure steam); super-heated water boilers. - Steam or other vapour generating boilers: - Water tube boilers with a steam production exceeding 45 t per hour	Boilers, heated by means of wood or other solid biomass or waste, excluding those of a kind capable of using coal as a fuel source	Boilers that use renewable and sustainably sourced biomass fuels for the production of heat and power emit less greenhouse gas than fossil fuel-powered boilers.  They serve climate change adaptation and mitigation purposes.

Source: Excerpted from ACCTS, 2024.



ACCTS's list of environmental services includes more suitable descriptions of the adaptation purpose of a service. For instance, the liberalization in “engineering design services for the construction of civil engineering works” is justified by the explanation that

Design of civil engineering works related to services covered by CPC 94, such as water distribution systems, sewage, industrial and solid waste treatment, and certain other civil engineering works such as dams, flood control works and tunnels, directly contribute to environment protection or natural resource management. Such services also cover design of installations for climate change adaptation to events such as landslides or flooding, as well as protective infrastructure where the primary purpose is to contribute to environment protection or natural resource management. (ACCTS, 2024, art. IV-04)

As the above shows, trade agreements can provide a useful framework for countries to advance the transfer of adaptation technologies. Regional trade agreements may be especially useful avenues for developing countries to pool demand and implement cooperative approaches. However, adaptation technologies are not as easily defined or isolated through multinational agreements as other technologies, such as vaccines or substitutes for ozone-destroying chemicals, which have seen accelerated transfer through patent waivers and trade liberalization in times of emergency (see Haselip et al., 2015). Therefore, trade policy-makers need sufficient understanding of what constitutes an adaptation technology for their country and how it can be reflected in lists of environmental goods and services. Trade agreements as frameworks for adaptation technology transfer could also be enhanced—for instance, countries could seek to broaden trade agreements' scope on areas of cooperation beyond market access to promote technology cooperation, capacity building, and financing to foster adaptation (Morin & Brand, 2024).

Given the opportunity for bilateral or regional agreements to be tailored to countries' specific contexts, any identification for goods and services that should be liberalized through trade agreements can draw on countries' identified adaptation technology needs, as discussed above. An awareness among trade policy-makers of the existing and ongoing processes in the national adaptation process is therefore crucial.



## 4.0 Country Perspectives on Technology Transfer and Trade for Adaptation

### 4.1 Adaptation Technology Needs

Countries are reporting technology needs under various mechanisms and separate UNFCCC processes, including transparency reports like Biennial Transparency Reports, as well as the TNA, NAP, and NDC processes (UNFCCC, 2022, 2025a). This creates inefficiencies and makes the communication of technology needs to technology providers or matchmakers—including relevant trade negotiators—more difficult (van Weelde et al., 2023). In the following analysis, two types of national documents are used as proxies to understand developing countries' adaptation technology needs and priorities: the NAPs submitted to the UNFCCC and TNA reports. Both the NAP process and the TNA are usually coordinated by countries' ministries of environment.

Based on a review of NAP documents submitted to the UNFCCC, the *Adaptation Gap Report 2024* stated that all the plans broadly referenced technology as a means to achieve adaptation goals. Almost half of these NAPs repeatedly referenced and emphasized the need for technologies, especially in areas related to data collection and climate modelling. The other half made minimal references to the need for technology (UNEP, 2024a).

As part of the TNA project, countries develop a TNA report, then a Barrier Analysis and Enabling Framework (BAEF) report, and finally a Technology Action Plan. The BAEF highlights barriers and enablers for the access and use of adaptation technologies. It also recommends policy measures to support increased technology adoption. Both the TNA and the BAEF are therefore useful resources to understand countries' challenges in accessing adaptation technologies and the role of international trade in this access. As of November 2024, 75 countries had submitted a TNA for adaptation and produced, based on these assessments, 75 BAEF reports (UNEP, 2024b).

In both the NAP and the TNA documents, countries primarily identified technology needs across the agriculture, water, and coastal protection sectors. To a lesser extent, countries also identified land use, land-use change, and forestry; disasters; and public health as relevant sectors (UNEP, 2021, 2024a, UNFCCC 2020). Prioritized adaptation technologies span software, orgware, and hardware: The most prioritized technologies included irrigation systems, storm surge barriers for coastal protection, crop and soil management technologies, crop diversification and the use of new varieties, water storage, and water harvesting technologies (UNEP, 2024a). Other commonly prioritized technologies relate to conservation agriculture and land-use planning, agroforestry, storage techniques for grains and seeds, and integrated soil nutrient management. Countries also expressed needs for “high-tech” adaptation hardware, like equipment for climate information services and early warning systems (Pörtner et al., 2022). Identified adaptation technologies are generally at a mature state globally (Pörtner et al., 2022), signifying that a country could access them via international trade.



The prioritization of technology needs under the TNA project is guided by several criteria, including the cost and accessibility of the identified technologies. When a country needs to import technologies, trade rules and barriers significantly influence both their cost and accessibility (Organisation for Economic Co-operation and Development et al., 2018). This underscores the important role that trade policies and trade barriers can play in shaping countries' decisions about which technologies to prioritize.

### **Box 2. Example of Fiji's TNA 2020**

“The following technologies were identified as the most preferred technology options for the respective sectors;

1. Agriculture Sector
  - 1.1 Agro-forestry
  - 1.2 Integrated Nutrient Management
  - 1.3 Improved Crop varieties
2. Coastal Zone Sector
  - 2.1 Construction of Sea Wall with Groynes
  - 2.2 Mangrove Rehabilitation
  - 2.3 Flood-hazard Mapping”

*Source: Ministry of Economy, 2020.*

## **4.2 Barriers to Adaptation Technologies and the Role of Trade**

Despite the clear recognition of trade's potential for adaptation technology transfer in international policy frameworks (see Sections 2 and 3), trade is rarely explicitly mentioned in countries' TNAs. Based on an analysis of nearly 2,000 enablers identified for more than 400 prioritized adaptation technologies in 90 TNAs, countries identified economic and financial factors as the most important barriers for technology access (UNEP, 2024a; UNFCCC TEC, 2022). These factors include high upfront investment costs, difficulties in obtaining loans, and uncertainties surrounding the return on investment. Financial constraints are a challenge for technologies requiring significant capital investment. The pre-eminence of high technology costs suggests that it could be helpful to explore if part of these costs could be reduced by eliminating tariff and non-tariff barriers.

In a few assessment reports, trade policy is mentioned explicitly within the barrier category of market conditions. An example can be found in the TNA of Vanuatu (Republic of Vanuatu, 2020), which states: “Barriers for Integrated Nutrient Management include cost of inorganic fertilizers. Costs can be affected by factors such as market conditions (i.e. import and export trade balances)” (p. 85). A trade deficit, where a country imports more than it exports, can lead to a weaker domestic currency, making imports more expensive.



A lack of skilled technical personnel and inadequate training also feature as prominent barriers in these analyses. Importing skills by facilitating trade in services and the recognition of diplomas from foreign workers could be a powerful enabler to address these. For instance, access to agricultural extension services—services that provide farmers with the needed knowledge, skills, and support to improve their agricultural practices—can facilitate the uptake of new seed varieties. Improving cross-border trade in such services, as well as the mobility of service providers in Africa, can expand access to these services and, thus, the transfer of more climate-resilient seeds (Brenton & Chemutai, 2021).

Structural barriers are equally important. Countries have identified the need to strengthen institutions, as well as legal frameworks, to improve technology implementation (UNEP, 2024a). The UNFCCC further highlights the importance of non-fiscal measures, such as establishing specific technology standards (UNFCCC TEC, 2022). These, in turn, may also have an impact on trade: When national standards differ from international ones, they can create barriers that limit market access for imported technologies. Conversely, harmonized standards can facilitate trade by ensuring compatibility and building user trust.

As of November 2024, 75 BAEF reports have been uploaded to the TNA database. We reviewed nine English reports from Small Island Developing States, given their high level of vulnerability to the impacts of climate change, as well as economic reliance on international trade. The reports were screened by trade-relevant keywords (trade, import(-s, -er(s)), customs, tariff, duties)<sup>2</sup> to understand how trade features into the factors influencing access to adaptation technologies in these countries.

Our analysis reveals that in all BAEF reports, international trade is mentioned in some way as relevant for adaptation technology, but to varying degrees. References to trade range from “high costs of imports of soft engineering equipments [sic]” as part of the barrier analysis for rainwater harvesting systems in Seychelles (Republic of Seychelles, 2017, p. 88) to identifying high import duties for multiple prioritized technologies, such as drip irrigation, climate-resilient potato seeds, and other agricultural equipment in Belize. An overview of the different categories of trade references for the nine countries is shown in Table A1 in the Appendix.

Five countries identify high import duties as barriers to accessing adaptation technologies. For instance, Trinidad and Tobago mentions high duties on imports for solar-powered drip irrigation system components. Four countries formulate specific recommendations and measures to facilitate trade in needed goods: Nauru suggests waiving import duties on imported materials needed for rooftop rainwater harvesting systems to offset the technology’s high capital cost (Nauru, 2021) and the Maldives suggest “import duty exemption for components of ... energy efficient rainwater harvesting system to make the technology more affordable to the general public” (Ministry of Environment Climate Change and Technology, 2023, p. 60). Belize recommends a review of import duties/taxes for imported components of the following technologies: solar water pumps, improved drip irrigation, climate-resilient grain seed varieties, plant micro propagation of heat- and drought-resistant varieties, crop cover-structure/greenhouse cooling systems, mini hydro plant for renewable energy generation for small farming households, and water supply systems (National Climate Change Office, 2018).

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<sup>2</sup> While export markets are referenced in some reports, and exports have relevance for countries’ adaptation efforts, the focus of this analysis is on imports.



The analysis shows that trade policy settings could be relevant for many of the identified barriers to technology access. Table 4 shows an overview of the role of trade for different barrier categories (as per UNFCCC TEC, 2022).

**Table 4.** The role of trade in different categories of barriers to technology access

Barrier category	Specific barrier or challenge	Role of trade
Economic and financial	<ul style="list-style-type: none"> <li>• High upfront investment costs</li> <li>• Difficulty obtaining loans</li> <li>• Uncertainty around return on investment</li> <li>• High cost of technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Reducing tariffs and non-tariff barriers could lower import costs.</li> </ul>
Market conditions	<ul style="list-style-type: none"> <li>• High cost of imported equipment</li> <li>• Few local suppliers of goods and services</li> <li>• Uneven playing field (e.g., due to subsidies on competing technologies)</li> <li>• Market control by established companies</li> </ul>	<ul style="list-style-type: none"> <li>• Trade imbalances impacting availability and price: trade deficits lead to weaker domestic currency and make imports more expensive.</li> <li>• Trade can improve affordability by increasing competition and access to lower-cost alternatives.</li> </ul>
Legal and regulatory	<ul style="list-style-type: none"> <li>• Inadequate or absent legal frameworks for technology adoption</li> <li>• Lack of supportive regulations</li> </ul>	<ul style="list-style-type: none"> <li>• Trade agreements often include provisions that require countries to adopt or harmonize legal standards, making it easier to align legal frameworks with international best practices, reducing legal uncertainty, and hindering technology adoption.</li> </ul>
Network	<ul style="list-style-type: none"> <li>• Limited connectivity between or access to suppliers and service providers</li> </ul>	<ul style="list-style-type: none"> <li>• Cross-border trade in services and facilitated mobility of service providers can help bridge service gaps.</li> </ul>
Institutional and organizational human skills	<ul style="list-style-type: none"> <li>• Few professional institutions</li> <li>• Limited institutional capacity</li> <li>• Limited management and organizational skills</li> <li>• Lack of skilled technical personnel</li> <li>• Inadequate training for using or maintaining technology</li> </ul>	<ul style="list-style-type: none"> <li>• Trade in services (e.g., agricultural extension services/ management advice) can build capacity.</li> <li>• Recognition of foreign qualifications can enable skilled migration.</li> </ul>
Social, cultural, and behavioural	<ul style="list-style-type: none"> <li>• Consumer preferences and perceptions</li> <li>• Social biases</li> <li>• Traditions</li> </ul>	<ul style="list-style-type: none"> <li>• Technology origin affects perception and uptake: local adaptation and cost-reduction could help counter negative views.</li> </ul>



Barrier category	Specific barrier or challenge	Role of trade
Information and awareness	<ul style="list-style-type: none"> <li>• Inadequate information, lack of awareness</li> <li>• Limited knowledge of available technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Importing educational services (like training) via trade could improve awareness.</li> </ul>
Technical	<ul style="list-style-type: none"> <li>• Poor technology quality or performance</li> <li>• Need for specific standards and certifications</li> </ul>	<ul style="list-style-type: none"> <li>• Trade agreements may help countries develop technical standards to ensure the quality of technology (see legal and regulatory barriers).</li> </ul>

Source: Author compiled based on UNFCCC TEC, 2022.

Interestingly, in the analyzed BAEF reports, trade and countries' past or present reliance on specific imports are also seen as a challenge to adaptation in general. Five of the nine countries identify their reliance on (food) imports as a vulnerability and seek to reduce such import dependency (see Table A1 in the Appendix). Grenada sees the importing of wastewater reuse technology as a barrier to local uptake of the technology, especially in the tourism sector. Most hotel owners see the technology as imported from Europe, expensive, and difficult to maintain. Even though local alternatives might exist, hotel owners are not aware of or convinced by them. They perceive the technology as expensive and challenging to operate, shying away from further use (Government of Grenada, 2019). This highlights the importance of awareness, as well as social and behavioural barriers to technology access.

In other cases, countries seek to facilitate the import of technology as a strategy to reduce dependence on other imported goods. The Maldives, for example, mentions their heavy reliance on fruit and vegetable imports as a vulnerability, given the susceptibility of international supply chains to climate-related disruptions. As a result, they identify agricultural technologies—which require imported components—as a means to boost domestic production and reduce import dependency (Ministry of Environment Climate Change and Technology, 2023, p. 9). This illustrates how countries see international trade as both a source of vulnerability and a pathway to build resilience to climate change impacts.

This analysis shows that trade, while having the potential to support adaptation technology transfer in developing countries, is not a silver bullet and is very context specific. Countries and supporting entities could emphasize the role of trade in future assessments, aiming to shed more light on the benefits and drawbacks of using trade to access adaptation technologies.



## 5.0 Lessons

- Both international climate policy and trade frameworks acknowledge the crucial role of trade for international technology transfer to developing countries and LDCs.
- The UNFCCC and the WTO conventions urge developed countries to take practical steps to facilitate the transfer of technologies to developing countries. However, neither the UNFCCC nor the WTO provide a comprehensive definition of what their understanding of technology is. This makes it challenging for international policy discussions to agree on concrete commitments to improve technology transfer.
- Awareness of technologies for climate change adaptation is increasing in both policy arenas, and the concept of adaptation technologies is gaining momentum.
- The global climate and trade policy communities are each addressing the role of technology transfer. However, work on analyzing and reporting needs and finding solutions for climate technology transfer is happening in parallel and unconnected forums. It is now time to link the trade and adaptation communities to advance the role of trade in support of adaptation technology transfer.
- Multilateral trade and climate policy negotiations share similar divergences between developed and developing countries when it comes to the interpretation of technology transfer. The lack of a common understanding of the concept and its implications for states' responsibilities hampers progress.
- Technology is difficult to define, as it includes materials, equipment, and tools (hardware); practices, knowledge, and skills (software); and organizational and institutional frameworks (orgware). Adaptation technology is even harder to define, as its definition largely depends on how a technology is used, making it challenging to create specific trade measures to support its transfer.
- Given the difficulties in coming up with a global list of adaptation goods and services, bilateral and regional agreements might better address countries' adaptation needs, as they can include more concrete and contextualized provisions for adaptation technology transfer.
- Many of the trade and technology transfer discussions focus on developed countries' obligations to transfer technologies to the Global South. This leaves the potential of South–South transfer underexplored. In the context of adaptation, this is a missed opportunity, as developing countries are at the forefront of developing or tailoring adaptation technologies to be used by other countries in the Global South.
- Countries are reporting climate technology needs under various mechanisms and separate processes. This creates inefficiencies and makes the communication of technology needs to supporting entities and technology providers more difficult.
- The role of trade in enabling or hindering technology access is not sufficiently explored or identified in these reports, including countries' TNA and NAP processes. The lack of a definition of technology makes linking the TNA to trade policies more difficult.



- The NAP and TNA processes provide a basis upon which to understand the trade barriers to adaptation technology transfer. Clearer articulation of the specific trade barriers of identified adaptation technologies in the NAP and TNA documents would be helpful to better align trade and adaptation policy and facilitate technology transfer.



## 6.0 Opportunities and Recommendations

Based on the lessons identified above, we suggest the following opportunities and recommendations for trade and adaptation policy-makers, as well as development partners supporting adaptation technology projects. These recommendations seek to increase linkages between trade and adaptation policy efforts to increase the role of trade in facilitating technology transfer for adaptation.

### **For adaptation policy-makers in developing countries:**

- Establish stronger links between adaptation and trade policy actors by, for example, involving trade ministry representatives and trade experts in the NAP process—especially during the identification of adaptation goals and priorities, which often include technology.
- For government officials leading the adaptation TNA process, further explore the specific trade barriers to adaptation technology so that recommendations for trade policies that ease access can be developed. One entry point would be to involve trade experts in the barrier analysis.
- Include a definition of adaptation technology in NAP and TNA documents to support policy alignment with trade.

### **For trade policy-makers in developing countries:**

- Trade policy-makers involved in negotiating regional and bilateral trade agreements might not sufficiently understand the concept of adaptation technology. To gain a better understanding of national adaptation challenges and needs, trade policy-makers should actively seek to be involved in the NAP and TNA processes and improve their engagement with government departments leading adaptation efforts.
- Trade policy-makers should therefore be aware of the prioritized adaptation technologies in the NAP and TNA documents and base their trade negotiations on these priorities.
- Discussions at the WTO can raise awareness on adaptation technologies and foster exchange on adaptation technology transfer across different sectors and regions (North–South, South–South, South–North).

### **For development partners and international agencies:**

- UNEP: Agencies developing the methodology for the TNA process could more clearly integrate questions regarding the impact of trade measures into the barrier assessment.
- Implementing agencies and development partners negotiating relevant support could also encourage countries to include trade experts and trade policy-makers in the NAP/TNA processes.
- The UNFCCC, the IPCC, and the WTO could move beyond generic and normative definitions of technology transfer and develop more actionable guidance to operationalize technology transfer, especially for adaptation technology.



- WTO WGTTC: Such actionable guidance could include developing recommendations on voluntary guidelines for incentivizing multinational firms to engage in technology transfer and guidelines for improving competition policies or mechanisms to support technical standards (Syam, 2024).
- Donors and development partners funding technology transfer programs should focus on supporting and facilitating South–South or triangular cooperation on technologies—for example, by supporting companies in the Global South to access countries and markets in other developing countries.
- Donors and development partners could increase assistance to developing countries for formulating and implementing technical standards to reduce barriers to technology transfer, as well as enhance the dissemination of information on adaptation technologies.

## 6.1 Knowledge Gaps and Further Research Opportunities

- Further contextualized research can be useful in understanding the specific trade barriers of identified adaptation technologies in developing countries. This research can inform the assessment of barriers in the TNA process and other reporting processes in which developing countries participate.
- Related to the above, research could shed more light on whether the IP rights system helps or limits the transfer of adaptation technology between or to countries in the Global South (WIPO is currently working on such a study).



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## Appendix A. References to trade in Small Island Developing States' TNA BAEF reports

**Table A1.** References to trade in Small Island Developing States' TNA BAEF reports (year of submission)

Category of trade reference	Maldives (2023)	Timor-Leste (2023)	Trinidad and Tobago (2022)	Nauru (2021)	Grenada (2019)	Belize (2018)	Seychelles (2017)	Guyana (2017)	Mauritius (2013)
Acknowledgement of import dependency	×	×	×	×					×
Goal to reduce (dependency on) imported products	×	×	×	×					×
Trade framed as a barrier to adaptation technology access <sup>3</sup>					×				
Trade barriers identified as barriers to adaptation technology access <sup>4</sup>	×		×	×		×		×	
Measures identified to reduce trade (dependency)/ support local production		×							

<sup>3</sup> This refers to instances where imports of foreign technologies are described as crowding out local adaptation technologies.

<sup>4</sup> This refers to the identification of high import duties for needed equipment or materials, or lack of importers/ import service providers in country.



Category of trade reference	Maldives (2023)	Timor-Leste (2023)	Trinidad and Tobago (2022)	Nauru (2021)	Grenada (2019)	Belize (2018)	Seychelles (2017)	Guyana (2017)	Mauritius (2013)
Enablers/measures identified to reduce trade barriers/support access to imports	X		X	X		X			

Source: Author compiled based on Department of Climate Change and National Resilience, 2021; Government of Grenada, 2019; Ministry of Economy, 2020; Ministry of Environment and Sustainable Development, 2013; Ministry of Environment Climate Change and Technology, 2023; National Climate Change Office, 2018; Office of Climate Change, Ministry of the Presidency, Guyana, & UNEP-DTU, 2017; República Democrática de Timor-Leste, 2023; Republic of Seychelles, 2017; Republic of Trinidad & Tobago, 2022; UNEP CCC, 2024a.

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