



TRADE AND ENVIRONMENTAL SUSTAINABILITY STRUCTURED DISCUSSIONS (TESSD)

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EXPERIENCES IN THE PROMOTION AND FACILITATION OF ENVIRONMENTAL GOODS AND SERVICES

Note by the Secretariat

Contents

1 INTRODUCTION	2
2 EXPERIENCES AND CURRENT EFFORTS IN EGS PROMOTION AND FACILITATION	2
2.1 Overview of past and ongoing initiatives.....	2
2.2 Objectives	4
2.3 Environmental goods	5
2.4 Environmental services	16
3 RESEARCH ON POTENTIAL BENEFITS AND CHALLENGES OF TRADE IN EGS	21
3.1 Trade effects.....	22
3.2 Diffusion of environmental technology.....	23
3.3 Environmental effects	23
REFERENCES	25

1 INTRODUCTION

1.1. The objective of this note is to provide a factual summary of past experiences and current efforts in the promotion and facilitation of environmental goods and services (EGS), as well as an overview of research on the possible benefits and challenges of trade in EGS. It focuses on the experiences at the WTO in the negotiations on environmental goods and services, including as part of the Doha Development Agenda (DDA), as well as in negotiations on a plurilateral sectoral Environmental Goods Agreement (EGA).¹ This is complemented by relevant information from other initiatives, including in the context of APEC and selected regional trade agreements (RTAs).

2 EXPERIENCES AND CURRENT EFFORTS IN EGS PROMOTION AND FACILITATION

2.1 Overview of past and ongoing initiatives

2.1. A number of initiatives have been undertaken by Members to promote and facilitate trade in EGS, including at multilateral (DDA) and plurilateral (EGA) levels, as well as outside the WTO, in the context of regional initiatives (for example, APEC). These initiatives reflect Members' recognition that trade in EGS has an important role to play in addressing mounting environmental challenges by fostering the deployment of existing green technologies and innovation of new technologies. At the WTO, this recognition has led to an evolution of the trade and environment debate towards a more pro-active, forward-looking approach, which seeks to use trade policy to support environmental goals.

2.2. Multilateral negotiations on EGS have taken place as part of the DDA. The Special Session of the Committee on Trade and Environment (CTESS) was established under the Trade Negotiations Committee (TNC) to conduct negotiations on trade and environment. Since work began in 2002, WTO Members carried out a substantial amount of work under Paragraph 31(iii), in particular on the identification of environmental goods of interest.² Since 2009, several contributions drew attention to the specific export interests of developing country Members, and to other issues such as special and differential (S&D) treatment, non-tariff barriers (NTBs), capacity building and transfer of technology. The reduction or elimination of tariff on environmental goods was also discussed in the context of the Negotiating Group on Market Access (NGMA)³, but without addressing the specific issues that were debated in the CTESS. In addition, environmental services are covered by the negotiating mandate in Article XIX of the GATS and, starting in 2000, Members engaged in the negotiation of specific commitments in environmental and other services sectors in the Special Session of the Council for Trade in Services (CTS-SS).⁴

2.3. APEC economies⁵ have long recognized the importance of trade in facilitating the diffusion of EGS, which they believe has the potential to lead to improved environmental outcomes. APEC has been advancing institutional frameworks to support this vision through APEC leaders' endorsements on initiatives such as: (i) the APEC Environmental Goods and Services Work Program (2008); (ii) the Yokohama Vision (2010); and (iii) Annex C (Trade and Investment in Environmental Goods and Services) of the Honolulu Declaration (2011).⁶ At the Vladivostok Ministerial meeting in 2012, APEC members agreed to apply tariff rates to 5% or less on a list of 54 HS codes. Alongside progress on the liberalization of trade in environmental goods, APEC economies have also engaged in work to promote liberalization, facilitation and cooperation in environmental services under the "Environmental Services Action Plan" (ESAP) endorsed by APEC Ministers in 2015.⁷

¹ The EGA negotiations included 18 participants representing 46 WTO Members.

² See the report by the Chairperson of the CTESS contained in TN/TE/19 (22 March 2010). At the first meeting of the CTESS (TN/TE/R/1), Members agreed to focus on goods in the CTESS while services would be covered in the Special Session of the Council for Trade in Services.

³ See e.g. JOB(06)/200/Rev.1, p. 21.

⁴ The GATS "built-in" mandate in Article XIX calls for "successive rounds of negotiations ... with a view to achieving a progressively higher level of liberalization [...]".

⁵ Australia; Brunei Darussalam; Canada; Chile; China; Hong Kong, China; Indonesia; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Philippines; Russian Federation; Singapore; Chinese Taipei; Thailand; United States; and Viet Nam.

⁶ https://www.apec.org/meeting-papers/leaders-declarations/2011/2011_aelm/2011_aelm_annexc

⁷ https://www.apec.org/meeting-papers/leaders-declarations/2012/2012_aelm

2.4. Building on the APEC initiative on environmental goods, in 2014, 14 WTO Members⁸ launched negotiations for the establishment of an Environmental Goods Agreement (EGA) to remove trade barriers on environmental goods that are important for protecting the environment and addressing climate change. The so-called Davos statement described the objective of the EGA negotiations as follows: "We are convinced that one of the most concrete, immediate contributions that the WTO and its Members can make to protect our planet is to seek agreement to eliminate tariffs for goods that we all need to protect our environment and address climate change".⁹ Participation eventually grew to include 18 WTO Members (46 Members counting the EU member states individually), with the last negotiating round taking place in December 2016.¹⁰

2.5. The proliferation of RTAs, which by definition should cover substantially all trade, has contributed to the removal of tariffs on environmental goods among the parties to these agreements. In addition, a number of RTAs make reference to cooperation and promotion on trade and investment in EGS or have addressed the issue in more specific terms. For example, the Agreement between New Zealand and the Separate Customs Territory of Taiwan, Penghu, Kinmen, and Matsu on Economic Cooperation (ANZTEC) came into force in 2013 and removes all tariffs on a specific list of 132 environmental goods.¹¹ In addition, this RTA also aims to facilitate the movement of business persons (mode 4) for the sale, delivery or installation of environmental goods or the supply of environmental services. The New Zealand-United Kingdom Free Trade Agreement, signed on 28 February 2022, will prioritize the liberalization of 293 environmentally beneficial products – the largest such list agreed in any RTA to date.¹² Under Article 22.7(2a), the Parties will keep the environmental goods list under review for potential modifications in relation to the extent to which goods contribute to "green growth and sustainable development objectives of the Parties, advances in available technologies, and potential dual-use of environmental goods".

2.6. Other RTAs make reference to sectors or goods that could provide positive environmental or economic outcomes including renewable energy goods and related services, energy efficient products or eco-labelled goods and services, sustainable construction materials, or environmental technologies (USMCA, EU-Singapore FTA, EU-UK TCA, modernized EFTA-Turkey FTA).¹³ Certain RTAs broadly recognize the importance of trade and investment in EGS, including as a means to improving environmental and economic performance (USMCA, Article 24.24); strengthening cooperation on environmental matters to increase trade and investment in EGS (US-Morocco FTA, Article 17.3(7)); promoting public awareness and education programmes on EGS to foster their trade (CARIFORUM-EU Economic Partnership Agreement, Article 190(f)); or generally promoting and encouraging the facilitation of trade and investment in EGS.¹⁴

2.7. The launch of the initiative towards an Agreement on Climate Change, Trade and Sustainability (ACCTS) was announced on 25 September 2019 by New Zealand, Fiji, Iceland, Norway and Costa Rica, and was later joined by Switzerland. The initiative seeks to: (i) remove tariffs on environmental goods and establish new commitments for environmental services; (ii) establish disciplines to eliminate harmful fossil fuel subsidies; and (iii) develop guidelines to inform the

⁸ WTO Members that launched the EGA are: Australia; Canada; China; Costa Rica; European Union; Hong Kong, China; Japan; Korea; New Zealand; Norway; Singapore; Switzerland; Chinese Taipei; and United States.

⁹ Joint Statement Regarding Trade in Environmental Goods, done in Davos, Switzerland, on 24 January 2014. See <https://ustr.gov/sites/default/files/EGs-Announcement-joint-statement-012414-FINAL.pdf>

¹⁰ WTO Members that participated in the EGA negotiations were: Australia; Canada; China; Costa Rica; European Union (including all current EU member States and United Kingdom), Hong Kong, China; Iceland; Israel; Japan, Korea; Liechtenstein; New Zealand; Norway; Singapore; Switzerland; Chinese Taipei; Turkey; and United States.

¹¹ ANZTEC Annex 7, "Environmental Goods List" – <https://www.nzcio.com/assets/NZCIO-documents/ANZTEC-Env-goods-Annex-7-10-July-2013-NZ.pdf>

¹² See NZ-UK FTA Key Outcomes: <https://www.mfat.govt.nz/assets/Trade-agreements/UK-NZ-FTA/NZ-UK-FTA-Key-Outcomes.pdf>

¹³ Further reading on climate trade provisions in RTAs – https://www.wto.org/english/tratop_e/envir_e/climate_change_rta.pdf

¹⁴ Promoting trade and investment in EGS is specifically noted in RTAs, including EU-Colombia-Peru FTA Article 271(2)), CETA Article 24.9(1), EU-Japan FTA Article 16.5(b), and EU-CARIFORUM FTA Article 190(f).

development and implementation of voluntary eco-labelling programmes and mechanisms. The seventh and most recent round of negotiations took place from 9 November to 7 December 2021.¹⁵

2.2 Objectives

2.8. Initiatives to promote trade in environmental goods and services broadly share the goal of enhancing the contribution of trade and trade policies to environmental protection, economic growth and sustainable development. More recent initiatives make explicit reference to the importance of addressing climate change.

2.9. In the Doha Ministerial Declaration (Paragraph 31(iii)) that launched the DDA, Members agreed to negotiations on the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services "with a view to enhancing the mutual supportiveness of trade and environment".¹⁶ The overall intention of the negotiations was to create a "triple-win" – for trade, for environment and for development. A reduction in trade barriers would facilitate trade, which in turn could lead to positive outcomes for the environment and development.

2.10. APEC's efforts to reduce barriers to environmental goods has been part of a broader effort to reduce trade barriers starting in 1990s, according to Steenblik (2005). In 1996, APEC leaders directed trade ministers to "identify sectors where early voluntary liberalisation would have a positive impact on trade, investment and economic growth in the individual APEC economies as well as in the region and submit recommendations on how this can be achieved". By the APEC leaders' Summit in 1997, environmental goods and services had been identified as one of the sectors which enjoyed the greatest support for voluntary sectoral liberalization.

2.11. At the 2010's APEC Economic Leaders' Meeting (Yokohama, Japan), the Leaders of APEC broadly articulated their vision of further integrating the Asia-Pacific region into the 21st century and spelled out specific motivations to preserve the environment. APEC recognized the heightened challenges with regard to the protection of the environment and natural resources, including the necessity to jointly address climate change.¹⁷ It recognized that both economic growth and environmental sustainability should be advanced in a holistic manner, and progress toward a green economy should be accelerated by promoting trade and investment in environmental goods and services and developing this sector in APEC economies.¹⁸ APEC would contribute to the pursuit of a Free Trade Area of the Asia-Pacific (FTAAP) by continuing and further developing its sectoral initiatives, including on environmental goods and services.¹⁹ Also, APEC then agreed to support progress in the EGS negotiations in the WTO DDA.²⁰ APEC's Green Growth Agenda (2011) sets the objectives of: (i) increasing the dissemination and utilization of environmental goods and services; (ii) reducing existing barriers and refraining from introducing new barriers to trade and investment in such goods and services; and (iii) enhancing capabilities to develop this sector, by prioritizing work related to addressing non-tariff measures on environmental goods, technology and services.²¹

2.12. APEC leaders have also recognized the need for complimentary liberalization of trade in environmental services, as well as capacity-building efforts to develop the sector. APEC's work pursuant to the 2015 ESAP has generated a series of reports on the state of the region's environmental services sector, including on regulatory measures relating to environmental services in APEC economies, as well as sectoral reports on renewable energy, energy efficiency and environmental remediation industries. Further work to advance the liberalization of trade in environmental services was conducted as part of the Final Review of the ESAP in December 2020 covering methodologies to identify the scope of environmental services; good regulatory practices

¹⁵ <https://www.mfat.govt.nz/en/trade/free-trade-agreements/trade-and-climate/accts-negotiating-rounds/#bookmark0>

¹⁶ WT/MIN(01)/DEC/1.

¹⁷ APEC, "The Yokohama Vision – Bogor and Beyond", p. 2.

¹⁸ APEC, "The Yokohama Vision – Bogor and Beyond", p. 3.

¹⁹ APEC, "The Yokohama Vision – Bogor and Beyond", p. 4; 18th APEC Economic Leaders' Meeting, Pathway to FTAAP.

²⁰ APEC, 22nd APEC Ministerial Meeting, Yokohama, Japan, 10-11 November 2010.

²¹ "APEC 2011 Leaders' Declaration", Honolulu, Hawaii, United States, 11-12 November 2011, https://www.apec.org/meeting-papers/leaders-declarations/2011/2011_aelm.

and capacity-building on licensing and approval procedures for environmental services suppliers; and capacity-building needs of technicians and workers in the sector.²²

2.13. The EGA negotiations were launched through a joint statement by a group of 14 Members at Davos, Switzerland, in January 2014. Building on the commitment of APEC Leaders, the group announced their "commitment to achieve global free trade in environmental goods, and pledge to work together, and with other WTO Members similarly committed to liberalization, to begin preparing for negotiations in order to advance this shared goal. ... We are convinced that one of the most concrete, immediate contributions that the WTO and its Members can make to protect our planet is to seek agreement to eliminate tariffs for goods that we all need to protect our environment and address climate change." Members furthermore committed to explore "a broad range of additional products, in the context of a future oriented agreement able to address other issues in the sector and to respond to changes in technologies in the years to come, that can also directly and positively contribute to green growth and sustainable development."²³

2.14. The objective of the ACCTS initiative is for trade and trade policies to contribute positively to climate change and sustainability and bring together some of the inter-related elements of the climate change, trade and sustainable development agendas and demonstrate how they can be mutually reinforcing. A further objective of the ACCTS is to encourage other WTO Members to join, so that the ACCTS can become the foundation for multilateral action, as well as an example on how trade rules can substantively help address climate change and other serious environmental challenges. Measures to be covered by the ACCTS, *inter alia*, include: (i) the removal of tariffs on environmental goods and binding commitments on environmental services; and (ii) the development of guidelines to inform the development and implementation of voluntary eco-labelling programmes and mechanisms to encourage their promotion and application.²⁴

2.3 Environmental goods

2.3.1 Experiences in the identification of environmental goods

2.15. Any tariff negotiation seeking to reduce or eliminate tariffs in specific products requires first and foremost identifying these products. Past and current initiatives have employed different approaches in defining such "product coverage".

2.3.1.1 Defining "environmental goods"

2.16. One approach to negotiating tariffs applicable to environmental goods is to begin by adopting a definition of an "environmental good", to then identify those specific products that meet the agreed definition. For example, in 2002, the CTESS negotiations initially focused work on a possible definition of environmental goods. However, given the challenges faced in defining environmental goods and the concerns expressed by some delegations, it was suggested early on that agreeing on a definition was not necessary. Members opted to follow a practical approach that consisted, rather, in listing those goods of interest to Members (see below), so-called "defining by listing" approach.²⁵

2.17. The 1999 OECD and Eurostat list of environmental goods, which provided useful background and inspired some of the discussions in the CTESS, also illustrates this approach. The OECD and Eurostat discussions began by developing a working definition of environmental goods and services,

²² See APEC Group on Services, "Study for Final Review of Environmental Services Action Plan (ESAP)", December 2020.

²³ <https://ustr.gov/sites/default/files/EGs-Announcement-joint-statement-012414-FINAL.pdf>

²⁴ <https://www.mfat.govt.nz/en/trade/free-trade-agreements/trade-and-climate/agreement-on-climate-change-trade-and-sustainability-accts-negotiations/> and [ACCTS Joint Leader's Statement](#).

²⁵ See report by the Chairperson of the Special Session of the Committee on Trade and Environment to the Trade Negotiations Committee contained in TN/TE/2 (4 July 2002). Numerous comments were made on this definition, with concerns raised on issues such as: how products with multiple end-uses would be classified; whether process and production methods (PPMs) and end-use criteria would be needed to define environmental goods and what the implications of that would be on the concept of "like products"; how the harmonized system would capture those goods; and how the relativity of the concept of "environmental friendliness" would be tackled (since some goods considered environmentally friendly in some parts of the world could be seen as unfriendly in others). One delegation argued that, while it was important not to rule out a definitional approach for work on environmental goods, definitions should not be seen as a precondition for progress to be made.

which were defined as those "[goods and services that] measure, prevent, limit, minimize, or correct environmental damage to water, air, and soil, as well as problems related to waste, noise and eco-systems." Once the conceptual exercise of the definition had been concluded, the discussions then turned to trying to identify the products that met this definition. One important point to bear in mind with respect to the OECD list of products, besides the fact that it was not developed in the context of a tariff negotiation, is that it was not intended to be exhaustive, but only illustrative.²⁶

2.3.1.2 Approaches based on lists of goods or sectors

2.18. A second approach is to define the product coverage by directly listing goods or sectors that are considered to fulfil certain environmental objectives.

2.19. In the CTESS, between 2002 and 2010, several Members and groups of Members submitted lists of environmental goods and categories with a view to reaching a multilateral agreement to liberalize trade on an agreed list of environmental goods.²⁷ This so-called "list-based approach" had seen the most engagement and submissions over the years. Some Members put forward revised and new approaches to address some of the specific concerns that had been raised by developing Members. For example, under a suggested "request and offer" approach Members would participate voluntarily in bilateral negotiations on the basis of requests and offers on those goods that they consider to be environmental goods important to their sustainable development efforts, and for which they were willing to assume liberalization commitments.²⁸ Another proposal outlined a possible combined approach between the list-based approach and the request and offer approach.²⁹

2.20. The list-based approach resulted in a universe of 409 unique tariff lines at the HS subheading (six-digits) level that were proposed for inclusion, which was based on a compilation of six separate lists that had been submitted by 13 Members: Qatar, Kingdom of Saudi Arabia, Philippines, Singapore, Japan, and the Group of Friends (Canada, European Communities, Japan, Republic of Korea, New Zealand, Norway, Chinese Taipei, Switzerland, and the United States).³⁰ Table 1 shows the number of unique subheadings and top HS chapters covered by the six lists.

Table 1. Overview of Members' lists of proposed goods

WTO Members	Number of unique subheadings (HS 2002, six-digits)	Top 2 HS chapters
Group of Friends	164	84, 90
Japan	59	87, 85
Qatar	20	84, 27
Philippines	17	84, 85
Singapore	72	90, 84
Kingdom of Saudi Arabia	259	84, 73

Source: Unofficial room document RD/TN/TE/2.

Note: The last column of the table identifies the two HS chapters with the largest number of tariff lines included in each of the lists submitted to the CTESS. The HS chapter headings referred to in the table are: 27 (mineral

²⁶ A note to the OECD list states that "The list is not exhaustive; not all environmental goods are covered. Some environmental goods have no equivalent HS commodity code. Some HS commodity codes include goods which may not be environmental goods." See OECD (1999), "Future Liberalisation of Trade in Environmental Goods and Services: Ensuring Environmental Protection as well as Economic Benefits", COM/TD/ENV(98)37/FINAL, Paris.

²⁷ See unofficial room document RD/TN/TE/2 for an overview of the submissions by Members.

²⁸ JOB(07)/146 (Brazil, 1 October 2007); JOB(09)/184 (Brazil, 15 December 2009).

²⁹ JOB/TE/16 (Mexico and Chile, 11 March 2011); JOB/TE/16/Corr.1 (Mexico and Chile, 21 March 2011).

³⁰ JOB/TE/3/Rev.1 – Compilation of Submissions under Paragraph 31(iii) of the Doha Declaration Pursuant to the CTESS Work Programme, 5 January 2011. Individual submissions: JOB(09)/132 (Canada, European Communities, Japan, Republic of Korea, New Zealand, Norway, Chinese Taipei, Switzerland and United States, 9 October 2009); TN/TE/W/75 (Japan, 27 November 2009); TN/TE/W/75/Add.1 (Japan, 16 February 2010); TN/TE/W/75/Add.2 (Japan, 10 January 2011); JOB(09)/169 (Kingdom of Saudi Arabia, 6 November 2009); JOB(09)/169/Add.1 (Kingdom of Saudi Arabia, 15 December 2009); JOB(09)/169/Add.2 (Kingdom of Saudi Arabia, 21 July 2010); TN/TE/W/19 (Qatar, 28 January 2003); TN/MA/W/24 (Qatar, 28 January 2003); JOB/TE/4 (Qatar, 14 June 2010); JOB/TE/2 (Philippines, 16 February 2010); JOB/TE/5 (Singapore, 23 June 2010).

fuels and oils); 73 (articles of iron and steel); 84 (boilers, machinery and mechanical appliances); 85 (electrical machinery and equipment); 87 (vehicles other than railway or tramway rolling-stock, and parts and accessories thereof); and 90 (optical, measuring, checking, precision instruments).

2.21. According to Balineau and de Melo (2013), the six lists diverge considerably and show limited overlap: not a single product appears on all six lists, and more than two-thirds of the products proposed are included in only one of them. In their view, this indicates diverging understandings and perceptions about which goods should be considered to be environmental. At the same time, it may be noted that among the 13 Members that have submitted six lists, nine Members that constitute the Group of Friends (with EU member States not counted individually) have been able to agree to a common list of 164 products.

2.22. In the EGA, the starting point was to agree on a list of ten broadly defined environmental goals, which are similar to those of the APEC and OECD lists, but with some variations. Thereafter, discussions focused on identifying which specific products addressed a particular environmental goal or challenge. The first five rounds of negotiations focused on discussing each of those 10 environmental goals. Participants were also expected to nominate products that they considered to be relevant for each environmental area, including a justification of their environmental benefits. An initial list compiled such nominations and resulted in a very large number of products. On this basis, the negotiators then began to assess the nominations based on different criteria, including their "environmental credibility", as well as the degree of support by, and level of priority for, the different EGA participants. In later rounds, participants exchanged lists of goods that they considered to be "acceptable" in the context of a final agreement, as well as those they considered to be "sensitive" (i.e. difficult to include for either trade-related or environmental reasons). Through this process, by the 18th and last round of negotiations, which took place in November 2016, the list had been progressively narrowed down to approximately 300 products.³¹ No agreement was reached on this list.

2.23. APEC negotiations took the OECD definition of activities that form part of the environmental industry as a starting point for identifying a list of environmental goods.³² The APEC Environmental Goods List (APEC-EGL), agreed to in 2012, comprises 54 environmental goods (at the Harmonized Standard six-digit level). In June 2021, APEC Trade Ministers affirmed their readiness to build on the APEC-EGL with the acknowledgement that, since 2012, new environmentally friendly goods, technologies and innovations had emerged that were not covered by the APEC-EGL.³³

2.24. Table 1 summarizes the categories of goods included in the DDA, EGA and APEC negotiations. The DDA has the highest number of total goods from submissions provided by Members with 411 HS subheadings (six-digit codes). From initial nominations, the EGA list was reduced to approximately 300 during the negotiations. APEC, with the only agreed list, is also the shortest with 54 goods, all of which were also part of the EGA list.

2.25. It could be argued that the three "lists" (including submissions under the DDA), broadly reflect the OECD definition of environmental goods as "activities which produce goods and services to measure, prevent, limit, minimize, or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems". As such, categories of goods included in all three initiatives included environmental activities such as air pollution, renewable energy, waste management and water treatment. Goods needed to address noise pollution and vibration abatement and natural risk management were only included in two of the three approaches – DDA and EGA, and DDA and APEC, respectively.

³¹ [https://www.international.gc.ca/trade-agreements-accords-commerciaux/topics-domaines/env/plurilateral.aspx?lang=eng#:~:text=On%20January%2024%2C%202014%2C%20Canada,Environmental%20Goods%20Agreement%20\(EGA\).](https://www.international.gc.ca/trade-agreements-accords-commerciaux/topics-domaines/env/plurilateral.aspx?lang=eng#:~:text=On%20January%2024%2C%202014%2C%20Canada,Environmental%20Goods%20Agreement%20(EGA).)

³² Eurostat (2009), "The Environmental Goods and Services Sector", Luxembourg: Office for Official Publications of the European Communities.

³³ "APEC Ministers Responsible for Trade Meeting Joint Statement 2021", Wellington, New Zealand, 5 June 2021, https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Trade/2021_MRT.

Table 2. Categories of goods covered by lists under different initiatives

DDA	EGA	APEC
<i>Air Pollution Control</i>	<i>Air pollution control (APC)</i>	<i>Air Pollution Control</i>
<i>Renewable energy</i>	<i>Cleaner and renewable energy (CRE)</i>	<i>Renewable Energy</i>
<i>Waste Management and Water Treatment</i>	<i>Wastewater management and water treatment (WMWT)</i>	<i>Waste Water Management and Potable Water Treatment</i>
<ul style="list-style-type: none"> • Clean Up or Remediation of Soil and Water • Management of Solid and Hazardous Waste and Recycling Systems • Waste Management, Recycling and Remediation • Waste Water Management and Potable Water Treatment 	<i>Environmental remediation and clean up (ERC)</i>	<i>Management of Solid and Hazardous Waste and Recycling Systems</i>
<i>Environmental Technologies</i>	<i>Environmental monitoring, analysis and assessment (EMAA)</i>	<i>Environmental Monitoring Analysis and Assessment Equipment</i>
<ul style="list-style-type: none"> • Gas Flaring Emission Reduction • Efficient Consumption of Energy Technologies • Cleaner or More Resource Efficient Technologies and Products • Energy Efficiency • Environmental Monitoring, Analysis and Assessment Equipment • Heat and Energy Management • Natural Risk Management • Noise and Vibration Abatement 	<i>Resource efficiency (RE)</i>	
	<i>Energy efficiency (EE)</i>	
<i>Carbon capture and storage</i>	<i>Noise and vibration abatement (NVA)</i>	<i>Natural risk management</i>
<i>Others</i>	<i>Environmentally preferable products (EPP)</i>	<i>Environmentally Preferable Products</i>
<ul style="list-style-type: none"> • Environmentally preferable products • Natural resource protection • Renewable products and energy sources • Resource and pollution management 		

Sources: WTO document JOB/TE/3/Rev.1; Reinsch et al. (2021); and APEC Policy Support Unit, Policy Brief No. 41 (October 2021).

2.3.1.3 Approaches based on activities or projects

2.26. A third approach aims to identify environmental goods based on environmental activities or projects. Under such "project approach", participants would agree on a list of environmental activities and commit to reducing or eliminating tariffs on the associated goods when used for such activities.

2.27. In the context of the *CTESS*, different variants of such an approach were discussed. Under the integrated approach³⁴, Members would first agree on environmental activities of interest to them and then submit a national list of public and private entities that normally carry out the agreed environmental activities in their territories. All goods imported by the notified entities for purposes of carrying out any of the agreed environmental activities would be granted preferential tariff treatment, as agreed by Members.

2.28. Since under this approach there is no common list of environmental goods, it would rely on other control mechanisms, such as import licences and/or post-importation audits to monitor whether or not, following their importation, the products in question were indeed used for their declared environmental purpose. In the course of the discussions on this approach, it was argued that, while the approach may be relatively straightforward to implement in the context of only a

³⁴ JOB(07)/77 (Argentina and India, 6 June 2007).

modest number of authorized public or private entities and projects, it may be challenging for customs authorities to control a significant number of entities or projects.

2.3.1.4 Role of the Harmonized System Nomenclature

2.29. The Harmonized System (HS) nomenclature is an international product nomenclature developed and regularly updated by the Harmonized System Committee (HSC) of the World Customs Organization (WCO), which is used by customs administrations around the world to identify and classify products in their operations. Determining the HS classification is usually the first step in determining a product's relevant import duty and other applicable regulations. The HS comprises approximately 5,000 commodity groups that are uniformly applied around the world.

2.30. The HS classification is based on the objective characteristics and properties of the good in question when presented for importation to customs authorities (e.g. material or substance, function and form in which it is being imported). Other elements, such as their end-use (i.e. how the products will be actually used after importation) or the manufacturing methods used in production of the good are normally not relevant for classification purposes, unless they have an impact on the objective characteristics of the products. These other elements may include, for example, goods that are "of a kind used" for certain activities or designed for a specific use.³⁵

2.31. Generally, tariff negotiators define the list of covered products based on HS codes, which can be expressed in terms of Chapters (2 digits), headings (4 digits), or subheadings (6 digits), or a combination of all three terms. However, it often happens that negotiators would like to cover only some, but not all, of the products falling within a particular HS subheading (i.e. a subset of products with no standard HS code). National tariff lines (i.e. at the 8-digit level or higher) cannot be used because they differ significantly across countries and may also change over time in a particular country. Therefore, tariff negotiators typically rely on the determination of so-called "ex-outs", which are definitions of a subset of products within a particular HS code which would be covered by the agreement. For example, HS 2017 subheading 9405.10 covers "Chandeliers and other electric ceiling or wall lighting fittings (excluding those of a kind used for lighting public open spaces or thoroughfares)", so an ex-out could be used by negotiators to indicate that only trade in a specific type of such devices should be liberalized. For example, if the agreement only covered those devices with an LED light source, this could be expressed as "ex9405.10 Designed for use solely with light-emitting diode (LED) light sources", which would signal that only the tariffs on those products will be liberalized and not the others.

2.32. The HS is an important tool to engage in tariff negotiations not only because it provides a common language to identify products, but also because the results can be directly implemented by the relevant customs administrations. When negotiations are based on HS codes, negotiators simply need to choose which ones to include in the product coverage. However, negotiating ex-outs is a more complicated process. Not only do the specific ex-out descriptions need to be agreed by all participants to the negotiations, but their definition also needs to be sufficiently precise to allow customs officers to identify the products based on their objective characteristics. While this approach has the benefit of allowing for the inclusion of products that may otherwise have been excluded, it is a resource-intensive process that requires customs expertise and extensive information about the products in question (Santana, 2015).

2.33. The EGA is a good example of a negotiation that drew successfully on the expertise of customs officials. In 2015, negotiators established a Customs Working Group (CWG), which brought together customs officers from all the participating Members. The CWG had two main tasks: first, to identify or confirm the HS classification of a nominated product; and, second, to negotiate sufficiently specific product descriptions of relevant environmental goods so that the ex-outs could be implemented by customs officers (i.e. based on their objective characteristics and following the same logic as the HS). This technical work was then looped back to tariff negotiators who would then negotiate whether or not to include the products in question. In this regard, it has been reported that the CWG played a critical role in identifying the classification of numerous products and defining the product descriptions for the proposed ex-outs.

³⁵ One example is HS 2022 subheading 9405.11: "Chandeliers and other electric ceiling or wall lighting fittings, excluding those of a kind used for lighting public open spaces or thoroughfares: Designed for use solely with light-emitting diode (LED) light sources" (emphasis added).

2.34. A final point to note is that the HS is not static. The nomenclature goes through a regular procedure of review and amendment that takes between 4-5 years and takes account of changes in technology and patterns of trade, as well as proposals by HS contracting parties and international organizations to better monitor trade in specific products. These amendments present an opportunity for Members to propose the creation of specific headings or subheadings that are relevant to the implementation of specific agreements. For example, the 2017 version of the nomenclature rearranged and regrouped the manner in which certain advanced semiconductors (MCOs) were classified. This amendment was introduced in order to take into account the parallel discussions that were taking place in the context of the Ministerial Declaration on the Expansion of Trade in Information Technology Products (ITA Expansion).

2.35. According to Steenblik (2020), the HS amendment that entered into force on 1 January 2022 (HS 2022) has significantly facilitated the monitoring of exports and imports of environmentally sensitive products, and the amendment planned for 2027 will be increasingly important for dealing with the world's pressing environmental problems. For example, HS 2017 subheading 9405.10 (Chandeliers and other electric ceiling or wall lighting fittings) was split into separate HS 2022 subheadings to better identify light sources with an LED light source: subheading 9405.11 for those "- Designed for use solely with light-emitting diode (LED) light sources", and subheading 9405.19, for "- Other". As a result, while negotiations based on HS 2017 would have required the negotiation of an ex-out to identify these products, negotiations based on HS 2022 could now be based on the standard HS subheadings that will be used at some point by all customs administrations.

2.3.1.5 The "multiple use" consideration

2.36. One of the most important considerations in identifying environmental goods beyond the six-digit (subheading) level is that some environmental goods may be used for a range of different purposes, some of which may not be environmental in nature. In its 1999 list, the OECD explained this problem as follows:

Many environmental products have a multiplicity of possible uses, many of which are not environmental. For example, separating harmful waste products from the output stream calls for a centrifuge. Yet centrifuges have a host of industrial uses, involving situations in which portions of a substance need to be separated for ordinary industrial reasons. One report estimates that 10% of centrifuge sales are for environmental purposes. Similar conditions hold for most environmental products, including pumps, filters, incinerators and chemicals which bind polluting substances. This multiple use problem complicates the process of estimating industry size. Inevitably one must either exclude certain products with clear environmental uses or run the risk of including some sales, production, trade, etc. in products which are of non-environmental use.³⁶

2.37. As theirs was largely an academic and illustrative exercise, the OECD listed the products at the HS six-digit (subheading) level, acknowledging that it was too broad because those subheadings also included goods that were not environmental goods.

2.38. Tariff negotiators have two options in case of possible multiple uses and where only a small portion of an HS subheading meets the objective of the agreement: either liberalize trade in all the relevant subheading and accept that the product may also be used for other purposes than the intended environmental objective; or, alternatively, use ex-outs and therefore try to narrow down the specific characteristics of the products used for environmental purposes with a view to eliminating, or at least reducing, the multiple-use issue.

2.39. Discussions in the CTESS revealed a number of technical challenges related to the identification and classification under the HS and the multiple use consideration. Concerns were raised particularly by developing countries, which proposed alternatives. It was suggested that for the identification of environmental goods, criteria relating to sustainable development could be applied by Members in line with their own principles and regulations, the multilateral agreements they had ratified, and their development priorities. The project-based approach was highlighted as being better able to deal with the multiple use challenge as there were few environmental goods as

³⁶ OECD (1999), p. 9.

such and that goods would become environmental only when they were used for environmental activities.

2.40. To facilitate the identification of environmental goods, the proposed lists of environmental goods included some ex-outs. Among the 409 tariff lines that make up the universe of environmental goods in the proposed lists, 55% refer to ex-outs. Some Members have expressed concerns about the potentially high levels of administrative complexity and transaction costs related to establishing and implementing ex-outs for a large number of products.³⁷ It was acknowledged that additional technical work between environment, trade and customs experts is needed to operationalize the proposed ex-outs.

2.41. In the EGA negotiations, participants decided to try to identify as much as possible the goods used for environmental purposes with a view to eliminating, or at least reducing, the multiple use problem. Approximately two-thirds of the list consisted of ex-outs. This was a resource-intensive process that required detailed information on both the technical specifications of products and their end-use. To enhance transparency and facilitate this process, a large volume of information was exchanged by participants via a secure and confidential website.

2.3.2 Tariff treatment

2.42. Tariff initiatives can differ significantly in terms of their negotiating objectives and types of duty being negotiated. The most common objectives in past sectoral initiatives at the WTO have been to harmonize the duty levels across countries (harmonization initiatives), or to fully eliminate tariffs for all participants (also known as "zero-for-zero" initiatives).³⁸ On the type of duty subject to the negotiations, the possibilities include to reduce or eliminate tariffs:

- through reciprocal preferences under a broader regional trade agreement or customs union, as well as through non-reciprocal preferences under preferential trade arrangements;
- by modifying the tariffs applied in practice by Members on a most-favoured-nation basis (i.e. the MFN applied tariffs); or
- by modifying the maximum duty level that a Member has agreed to levy on the importation of specific goods originating in other WTO Members (i.e. the bound duties), as provided for in their WTO Schedules of concessions.

2.43. The combination of these factors is reflected in the multiplicity of approaches followed in past environmental goods negotiations.

2.44. The APEC initiative on environmental goods is an example for the voluntary and coordinated modification of MFN applied tariffs. In 2012, APEC economies agreed to voluntarily reduce MFN applied tariff rates to 5% or less on a list of 54 environmental goods at the HS six-digit level by the end of 2015. No differentiation was made among APEC economies regarding the product coverage, magnitude of tariff reductions and implementation period, likely reflecting the voluntary and non-binding nature of this commitment. As of March 2021, 19 out of 21 APEC economies are fully compliant with regard to the APEC-EGL.³⁹

2.45. DDA and EGA negotiations reflect efforts to achieve a reduction or elimination of bound duties in Members' Schedules of concessions at the WTO. In multilateral negotiations in the CTESS, each proposed approach included options for the precise mode of tariff treatment, including with regard to S&D treatment for developing Members. Three tenets of S&D treatment were proposed: (i) lower levels of tariff cuts for developing Members; (ii) on fewer goods; and (iii) over a longer time-period.

2.46. Under the list approach, proposals were made to establish different lists of environment goods to provide Members with flexibilities with regard to tariff treatment of some of them. For instance, it was suggested that all Members would be required to eliminate tariffs on all goods on a "core list" by a certain date, while for a "complementary list", Members would be required to eliminate tariffs only on a given share of self-selected goods, with the share being smaller for developing Members.⁴⁰ Another proposal suggested the creation of a "development list", which would comprise products

³⁷ TN/TE/R/18 (Note by the WTO Secretariat, 8 June 2007).

³⁸ See TN/MA/S/13.

³⁹ APEC news release: https://www.apec.org/Press/News-Releases/2016/0128_EG

⁴⁰ TN/TE/W/38 (United States, 7 July 2003).

selected by developing and least developed Members from a multilaterally agreed list for liberalization ("common list") for exemption or a lower level of reduction commitment.⁴¹

2.47. Under the request and offer approach, the precise tariff commitments undertaken by Members would be the result of voluntary bilateral negotiations on the basis of requests and offers. The agreed outcomes of these negotiations would be multilateralized in accordance with the MFN principle. A given number of offer rounds would be organized to ensure balance in the basket of concessions, taking into account differences in levels of development among Members.

2.48. Another proposal included a number of guidelines for S&D treatment that would be applicable to any approach under consideration, including substantially lower tariff reduction levels and longer implementation periods for developing than for developed Members. On products of export interest to developing Members, developed Members should consider reducing or eliminating tariffs (and non-tariff barriers) over a shorter implementation period. In order to reflect the principles of S&D treatment, developing Members should be allowed to adapt the scope of their liberalization commitments to their development and trade needs and, thus, be allowed to exclude products of development interest from trade liberalization.⁴²

2.49. In the *EGA*, participants sought to fully eliminate tariffs on environmental goods, and to bind them at duty-free levels in their respective WTO Schedules of concessions. These new tariff elimination commitments would only be applied by the participating Members, making it a "plurilateral" agreement. However, the tariff elimination would have been applied on a most-favoured-nation basis because the concessions would be incorporated into the participants' respective WTO Schedules, which are multilateral legal instruments. It has been reported that some participants proposed to allow developing country participants to retain tariffs of up to 5% on 5% of the products in the list. However, Reinsch, Benson and Puga (2021) note that this was opposed by other participants, who preferred to follow the 1996 ITA and 2015 ITA Expansion models, where no exceptions to the product coverage were allowed, and where no specific special and differential treatment provisions were provided for developing countries and LDCs. Rather, special sensitivities would be taken into account through the staging of the concessions (see next section).

2.3.2.1 Implementation of tariff reduction or liberalization (staging)

2.50. In terms of implementation, the question relates to the determination of how tariff reductions or eliminations will take place over time, which has to do both with the duration and the magnitude of the reductions.⁴³

2.51. *EGA* negotiators sought to follow the same staging methodology that had been adopted in the 2015 ITA Expansion, and would have included four baskets: (i) immediate elimination upon entry into force of the agreement, which would apply to the majority of the products (e.g. 75% of the products in the list); (ii) a three-year phase-out in four equal annual instalments; (iii) a five-year phase-out in six equal annual instalments; and (iv) a seven-year phase-out in eight equal annual instalments, which would only be used in exceptional circumstances and reserved for only the most sensitive products (ICTSD, 2016). A report by the WTO Secretariat summarizes the ITA Expansion approach as follows:

Similar to the 1996 ITA, the group decided not to include general provisions on special and differential treatment among participants or to allow for exceptions to the final product coverage. Three-year staging in four equal annual reductions was to be applied as "standard" staging, with the possibility for extended staging for individual participants based on their sensitivities to be considered on a product-by-product basis. The participants further agreed that extended staging should not go beyond five years,

⁴¹ TN/TE/W/42 (China, 6 July 2004).

⁴² TN/TE/W/76 (Argentina and Brazil, 30 June 2010).

⁴³ In the WTO context, the usual practice has been for tariff reductions to take place in "equal annual instalments", meaning that reductions of an equal magnitude are applied by the concerned Member until the duty is reduced to the agreed level or completely phased out. However, it is also possible to agree to implement the new concessions immediately (i.e. without transition period), to have "front-loading" (i.e. the initial reductions are of a larger magnitude than the subsequent ones), or to have "back-loading" (i.e. the initial reductions are relatively smaller and larger reductions take place during the last stages).

with six equal annual reductions, though longer staging up to a maximum of seven years could be considered in exceptional circumstances and for highly sensitive products.⁴⁴

2.52. In the CTESS, it was proposed, *inter alia*, that tariffs on a multilaterally agreed list of environmental goods would be eliminated no later than a given deadline year for developed Members (and those developing Members declaring themselves in a position to do so), while all developing Members would eliminate tariffs X years thereafter. LDCs were encouraged to examine where tariff reductions in bound and applied rates may be beneficial to achieving their sustainable development goals.⁴⁵

2.53. In 2012, APEC leaders agreed to implement reductions in MFN applied tariffs on the 54 goods contained in the APEC-EGL over a period of three years (by the end of 2015). Most APEC economies have been able to implement this voluntary commitment, with a number of them taking more than the three years originally envisaged.

2.3.3 Additional points of discussion

2.54. Beyond the above-mentioned elements, which have been addressed in the context of most environmental goods negotiations, two additional considerations came up in the EGA negotiations: the need to introduce a "critical mass" requirement; and any ways to "future proof" the list of environmental goods.

2.55. Some Members have expressed in the course of the EGA negotiations the concern that a "free-rider" situation could arise from having plurilateral tariff negotiations that will then be applied on an MFN basis. Because the tariff liberalization would be bound in the WTO Schedules of concessions, and the new duty-free concessions would have to be applied immediately and unconditionally to all WTO Members, there could be cases where these market access opportunities benefit countries that do not participate in the agreement, i.e. without requiring equivalent concessions from them. In order to address this concern, both the 1996 ITA and the 2015 ITA Expansion applied a "critical mass" requirement, whereby the agreement would only be implemented once participants accounting for at least 90% of the trade in the relevant products had joined the agreement.⁴⁶ EGA negotiators also discussed a number of technical aspects surrounding the critical mass concept, including: whether to adopt the same minimum 90% threshold; which data should be used for the calculation (i.e. export statistics or both export and import statistics); and whether the critical mass would need to be a one-off exercise, as in the ITA and ITA Expansion, or whether this should be a continued exercise even after entry into force of the EGA.

2.56. A second broad point of discussion for EGA negotiators was that they were negotiating products undergoing rapid technological innovation, resulting in a risk of the list of products quickly becoming obsolete, or that products that were considered to be "environmental" at a given point in time would no longer be considered as such shortly afterwards. EGA negotiators referred to this as a question of how to "future proof" the list, and of how to make the EGA a "living agreement".⁴⁷ At some point, one participant proposed to have "annual or biannual suggestions for further tariff liberalization for new innovative environmental products, dealing with definitional issues and/or situations where there was a good case that a component that had dual-use character was a core component for the environmental end-product to implement the 'living agreement'".⁴⁸ It has been

⁴⁴ WTO Secretariat (2017), "20 Years of the Information Technology Agreement: Boosting trade, innovation and digital connectivity", p. 62.

⁴⁵ TN/TE/W/65 (Canada, European Communities, New Zealand, Norway, Singapore, Switzerland, and United States, 9 May 2006).

⁴⁶ See paragraph 4 of the Annex to the Ministerial Declaration on Trade in Information Technology Products (1996 ITA, WT/MIN(96)/16), and paragraph 7 of the Declaration on the Expansion of Trade in Information Technology Products (2015 ITA Expansion, WT/L/956).

⁴⁷ In a report from 8 September 2015, the European Commission noted that "the intention is for the EGA to become a 'living agreement' which would allow the addition of new products in the future". <https://trade.ec.europa.eu/doclib/press/index.cfm?id=1116>

⁴⁸ European Commission (2018), "The European Services' Position Paper on the Sustainability Impact Assessment in Support of Negotiations on the Environmental Goods Agreement EGA", dated September 2018. This document noted that "A future oriented EGA should have the "living agreement" mechanism to allow for the incorporation, as appropriate, of additional environmental goods in order to respond to rapid technological developments in the environmental sector, pressing environmental challenges, policy and regulatory

reported that, although some participants considered that this would have been too prescriptive, there was a common understanding that the product coverage would be periodically reviewed.

2.57. In the CTESS negotiations, it was suggested that negotiators should seek to ensure that any agreed set of environmental goods does not remain static over time to allow Members to have access to the best available technologies, the so-called "living list" approach. It was suggested that a review mechanism be created to keep up to date any set of items selected for liberalization.⁴⁹

2.58. In June 2021, APEC Trade Ministers affirmed their readiness to build on the APEC-EGL with the acknowledgement that since 2012 new environmentally friendly goods, technologies and innovations had emerged that were not covered by the APEC-EGL.⁵⁰ A 2021 study indicated that APEC members could consider an approach to expanding their environmental goods list that is focused on new and emerging renewable energy products and technologies that contribute to emissions reduction and mitigation. Presenting an illustrative list of 21 environmental goods for renewable energy generation, transport, storage, trade and use, the study also suggested that such update would need to account for whole of value chains and be capable of being expanded, updated and built on over time (APEC, 2021a).

2.3.4 Non-tariff barriers

2.59. As with import tariffs, market access conditions may also be nullified or impaired by non-tariff barriers (NTBs), which by definition include all other measures beyond the application of ordinary customs duties. The term is broad in nature and generally understood to encompass measures such as local content requirements; non-automatic import licensing procedures; standards, technical regulations and conformity assessment procedures; labelling requirements; and subsidies, among others.

2.60. In the DDA negotiations, Members stressed the importance of NTBs in the mandate contained in Paragraph 31(iii) of the Doha Ministerial Declaration. It has been noted that, while the elimination of tariffs is an important means of making environmental goods more affordable and widely available, NTBs can be equally or even more significant impediments to trade in such goods.⁵¹ Overall, however, only limited work was undertaken on NTBs in the CTESS.

2.61. Members have identified broad categories of measures that may act as possible NTBs to trade in environmental goods. For example, intellectual property rights and standards, conformity assessment procedures and labelling are possible NTBs identified that could inhibit the dissemination of environmental technologies.⁵² Similarly, Members noted that patents on environmentally sound technologies could represent a non-tariff barrier. Members also noted that when environmental goods are subject to NTBs, approval, mutual recognition procedures and financial and technological support measures could facilitate the entry of environmental goods into the markets of developed Members.⁵³

2.62. Members have also included suggestions on NTBs in their submissions with regard to negotiating approaches. For instance, it was suggested that Members could identify product-specific NTBs for discussion once product coverage of a common core list had been determined.⁵⁴ Another suggestion was that domestic requirements could be relaxed for the effective conduct of agreed environmental activities under an integrated approach, and that a structured work programme could be established to address other NTBs faced by developing Members.⁵⁵ Members also underlined the

developments, market developments, shifts in trade, changes to the HS nomenclature or experience gained in applying the EGA." See https://trade.ec.europa.eu/doclib/docs/2019/march/tradoc_157727.pdf.

⁴⁹ JOB(07)/54 (Canada, European Communities, Japan, Republic of Korea, New Zealand, Norway, Chinese Taipei, Switzerland, United States, 27 April 2007). See also the proposal by New Zealand to make the lists of environmental goods "living lists", TN/TE/W/46 (New Zealand, 10 February 2005).

⁵⁰ "APEC Ministers Responsible for Trade Meeting Joint Statement 2021, Wellington, New Zealand, 5 June 2021, https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Trade/2021_MRT.

⁵¹ TN/MA/W/70-TN/TE/W/65 (Canada, European Communities, New Zealand, Norway, Singapore, Switzerland and United States, 9 May 2006).

⁵² JOB(09)/169/Add.2 (Kingdom of Saudi Arabia, 21 July 2010).

⁵³ TN/TE/W/69 (Cuba, 30 June 2006).

⁵⁴ JOB/TE/15 (Australia, Colombia, Hong Kong (China), Norway and Singapore, 7 March 2011).

⁵⁵ JOB(07)/77 (Argentina and India, 6 June 2007).

need to address and reduce specific NTBs on particular goods, including any time-consuming and burdensome customs formalities, to facilitate trade in environmental goods.⁵⁶

2.63. In the EGA, participants discussed the possibility of establishing a work programme that would have allowed participants to discuss the NTBs affecting trade on the environmental goods covered by the agreement.

2.64. Regarding approaches in RTAs, under Article 2.5 (Non-Tariff Measures) of the ANZTEC, Parties will endeavour to address any NTB identified by either Party that impedes trade in environmental goods or services. Article 17.3 (Environmental Goods and Services) similarly endeavours to address any NTB identified that could impede the trade in environmental goods and services. In cases where NTBs are identified, the Joint Commission established under the Agreement in Chapter 22 (Institutional Provisions) will seek to resolve differences or disputes.

2.65. A recent policy brief by the APEC Secretariat categorized 223 NTBs that affect the APEC-EGL into eight types of NTBs: (i) contingency trade-protective measures; (ii) non-automatic import-licensing procedures, prohibitions other than authorizations for SPS or TBT reasons; (iii) internal taxes and charges levied on imports; (iv) local content measures; (v) subsidies (excluding export subsidies); (vi) government procurement measures; (vii) export-related measures (subsidies, licences or quotas); and (viii) other measures. The biggest share of these NTBs was export-related measures, which were followed by subsidies and local content measures (APEC, 2021b).

2.3.5 Development issues

2.66. The participation of developing Members in initiatives to liberalize trade in environmental goods has been limited so far. In the CTESS, a number of developing countries participated actively, including through formal submissions. Certain developing Members, including Argentina and India, suggested approaches towards advancing the discussions through the integrated approach, while Brazil had instead suggested the request and offer approach. More broadly, submissions were made by Argentina; Brazil; Bolivia; Chile; Colombia; Cuba; India; Korea; Mexico; Hong Kong, China; Singapore; Peru; the Philippines; Qatar; Saudi Arabia; Chinese Taipei; and Venezuela.

2.67. At the launch of the EGA negotiations in 2014, six developing Members (China; Costa Rica; Hong Kong, China; Republic of Korea; Singapore; and Chinese Taipei) joined initially the negotiations, while Turkey joined later. Meanwhile, 14 out of 21 APEC Member economies represent developing economies.

2.68. According to De Melo and Solleder (2020a), the low participation of developing Members reflects concerns about the negotiation of lists "would include mainly industrial products and exclude environmentally preferable products (EPPs) in which developing countries have a comparative advantage but which would meet resistance at the WTO. Fears also include little new access to markets where tariffs are already very low, an import surge in their own markets, and the fear that their domestic markets are too small to develop viable industries in EGs, if only because to develop EGs one needs environmental regulations in the first place."

2.69. As part of the negotiations in the CTESS, a number of developing Members underlined the importance of transfer of technology and support for the development of environmental technologies. In their view, an important outcome of the negotiations should be to strengthen the environmental goods sector in developing Members, including through technology transfer and capacity building, considering that this sector is "only now emerging in most developing countries".⁵⁷ Some Members had proposed a technology transfer mechanism in the WTO, "technology pools" accessible to developing Members and "new and additional financing" for "joint technology excellence centres" in developing Members.⁵⁸ In addition, a financial mechanism to ensure access to and the development of these technologies, investments in environmental projects, and capacity

⁵⁶ TN/TE/W/65 (Canada, European Union, New Zealand, Norway, Singapore, Switzerland and United States, 9 May 2006).

⁵⁷ See documents JOB(06)/194 (Argentina, Bolivarian Republic of Venezuela, Brazil, Egypt, India, Indonesia, Namibia, Philippines, South Africa and Tunisia, 19 June 2006), and JOB(06)/149 (Colombia, 19 May 2006).

⁵⁸ JOB/TE/17 (Plurilateral State of Bolivia and Bolivarian Republic of Venezuela, 24 March 2011).

development for the production of environmental goods in developing Members were also suggested by Members.⁵⁹

2.4 Environmental services

2.70. This section provides an overview of some of the key issues raised in previous work on environmental services in the WTO.⁶⁰ It is largely based on discussions held in the CTS-SS since MC-11⁶¹, as well as on earlier discussions during the negotiation of specific commitments pursuant to the GATS' built-in mandate, particularly during the period between 2000 and 2008.⁶²

2.71. The section is divided into three parts. The first part provides some background on trade in environmental services, including as regards to the scope of the sector and restrictions to trade under different modes of supply. The second part addresses the identification of environmental services for the purpose of trade negotiations, which has been an area of focus in the WTO's services market access negotiations. Members' proposals on the classification of environmental services are briefly discussed in this context. The third part describes Members' specific commitments on environmental services under the GATS and discusses services offers made during multilateral negotiations. It also highlights the extent to which GATS+ commitments have been undertaken by Members in RTAs.

2.4.1 Background

2.4.1.1 What is the scope of the environmental services sector?

2.72. The scope of the environmental services sector is not clearly defined at the multilateral level. When the sector was first discussed in the WTO, environmental services were commonly understood to include infrastructure services supplied by municipal utilities, such as waste water treatment, waste management, sanitation, as well as a few other services including as they relate to end-of-pipe pollution.⁶³

2.4.1.2 How are environmental services traded?

2.73. Services trade is defined under the GATS as encompassing four modes of supply, namely cross-border supply (mode 1), consumption abroad (mode 2), commercial presence (mode 3) and the movement of natural persons (mode 4).⁶⁴ All four modes of supply are relevant to environmental services trade, though their importance varies depending on the services concerned.

⁵⁹ TN/TE/W/79 (China and India, 15 April 2011).

⁶⁰ Work on environmental services at the WTO has been conducted mainly in the Special Session of the Council for Trade in Services (CTS-SS). Issues related to the classification of environmental services have also been discussed in the Committee on Specific Commitments (CSC). While environmental services are mentioned in Paragraph 31(iii) of the Doha Ministerial Declaration, work on services has been limited in the CTESS where Members acknowledged that the provision of environmental services is closely linked to trade in related goods. Other initiatives outside of the WTO aimed at facilitating trade in environmental services are also mentioned in this section when relevant.

⁶¹ These discussions have focused on three communications by groups of Members on environmental services, namely Communication from Australia, Canada, Republic of Korea, Mexico, New Zealand and Switzerland (JOB/SERV/293/Rev.2); Communication from Australia, Canada, European Union, Republic of Korea, Mexico, New Zealand, Switzerland and United Kingdom (JOB/SERV/299/Rev.3); and Communication from Australia, Canada, Republic of Korea, Mexico, New Zealand, Switzerland and United Kingdom (JOB/SERV/308).

⁶² The built-in mandate of negotiation is contained in GATS Article XIX, which calls for "successive rounds of negotiations ... with a view to achieving a progressively higher level of liberalization [...]". The negotiations cover all services within the scope of the GATS, including environmental services.

⁶³ Various definitions of environmental services were used in other contexts. The OECD/Eurostat definition, for instance, covers activities falling under three broad categories, namely Pollution Management (including air pollution control, wastewater management, solid waste management, remediation and clean up of soil and water, noise and vibration abatement, and monitoring, analysis and assessment); Cleaner technologies and products; and Resource management. See also WTO (2019), "World Trade Report – The Future of Services Trade", p. 121.

⁶⁴ Trade in services is defined in Article I:2 of the GATS as "the supply of a service: (a) from the territory of one Member into the territory of any other Member; (b) in the territory of one Member to the

2.74. Commercial presence (mode 3) is the predominant mode of supply for the environmental services sector. As many environmental services are infrastructure-dependent and require a continuous and long-term local presence in the territory, it is important for foreign firms to be able to establish and operate affiliates abroad, or to invest in local companies. Commercial presence is a vehicle to ensure additional investment and transmission of technology and know-how. The supply of environmental services through the movement of natural persons (mode 4) is also particularly relevant for the sector. It enables firms to send abroad managers or technicians with specialized skills when operating through affiliates and allows professionals, such as environmental consultants, to physically supply their services abroad.

2.75. Cross-border supply (mode 1) had limited commercial significance at the time the GATS entered into force but the advancement of technology has opened new opportunities for trade under this mode. This is the case, for instance, with technology that makes it possible to operate environmental facilities or equipment remotely. Also, more generally, it is now easier to provide information and advice over the Internet and other communication networks, thereby allowing for various types of environmental services to be provided in this manner. Consumption abroad (mode 2) involves the supply of a service to the consumer or its property in the territory of the supplier. This mode of supply would cover activities such as the dismantling of ships, cars or computers for the purpose of recovering materials that could be reused or recycled.

2.4.1.3 Examples of trade restricting measures in the environmental services sector

2.76. Restrictions affecting services trade are mostly regulatory in nature. Such measures may impede the ability of a foreign service provider to supply its services in a particular market (limitations on market access), or they may affect the conditions of competition of a foreign supplier after it has entered the foreign market, e.g. by extending more favourable conditions to domestic suppliers (limitations on national treatment).

2.77. Several impediments to trade in environmental services affect the supply of environmental services through a commercial presence. These may include, for instance, limitations on the types of legal entity, such as incorporation requirements; restrictions on the number or location of subsidiaries; discrimination against foreign companies (e.g. high registration fees and discriminatory taxes, equity limitations); and restrictions on the ownership of specific assets, such as landfills and sewage systems. Other restrictions can affect the movement of key personnel, such as managers, professionals and experts.⁶⁵

2.78. Other problems encountered by exporters of environmental services include a general lack of regulatory transparency; weak or inconsistent enforcement of environmental regulations; unnecessary delays in licensing and certification procedures; difficulties in transferring or acquiring the necessary equipment (e.g. because of high import tariffs levied, even when the equipment is imported for a short period); or an obligation to use local inputs. Measures affecting trade in related services (e.g. architectural services or engineering), or environmental goods trade can also affect the provision of environmental services.⁶⁶

2.4.2 Identification of environmental services for trade negotiation purposes

2.79. The two key instruments used by Members for the purpose of scheduling their GATS commitments on environmental services are the Services Sectoral Classification List (W/120 list) and the provisional version of the UN Central Product Classification (CPC prov.).

2.80. In the W/120 list, the environmental services sector is broken down into four sub-sectors, namely "6.A – Sewage services" (CPC 9401); "6.B – Refuse disposal services" (CPC 9402); "6. C – Sanitation and similar services" (CPC 9403); and "6.D – Other". The "Other" category does not refer to the CPC but several Members have undertaken specific commitments under 6.D on the remaining sub-sectors in Division 94 of CPC prov., namely "Cleaning of exhaust gases" (CPC 9404); "Noise

service consumer of any other Member; (c) by a service supplier of one Member, through commercial presence in the territory of any other Member; (d) by a service supplier of one Member, through presence of natural persons of a Member in the territory of any other Member."

⁶⁵ See Council for Trade in Services, Note by the Secretariat, "Background note on Environmental Services" (S/C/W/320).

⁶⁶ See e.g. Nordås and Steenblik (2021); Sauvage and Timiliotis (2017); APEC (2016).

abatement services" (CPC9405); "Nature and landscape protection services" (CPC 9406); and "Other environmental protection services not elsewhere classified" (CPC 9409).⁶⁷

2.81. In past discussions, some Members have expressed the view that the classification in W/120 and CPC prov. is based on a narrow definition of environmental services and does not reflect the evolving structure of the environmental industry. It was argued that by focusing on pollution control and waste management, the classification fails to account for a range of environmental services, including activities relating to the prevention and remediation of pollution, cleaner technologies and resource management.⁶⁸

2.82. In the early stages of the negotiations under GATS Article XIX, the European Union and Switzerland tabled proposals on the classification of environmental services.⁶⁹ These proposals suggested to restructure the environmental services category around seven sub-sectors based on the environmental media (e.g. air, water, soil, waste, noise, etc.). In their view such categorization would better reflect how environmental services providers tended to specialize. Several questions were raised by Members regarding the proposals by the European Union and Switzerland, in particular on the concordance between the proposed new headings and the relevant definitions under the CPC prov.⁷⁰ Furthermore, for some Members that had already scheduled commitments based on W/120 and CPC prov., it was unclear whether modifying the classification would amount to a mere technical change, or to a more substantive change that could possibly alter the scope of the commitments.

2.83. In recent submissions and discussions on market access in the CTS-SS, some Members have argued that the scope of the environmental services sector should be expanded to include "related" services, i.e. services classified under other sectors of the CPC, which either support environmental activities or facilitate the supply of "core" environmental services.⁷¹ It was noted that, in addition to "core" environmental services, there are many other service sectors where international trade liberalization and improved GATS commitments could contribute to advancing global environmental goals.⁷² Examples of such services included: advisory and consultative engineering services (e.g. for environmental impact assessments); architectural design services (e.g. on the choice of energy efficient materials in building projects); construction services (e.g. construction of water and sewer mains); and distribution services (e.g. wholesale trade services of waste and scrap and materials for recycling).⁷³

2.84. The inclusion of "related" services as part of the scope of environmental services for trade liberalization purposes may raise certain issues, particularly regarding the treatment of "multiple use" services, i.e. services that are not exclusively used for environmental purposes. Some Members have expressed concerns that expanding the scope of environmental services to include related services may result in the liberalization of sectors that are not beneficial for the environment.⁷⁴

2.85. Various approaches have been considered to address the issue of "multiple use" with regard to environment-related services.⁷⁵ One approach consists in establishing an "inventory" of activities

⁶⁷ It is noted that the Services Sectoral Classification List and its related CPC Prov. categories are not mandatory. While most Members have listed their commitments based on the structure and headings of the W/120 classification list, referencing the corresponding CPC definitions, a few Members have used W/120 but have not included CPC definitions; in some cases, alternative definitions have been provided.

⁶⁸ See e.g. Committee on Specific Commitments, Informal Note by the Secretariat, "Environmental Services: Overview of Classification Issues" (JOB/SERV/84, 31 August 2011).

⁶⁹ See Proposals by the European Communities (S/CSS/W/38) and Switzerland (S/CSS/W/76).

⁷⁰ See Informal Note by the Secretariat, "Environmental services: Overview of Classification Issues" (31 August 2011) in JOB/SERV/84, p. 3. Several Members used the proposed new headings and subheadings in their Services offers and revised offers on environmental services.

⁷¹ See in particular the communication by Australia, Canada, European Union, Republic of Korea, Mexico, New Zealand, Switzerland and United Kingdom (JOB/SERV/299/Rev.3, 29 June 2021).

⁷² See JOB/SERV/308.

⁷³ See also Nordås and Steenblick (2021) for indicative lists of services identified on the basis of an environmental end-use as well as "environmentally relevant services" classified under different divisions of CPC 2.1.

⁷⁴ See e.g. Council for Trade in Services in Special Session, Summary by the Chairperson – Informal Meeting of 21 October 2020 in JOB/SERV/303.

⁷⁵ See for instance Proposals by the United States (S/CSS/W/25); European Union (S/CSS/W/38);

that contribute to the provision of environmental services, or that have clear environmental end-uses. Such environment-related services could be listed as part of a "cluster" or "check-list" that is used as an aide-mémoire during negotiations.⁷⁶ Any commitment undertaken on services included in the cluster could be scheduled in the relevant (non-environmental) sectors.

2.86. It is noted that services related to climate change are likely to include a range of services reaching beyond the "core" environmental services identified in Division 94 of the CPC. Services required for the provision of renewable energy, energy efficiency or low emissions technologies, for instance, would likely fit under other services sectors.⁷⁷ These may include services such as project development advice, construction, design, engineering and consultancy, R&D, financing, operational management, training and education, analytical services, testing and analysis, installation, repair and maintenance services, computer-related services; and telecommunication services.⁷⁸

2.87. In a joint proposal tabled under Paragraph 31(iii) of the Doha Declaration, the United States and European Union argued that services that enabled Members to fulfil climate-change-related objectives included not only environmental services (such as air pollution control and climate control services) but also technical testing and analysis services (e.g. air composition and purity testing services); energy-related services (e.g. engineering and maintenance services to optimize the environmental performance of energy facilities); and services for the design and construction of energy-efficient buildings and facilities.⁷⁹

2.4.3 Environmental services in GATS schedules of commitments and offers during the multilateral services trade negotiations

2.88. Specific commitments under the GATS are the undertakings that individual Members enter into regarding market access, national treatment, as well as additional commitments.⁸⁰ These commitments are listed in Members' Schedules, which form an integral part of the GATS.

2.89. The number of Members with GATS commitments in the environmental services sector (sector 6) is relatively low compared to other sectors of the W/120 list.⁸¹ 59 schedules (counting EU-25 as 1) include specific commitments in at least one of the seven environmental services sub-sectors listed in the CPC prov.⁸² The low level of commitments in the environmental services sector may be explained in part by the fact that, at the time of the Uruguay Round, awareness of the need to protect the environment was not as widespread as it is today. The participation of the private sector in the provision of these services was also more limited.

2.90. The chart below shows the average level of treatment bound by mode of supply for the environmental services sub-sectors committed in schedules. About 38% of Members' commitments under mode 1 (cross-border trade) are fully bound (i.e. no limitations); 32% are partially bound; and 30% are unbound. There is a high proportion of full commitments under mode 2 (71% on average). With respect to mode 3 (commercial presence), the proportion of full commitments is 57%

Canada (S/CSS/W/51); Switzerland (S/CSS/W/76); and Australia (S/CSS/W/112). See also Communication from Australia, European Communities, Japan, New Zealand, Chinese Taipei and United States (TN/S/W/28), highlighting the potential overlaps of environmental services with services classified in other sectors under the CPC, such as R&D, technical analysis services, engineering etc. The proponents argue that it should not be necessary to create a specific sub-category in a revised classification of environmental services for these services; any commitments should cover the environment-related activity in the relevant service sectors, in addition to "core" environmental services, consistently across sectors.

⁷⁶ A similar approach was proposed for energy-related services.

⁷⁷ See Committee on Specific Commitments, "Services related to climate change", Informal Note by the Secretariat (JOB/SERV/100, 11 June 2012).

⁷⁸ See JOB/SERV/100.

⁷⁹ Proposal for a Result under Paragraph 31(iii) of the Doha Ministerial Declaration, Non-paper by the European Union and the United States (JOB(07)/193/Rev.1, 6 December 2007).

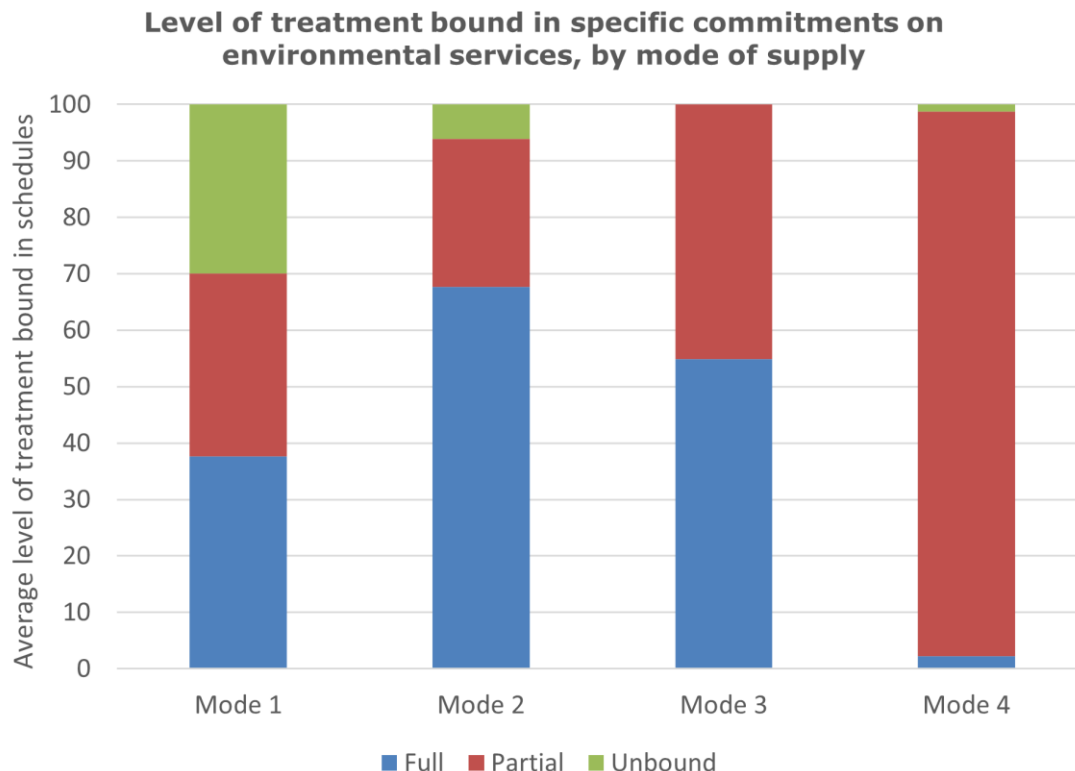
⁸⁰ The relevant disciplines on market access and national treatment are set out in Articles XVI and XVII of the GATS. Members may also undertake "additional commitments" with respect to measures affecting trade in services that are not subject to scheduling under GATS Articles XVI and XVII, including as regards qualifications, standards or licensing matters (GATS, Article XVIII).

⁸¹ "Environmental Services", Note by the Secretariat (S/C/W/320, August 2010).

⁸² The level of commitments on environmental services is notably higher in the case of recently acceded Members.

on average. Further, no Member has left mode 3 totally unbound. Commitments under mode 4 (movement of natural persons) are primarily partial commitments.

Figure 1: Level of treatment bound in specific commitments on environmental services, by mode of supply



2.91. It may be noted that, in their schedule, several Members have inscribed annotations or conditions in sectoral headnotes or at the sub-sectoral level, for instance to limit the type of services covered under the various committed sub-sectors. For instance, several Members have limited their commitments to consulting and/or advisory services in relation to environmental services, either across the entire range of committed sectors or with respect to some sub-sectors only.⁸³ In addition, several types of limitations listed in the horizontal section of Members' Schedules (which apply to all sectors listed) may be relevant to the environmental services sector. These include for instance limitations on real estate ownership or lease, foreign equity limitations, residency or nationality requirements for directors, minimum capital requirements, technology transfer requirements or the obligation to train local employees.

2.92. In the context of the multilateral services negotiations initiated in 2000, 25 Members had offered new or improved commitments in the sector.⁸⁴ At the "Signalling Conference" held in 2008 at Ministerial level, a number of Members shared further indications on areas where they would be willing to undertake new and improved commitments, subject to a successful conclusion of the overall negotiations.⁸⁵ Several participants also expressed their willingness to reduce or eliminate trade restrictive measures in this area. While these aspirations did not materialize because of the

⁸³ The exclusion is indicated either in a sectoral headnote or at the level of the sub-sectors concerned.

⁸⁴ For sewage services (6.A), five Members offered improved to their existing commitments in this sector, while eight Members that had no commitments in the subsector, offered new commitments. For refuse disposal services (6.B), seven offered to improve existing commitments and 9 offered new commitments. With respect to sanitation and similar services (6.C), four Members proposed improvements and 10 offered new commitments. Offers in other environmental services (6.D) were more numerous, with 10 Members proposing improvements to existing bindings, and 10 others offering new commitments.

⁸⁵ See Chairman's report to the Trade Negotiations Committee (JOB(08)/93, 30 July 2008).

overall slowdown in the negotiations, many Members have continued to undertake GATS+ commitments on environmental services in their RTAs.

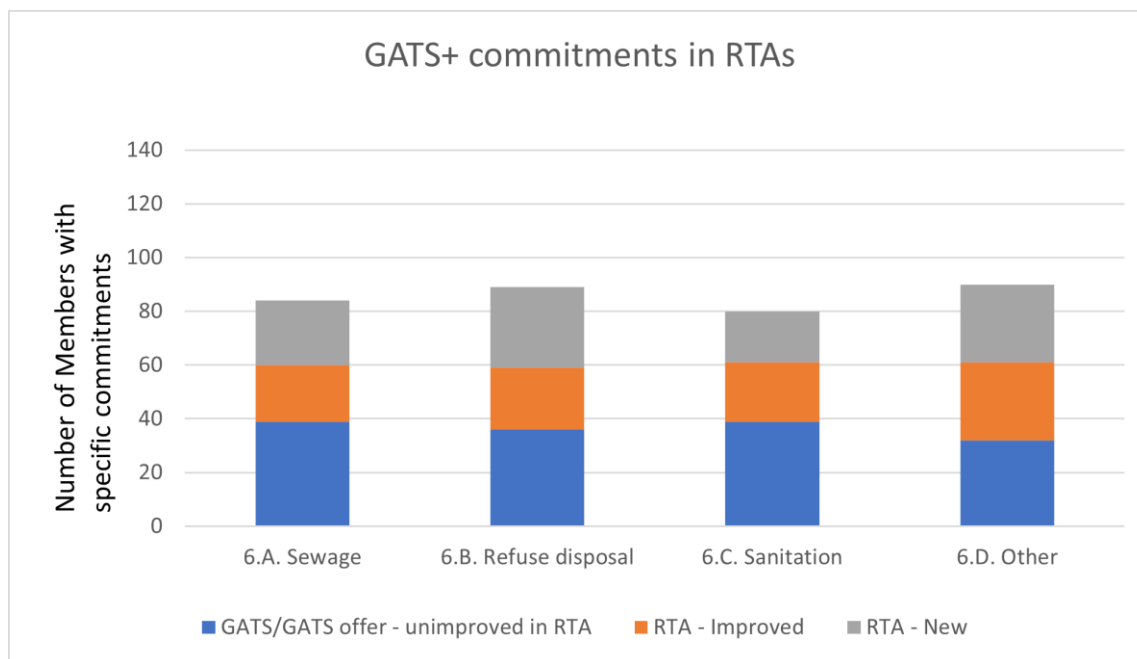
2.4.4 Environmental services in regional trade agreements

2.93. While not all WTO Members have taken part in services RTAs, their number has increased significantly over recent years and outcomes on environmental services in such agreements may carry some lessons for possible future achievements in the WTO. Figure 2 provides an overview of Members' GATS+ commitments in RTAs, drawing from a survey of 142 agreements notified under GATS Article V.

2.94. The figure highlights that, overall, many Members have undertaken RTA commitments on environmental services that go not only beyond existing GATS commitments, but also beyond offers made during the multilateral services negotiations. These new or better commitments in RTAs are significant for each of the four environmental services sub-sectors.

2.95. For example, as regards refuse disposal services (CPC 9402), 23 of the 59 Members (counting EU-25 as 1) that had GATS commitments or offers in the sector have undertaken improved commitments in RTAs by binding a better level of treatment for market access or national treatment, under any mode of supply. In addition, 30 Members that had no GATS commitments nor made offers in refuse disposal services have undertaken commitments in RTAs.

Figure 2: GATS+ Commitments on Environmental Services in Regional Trade Agreements (RTAs)



Note: On the basis of 142 of the 193 regional trade agreements notified under GATS Article V as of 1 March 2022. Counting EU-25 as one. "GATS/GATS offer – unimproved in RTA" means the number of Members that have GATS commitments or that have made an offer in the WTO services negotiations in the relevant subsector, and that have not taken better commitments in RTAs. "RTA – Improved" means the number of Members that have undertaken a commitment in RTAs that improve a GATS commitment or offer. "RTA – New" means the number of Members that have undertaken a commitment in RTAs, where no commitment or offer had been made under the GATS. 6.A = Sewage services (CPC 9401); 6.B = Refuse disposal services (CPC 9402); 6.C = Sanitation and similar services (CPC 9403); and 6.D = Other.

3 RESEARCH ON POTENTIAL BENEFITS AND CHALLENGES OF TRADE IN EGS

3.1. Research on trade in environmental goods and services has covered a number of different dimensions which, *inter alia*, include: (1) trade effects; (2) diffusion of environmental technology;

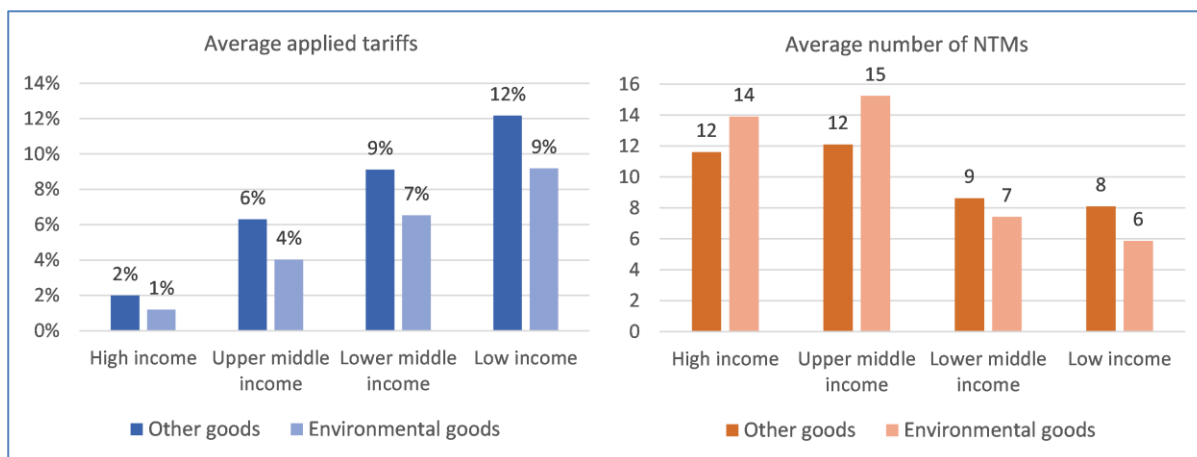
and (3) environmental effects. In the following, a brief, non-exhaustive overview of some of the main insights of the economic literature is provided.

3.1 Trade effects

3.2. Trade in environmental goods and services can bring benefits to both importers and exporters. Importing countries can gain greater access to the most efficient, diverse and least expensive goods, services and technologies on the global market, while exporters can benefit from new market opportunities and spur development of globally competitive industries dedicated to environmental improvements (Kennett and Steenblick, 2005).

3.3. Applied tariffs tend to be relatively low for environmental goods. According to Garsous (2019), average tariffs applied on around 250 environmentally related goods in OECD countries stood at only 0.8% in 2016, while tariffs applied by non-OECD countries averaged 4.1%. Figure 3 shows that average applied tariffs on clean energy and energy efficiency goods tend to be lower compared to other goods, and are lower for high and upper-middle income countries. However, high and upper-middle income countries apply more non-tariff measures on environmental goods than low and lower-middle income countries.

Figure 3. Tariffs and non-tariff measures on selected environmental goods by income group, 2019



Source: World Bank-WTO (2022, Figure 8):

https://www.wto.org/english/tratop_e/devel_e/joint_policy_note_jan22.pdf

Note: The illustrative list of environmental goods, compiled by the WTO Secretariat, covers some 177 goods (HS six-digit level) that can help decarbonize the economy, including clean and renewable energy and energy efficiency goods. Other goods correspond to any other goods.

3.4. Tariff reductions will foster trade in environmental goods, but trade impacts will differ across economies, also depending on prevailing tariff levels and goods covered. Tariff reductions are expected to have modest impacts on trade for high income economies, while increases in imports are estimated to be larger for lower income countries (Tamini et Sorgho, 2018; De Melo and Solleder, 2020a). For developing countries, environmentally preferable products (EPPs) may be of particular export interest (De Melo and Solleder, 2020a), while environmental goods related to sanitation, waste management, water supply and availability, food production and cooking, and renewable energy are particularly relevant regarding developmental and environmental aspects (Knudson et al., 2015).

3.5. In the context of a possible EGA, LDC exports are expected to see only a limited impact as they already benefit from non-reciprocal duty-free market access in several economies and have limited export potential in technology-intensive environmental goods (Baltzer and Jensen, 2015). Transitional challenges for developing countries, *inter alia*, can include increased competition for their domestic companies, loss of tariff revenue and the need to build regulatory capacity, including with regard to customs (Monkelbaan et al., 2016).

3.6. As tariffs on EGS tend to be low relative to NTMs, particularly in advanced economies, the importance of addressing NTMs for fostering environmental goods and services has been highlighted (Tamini and Sorgho, 2018; De Melo and Solleder, 2020b). Empirical findings regarding environmental goods point to the positive trade effects of lowering NTBs (He et al., 2015) as well as regulatory harmonization of NTBs (De Melo and Solleder, 2020a). Addressing NTBs is expected to vastly increase the potential impact of an EGA, and be particularly beneficial for SMEs (Monkelbaan et al., 2016). As LDCs tend to face difficulties with standard compliance, it would be in their interest to join discussions to regulate standards and sustainability criteria (Baltzer and Jensen, 2015). To facilitate services trade, regulatory collaboration and recognition of standards and qualifications are helpful in addressing regulatory differences, which are often linked to the stringency of environmental policies (Nordås and Steenblik, 2021).

3.2 Diffusion of environmental technology

3.7. The development and diffusion of environmental technologies are key for addressing environmental challenges, including for climate change adaptation and mitigation. Trade can transfer technology through different channels, including through trade in intermediate inputs or capital equipment, or by stimulating innovation in the importing country.

3.8. International trade in capital goods, intermediate inputs and services plays an important role in providing access to environmental technology. For example, only a small number of companies located in a few countries have specific technological expertise in wind-turbine manufacturing. Trade in wind turbines therefore provides importing countries access to advanced environmental technology that allows them to progress in the transition to clean energy (Garsous and Worack, 2021).

3.9. By fostering competition and allowing firms to exploit economies of scale, international trade also contributes to reducing the price and making environmental technologies more affordable. For instance, in the case of solar photovoltaic technology, open and transparent trade regimes have enabled the emergence of a globally integrated solar global supply chain, leading to a decline in the cost of the electricity generated by solar photovoltaic plants by 77% between 2010 and 2018 (WTO-IRENA, 2021).

3.10. Trade in services is often complementary to environmental goods trade. Environmental services, as well as other ancillary services, are in many cases essential for the effective use of environmental goods as well as for realizing the gains from trade in environmental goods (Steenblik and Geloso Grosso, 2011; Brenton and Chemutai, 2021). For example, for the development of a solar photovoltaic plant of 55 MW, 56% of the person-days needed are associated with services related to energy installations, operations and maintenance and grid connection, while only 22% are associated with manufacturing (WTO-IRENA, 2021). The implication of complementarities in the use of environmental goods and services in areas such as water and wastewater treatment, solid-waste management services, air pollution and sound-level monitoring is that the potential benefits of simultaneously liberalizing trade in environmental services and in environmental goods are likely to be much greater than liberalizing trade in only one or the other (Steenblik et al., 2005).

3.3 Environmental effects

3.11. Trade in EGS and the related diffusion of environmental technologies can play an important role in helping countries achieve environmental objectives, including with regard to addressing pollution and climate change. By lowering prices, fostering innovation and transferring technology, trade promotes the production and use of EGS compared to other, less environmentally friendly goods (composition effect) and fosters more environmentally sustainable production methods (technique effect). At the same time, increased trade in EGS also fosters economic activity which can lead to more emissions or environmental degradation (scale effect) (Grossman and Krueger, 1993; Copeland and Taylor, 2005).

3.12. The interplay between these three effects implies that overall environmental benefits from trade in EGS are not automatic and depend on a number of factors. The limited number of studies available indicate that environmental effects, *inter alia*, depend on a country's net trade status with regard to environmental goods, the type of environmental goods in terms of their environmental purpose, the pollutant considered, and the presence of complementary environmental policies such

as end-use control or carbon taxes (Zugravu-Soilita, 2018 and 2019; Wan et al. 2018; Hu et al., 2020).

3.13. In order to allow countries, in particular developing countries, to reap the environmental benefits from (liberalization of) trade in environmental goods, a number of studies have highlighted the need for technical assistance, technology transfer and complementary policies such as the implementation of Multilateral Environmental Agreements, regulatory harmonization between trading partners, investment, government procurement, licensing of intellectual property rights, and elimination of non-tariff barriers (Vikhlyaev, 2004; Nguyen and Kalirajan, 2016; De Melo and Solleder, 2020; Tamini and Sorgho, 2018; Chen and Hu, 2020; Zugravu-Soilita, 2018 and 2019).

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