

Identifying Products with Climate and Development Benefits for an Environmental Goods Agreement

By Rene Vossenaar

ICTSD

International Centre for Trade and Sustainable Development

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LIST OF ABBREVIATIONS AND ACRONYMS

APEC	Asia-Pacific Economic Cooperation
BoS	Balance of system
CSP	Concentrated solar power
CTESS	(WTO) Committee on Trade and Environment in Special Session
EGA	Environmental goods agreement
EU	European Union
GHG	Global greenhouse gas
HS	Harmonized System
HTS	(US) Harmonized Tariff Schedule
ICTSD	International Centre for Trade and Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
IT	Information technology
ITA	Information Technology Agreement
ITC	International Trade Centre
LC	Liquid crystal
LCD	Liquid crystal devices
MFN	Most-favoured nation
MS-RE	Mapping Studies Renewable Energy
MS-SET	Mapping Studies Sustainable Energy Technologies
NTB	Non-tariff barrier
PV	Photovoltaic
RE	Renewable energy
SDT	Special and differential treatment
SWH	Solar water heaters
TFT	Thin film transistor
TiSA	Trade in Services Agreement
TL	Tariff line
UN	United Nations
US	United States
USITC	United States International Trade Commission
WG III	Working Group 3
WITS	(World Bank) World Integrated Trade Solution
WTO	World Trade Organization

FOREWORD

Climate change is an unprecedented challenge facing humanity today. Given that fossil fuel-based energy use is the biggest contributor to anthropogenic greenhouse gas emissions, a rapid scale up and deployment of renewable or sustainable energy sources could significantly reduce the emissions responsible for global warming. A switch to cleaner and low-carbon transport fuels and technologies as well as greater energy efficiency measures could also make a positive contribution toward achieving this goal.

In addition, a scale up of sustainable energy will contribute to enhancing access to energy for millions of people in the developing world and power rapid economic growth in emerging countries through increasingly sustainable means, enabling them to move further away from carbon-intensive growth trajectories. It will also enhance energy security by reducing the reliance of countries on fossil-fuel imports.

Scaling up the expansion of renewable energy will entail addressing impediments to the global diffusion of clean energy goods and services. Trade policy can contribute in this regard by lowering barriers to market access for sustainable energy goods and services.

While the World Trade Organization (WTO) Doha mandate calls for a reduction, or as appropriate, elimination of tariffs and non-tariff barriers on environmental goods and services (EGS), the lack of a universally accepted definition of EGS has meant that trade delegates at the WTO have struggled over the scope of goods and services that could be taken up for liberalization. Meanwhile, the Asia-Pacific Economic Cooperation (APEC) economies have moved ahead, concluding a first-ever trade outcome on environmental goods. In September 2012, leaders of the APEC economies, meeting in Vladivostok, Russia, agreed to voluntarily reduce applied tariffs to 5 per cent or less on a list of goods contained within 54 product subcategories.

Building on the APEC initiative, trade policymakers have launched negotiations on a plurilateral initiative on environmental goods, building on an initial agreement by 14 WTO members (referred to as the G14) on the sidelines of the World Economic Forum in January 2014 in Davos. These negotiations for an 'Environmental Goods Agreement'(EGA) are aimed at eliminating tariffs on environmental goods on a plurilateral basis and eventually bringing it to the WTO, extending benefits to all members on a most-favoured nation (MFN) basis once a 'critical mass' of members in terms of the share in world trade of the goods agreed upon has been reached. The initiative is open to new members to join.

There is by no means a consensus on what tariff lines (TLs) within lists proposed in the context of earlier WTO negotiations constitute environmental goods for the purpose of the EGA negotiations. One of the main reasons for this is that most products falling within these categories of the Harmonized System (HS) are often used for both environmental and non-environmental purposes. While goods in the APEC list address a number of environmental objectives, the International Centre for Trade and Sustainable Development (ICTSD) has prioritized clean energy in the context of the EGA, given the urgency of climate change mitigation expressed above.

The rationale for this paper and its proposal to consider adding new products relevant for the supply of clean energy to an EGA list of goods reflects this priority. Previous ICTSD research has revealed a number of TLs, including outside the APEC list, for which climate-related environmental end-uses are clearly identifiable. Certain other goods, despite also having non-environmental uses, are important for their application in clean energy value-chains. Many are also heavily traded and of trade interest to developing countries. By including such goods, there would be large trade gains

for developing economies, in addition to the environmental gains realized through their lower-cost deployment within clean energy value-chains. Yet, other climate-friendly goods are also relevant from the point of view of promoting energy access to populations in the developing world.

This paper presents an overview of trade among the G14 as well as key non-G14 economies in the 54 product sub-categories included in the APEC list. It also examines for these 54 sub-headings more detailed trade information at the TL level (including at the level of more detailed statistical codes) in an attempt to gain some insight into the relative importance of trade in environmental goods. It also analyses additional climate-related products, derived inter alia from earlier ICTSD research, particularly climate technology mapping studies (MS), which could potentially be added to those included in the APEC list for subsequent inclusion in the EGA. The paper presents a preliminary analysis of trade flows and tariffs for this non-exhaustive list of climate-relevant products and components. Finally, it also puts forward proposals on measures needed to make EGA negotiations more transparent as well as facilitate better estimates of global trade flows in environmental goods.

René Vossenaar formerly worked with the United Nations Conference on Trade and Development (UNCTAD) as Head of the Trade, Environment and Development Branch. Since his retirement in March 2005, he has occasionally worked as an independent consultant. He has prepared several studies for ICTSD on linkages between the deployment of climate-friendly technologies and international trade, in particular on the renewable energy supply and the buildings and transport sectors. He also contributed a paper on climate-related single-use environmental goods. Before joining UNCTAD, he worked for the Economic Commission for Latin America and the Caribbean (ECLAC) in Santiago de Chile, Buenos Aires, and Brasilia.

This paper was conceived by ICTSD and developed by ICTSD's Global Platform on Climate Change, Trade and Sustainable Energy. The concept of the research originates in ICTSD's work on a Sustainable Energy Trade Agreement (SETA). In particular, it has been informed by a workshop with EGA negotiators in the Japanese Permanent Mission to the WTO in June 2014 and the ICTSD Dialogue "Green Goods Initiative: A stepping stone towards effective climate change action" in July 2014, as well as the work by ICTSD's E15 initiative in the area of clean energy technologies.

As a valuable piece of research, it has the potential to inform innovative policy responses on sustainable energy trade initiatives and will be an important reference tool for policymakers involved with energy access as well as trade negotiators. We hope that you will find the paper to be a thought-provoking, stimulating, and informative piece of reading material and that it proves useful for your work.

Ricardo Meléndez-Ortiz
Chief Executive, ICTSD

EXECUTIVE SUMMARY

In a joint statement (Davos, Switzerland, 24 January 2014), 14 World Trade Organization (WTO) members announced their intention to launch plurilateral negotiations on an environmental goods agreement (EGA) aimed at liberalizing import tariffs on a wide range of environmental goods. The negotiations were launched in July 2014. The EGA will apply the WTO most-favoured nation (MFN) principle and enter into force when a 'critical mass' of trading partners joins the agreement. The first phase of the negotiations is aimed at eliminating tariffs or customs duties. A second phase could, according to some trade negotiators, also address non-tariff barriers (NTBs) and environmental services.[1]

The EGA will cover a number of thematic categories, which may include: air pollution control; solid and hazardous waste management; wastewater management and water treatment; environmental remediation and clean-up; cleaner and renewable energy (RE); energy efficiency; environmental monitoring; analysis and assessment; noise and vibration abatement; environmentally preferable products; and resource efficiency.

Negotiations will build on the Asia-Pacific Economic Cooperation (APEC) List of Environmental Goods (developed to support an APEC commitment to reduce applied tariff rates to 5 per cent or less by the end of 2015). The list classifies environmental goods under 54 different Harmonized System (HS) subheadings, using the term 'ex-out' to indicate that only part of a subheading may be considered as an 'environmental good.' It is envisaged that additional products will be added during the EGA negotiations.

The APEC list includes a large range of environmental goods, such as solar photovoltaic (PV) cells, modules, and panels; wind turbines; catalytic converters; and trash compactors. It also includes multiple-use products that may have both environmental and non-environmental applications, such as water filtering and purification equipment and various types of monitoring, analysis, and assessment equipment. The inclusion of many parts and components in the APEC list may be useful for tariff liberalization in the context of value chains.

For a tariff analysis, it is necessary to link ex-outs of the APEC list with national tariff schedules. For a global trade analysis, it is unavoidable to use uniform trade data at the level of HS subheadings.

Where a specific tariff line (TL) for an environmental product is available in a WTO member's tariff schedule, implementing a tariff cut is straightforward. Where TLs are more broadly defined than the ex-outs in the APEC list (and environmental goods that may be added in the EGA negotiations), a WTO member could eliminate tariffs for the full TL or create a new and additional TL that captures the ex-out more narrowly. Similarly, in the case of multiple-use products, a WTO member could cut tariffs for the full TL or create a new one for products with a specific environmental end-use.

Several HS subheadings of the APEC list are basket categories, covering products not specified or included elsewhere in relevant HS chapters, with trade in environmental goods often accounting for only a small portion of total trade in the subheading. Such subheadings account for a large portion of global and G14 trade (i.e. trade by G14 participants). Consequently, most trade in the majority of subheadings of the APEC List is in products that are not primarily used for environmental purposes. Conversely, the APEC list includes only part of today's internationally traded environmental goods.

It is difficult to estimate the value of trade in environmental goods (to be) covered by an EGA. If measured at the level of entire subheadings of the APEC list (and subheadings that may be added in the EGA negotiations), trade flows in environmental goods will be heavily overestimated. In addition, there will be a lot of noise in the calculation of critical-mass thresholds.

This note examines more detailed trade information at the TL level (including at the level of more-detailed statistical codes) in an attempt to gain some insight into the relative importance of trade in environmental goods in certain HS subheadings, at least in the case of countries for which such information is available. However, even at this level, ex-outs are often traded as part of catch-all items for 'not elsewhere specified' products.

The EGA and climate change

The elimination of trade barriers in certain environmental goods may contribute to climate-mitigation policies. 'Negotiating Global Free Trade in Environmental Goods and Services' is one of the measures included in United States (US) President Barak Obama's Climate Change Action Plan (announced in June 2013). International trade and supply chain integration among key trading partners have already played a key role in reducing the costs of low-carbon technologies. Tariff liberalization driven by an EGA may contribute to further cost reductions. International trade also plays a key role in spreading the benefits of reduced costs of low-carbon technologies to other countries. From a climate-mitigation perspective, trade in cleaner and RE products is particularly relevant. The APEC list includes equipment and parts used in core RE technologies, i.e. solar PV and wind power, as well as a range of other RE products. However, the APEC list does not include certain products associated with RE supply and other climate-related technologies that have been included in lists proposed in the context of deliberations in the WTO Committee on Trade and Environment in Special Session (CTESS) or examined in International Centre for Trade and Sustainable Development (ICTSD) work. Some of these products could be added to those included in the APEC list as candidates for possible inclusion in the EGA. This paper presents a preliminary analysis of trade flows and tariffs for a non-exhaustive list of products and components associated with sustainable energy technologies suggested by ICTSD.

Possible impact

While an EGA may contribute to significant tariff liberalization in certain environmental goods, its overall impact on import tariffs on environmental goods is likely to be relatively small. Import tariffs in most G14 markets are, in general, already low. Their reduction or elimination may nevertheless make certain environmental technologies more cost-competitive, including by reducing the impacts of cumulative tariffs facing products that cross borders several times in the context of global value chains. Binding of tariffs may add to predictability in international trade. Tariffs for nine subheadings of the APEC list (including the subheading that provides for trade in solar cells, panels, and modules) have already been fully eliminated under the Information Technology Agreement (ITA). Since all G14 members are ITA signatories, an EGA can result in further tariff liberalization in these subheadings only if a non-G14 country that is not a signatory of the ITA (or has not already eliminated import duties for other reasons) joins the EGA.

An EGA may have larger impacts on tariff levels if additional products are included or certain other countries join the agreement.

Future negotiations on NTBs and environmental services may be important. For example, environmental services are often indispensable for trade in environmental goods.[2]

The way forward

It is difficult to obtain reliable data on global trade in many RE products and other environmental goods. Therefore, more work is needed to make negotiations on an EGA more transparent, in particular in terms of tariff classifications and trade flows. There is also a need to better understand the extent to which business surveys of markets for environmental goods (and services) correspond

with estimates of global trade flows in environmental goods based on the HS and the United Nations (UN) Comtrade database (COMTRADE).

Establishing lists of HS codes to be covered by an EGA may be difficult, because environmental goods tend to be classified under HS subheadings that also provide for trade in unrelated products. This may require a large use of ex-outs. Some suggestions to help make lists of environmental goods work in practice include the following:

Governments may wish to exchange information on how environmental goods on the APEC list (and future additions) are classified in terms of their own tariff schedules. Similarly, APEC economies could exchange information on how they are implementing any changes, where necessary, to comply with their tariff-reduction commitments in the APEC context.

There may be some merit in exploring 'model lists' of HS subheadings for analytical purposes (as the WTO Secretariat has done in the context of its analysis of trade in IT products). Large catch-all subheadings that provide only marginally for trade in environmental goods may have to be excluded from trade analyses.

There may be a need for technical work that EGA participants could use in creating TLs that specifically capture a product's environmental end-use.

Some criteria may be developed to guide the possible inclusion of additional products in the EGA, such as, for example, environmental benefits; possible impacts of tariff elimination; and practical factors, such as ease of implementing tariff cuts taking into account HS classifications and existing national tariff schedules, including the costs and benefits of creating new TLs.

Tariff cuts could encompass a range of intermediate products, including those that are relevant for RE value chains. This may help reduce costs in both environmental and non- environmental sectors. A value-chain approach to environmental technologies, taking into account components and parts, could be particularly effective in reducing costs of environmental installations.

Conclusions of a trade and tariffs analysis of the APEC List (Chapter 2)

G14 participants have announced that they would use the APEC list as a 'starting point' for negotiating the EGA. This section presents some takeaways from the analysis presented in Chapter 2, based on all trade in the 54 HS subheadings of the APEC list as well as information on MFN-applied and bound tariffs available in WTO databases.

Trade flows and thresholds

- The G14 accounted for 86 per cent of global trade (79 per cent in imports and 93 per cent in exports) in 2012. This figure includes trade between European Union (EU) member states[3], or so-called intra-EU28 trade, as well as re-imports and re-exports.

- Excluding intra-EU28 trade as well as re-imports and re-exports, the G14 share in global trade in the 54 HS subheadings was 83 per cent in 2012. In 2013, this figure fell to 81.4 per cent as G14 trade (in particular imports) fell in value terms compared with 2012, while trade by non-G14 participants increased.

- China, the EU, and the US were, at the same time, the largest importers and exporters in 2011-12. Japan, Korea, and the EU had large trade surpluses. However, estimates based on all trade at the HS subheading level may significantly distort the picture of trade flows in more narrowly defined environmental goods.

- The largest non-participants in the G14, in descending order of the value of total trade (imports plus exports), in 2012 were Mexico, India, Malaysia, Thailand, the Russian Federation, Brazil, Turkey, Indonesia, Saudi Arabia, and South Africa. The Philippines is also an important exporter.

MFN-applied tariffs

- The simple average MFN-applied tariff of the G14 is only 1.67 per cent. More than half of the HS subheadings and (national or regional) TLs of all G14 members combined are duty free on an MFN basis. Similarly, more than half of the G14 imports (in value terms) in the subheadings of the APEC list are duty free.

- The simple-average MFN-applied tariff in G14 participants is less than 2 per cent in 35 of the 54 HS subheadings of the APEC list. It is more than 5 per cent in only one subheading: HS 841919 (instantaneous or storage water heaters, nonelectric), with a simple average tariff of 5.6 per cent and a maximum tariff of 35 per cent.

- MFN-applied tariffs in non-G14 WTO members are, in general, higher than in the G14 members. The simple average MFN-applied tariff in key non-G14 countries is 3.7 per cent, ranging from 1 per cent in South Africa to 12 per cent in Brazil. However, in several countries (in particular, Malaysia, the Russian Federation, South Africa, and Turkey), the simple MFN-applied tariff is quite low and similar to the G14 average.

- In value terms, 56 per cent of all G14 imports in the APEC list are already duty free. Imports into Hong Kong, Norway, and Singapore are entirely duty free; imports into Canada, Costa Rica, and Japan are almost entirely duty free. In China and Korea, however, less than 30 per cent of imports (in value terms) are duty free.

- The largest importers of dutiable goods are China, the EU, the US, and Korea.

- While Mexico is the most important non-G14 country in terms of total import values, Brazil and India are the most important in terms of the value of dutiable imports. In Malaysia and South Africa, more than 90 per cent of the value of imports in the 54 subheadings of the APEC list is already duty free.

Bound tariffs

- In the G14, the simple average bound tariff for all 54 subheadings on the APEC list is 5.9 per cent (excluding subheadings with unbound or only partially bound tariffs). Simple averages are highest in Costa Rica, New Zealand, and Korea.

- Bound tariffs are generally much higher in non-participants in the G14, in particular in Mexico, Brazil, Indonesia, and India.

- G14 members have already fully eliminated bound tariffs in nine subheadings of the APEC list that are also fully covered by the ITA.[4]

Conclusions of the analysis of climate-related products (Chapter 3)

This section presents some takeaways from the analysis presented of RE and sustainable energy products (that also include certain energy-efficiency and energy storage products) identified in ICTSD work, particularly technology mapping studies (MS) carried out in the RE supply, buildings and transport sectors. MS products are grouped into two lists: a RE energy (MS-RE) list and a broader

sustainable energy (MS-SET) list that contains RE products and additional energy-savings and energy storage products not included in the APEC list. Some of these products are already covered in the APEC list and others may be added for possible inclusion in the EGA. As in the previous section, the trade analysis is based on all trade in HS subheadings that provide for trade in such products.

- One-third of the HS subheadings of the APEC list provide for trade in RE equipment and components. Based on all trade in these subheadings, global trade (imports plus exports, excluding intra-EU28 trade) is estimated at USD 400 billion in 2012, with the G14 accounting for 87 per cent. However, trade figures based on HS subheadings are heavily overestimated, particularly owing to the inclusion of HS 901380 —liquid crystal devices (LCDs) and other optical appliances and instruments. Therefore, it is difficult to carry out a meaningful analysis of trade in RE products based on all 18 RE-related HS subheadings of the APEC list. Core RE supply products on the APEC list are PV cells and modules and wind-powered generating sets.

- PV cells and modules account for a significant portion of total trade in the APEC list. Recent developments in trade in HS 854140 weigh heavily in trade flows and trade balances of individual reporters, with sharply reduced values of Chinese exports on the one hand and imports of the EU28 and the US (in 2013) on the other. PV-specific trade flows for China and some other G14 members confirm these developments.

- A comparison with lists of RE equipment and components developed by ICTSD (based on technology mappings studies) indicates that there may be certain gaps in the APEC list. For example hydraulic turbines (used in hydropower applications) and batteries (used for energy storage) could be considered candidates for possible future inclusion in the EGA. Similarly, the MS-RE list includes certain components and heavily traded intermediate products that could be considered in the EGA context, while recognizing that they may have multiple applications.

- In the case of most RE-related products of the APEC list and possible additions based on ICTSD work, there may be a need — for the purposes of tariff elimination as part of the EGA — to create new and additional TLs to capture the specific RE-related characteristics of the product or to specify its use in RE applications.

- Climate-related environmental goods listed by ICTSD as possible future additions to those included in the APEC list (for consideration in the EGA context) are classified under 39 different HS subheadings (called the MS-SET list). Based on all trade in each subheading, G14 participation in global trade in the subheadings of the MS-SET list (excluding intra-EU28 trade) in 2012 is estimated at 76 per cent (82 per cent in exports and 70 per cent in imports). This implies that, if these subheadings were added to the 54 subheadings of the APEC list, more trading partners would have to enter the EGA to meet a given critical mass threshold (Table 15).

- G14 tariffs for the MS-SET list are, in general, somewhat higher than for the APEC list, with a simple average MFN-applied rate of 2.7 per cent and a maximum MFN-applied tariff of 15 per cent. For dutiable HS subheadings, the simple average MFN-applied tariff is 5.4 per cent. The simple average bound tariff is 8.5 per cent.

- The largest non-participants in declining order of 2012 trade (exports plus imports) in the combined APEC and MS-SET lists are: Mexico, Brazil, the Russian Federation, Thailand, Malaysia, India, Turkey, Indonesia, South Africa, and Viet Nam.

1. INTRODUCTION

In a joint statement (delivered at Davos, Switzerland, 24 January 2014), a group of 14 WTO members (Australia, Canada, China, Costa Rica, the EU, Hong Kong, Japan, Korea, New Zealand, Norway, Singapore, Switzerland, Chinese Taipei, and the US), hereafter referred to as the G14, announced their plan to start plurilateral negotiations aimed at liberalizing import tariffs on a wide range of environmental goods.[5] The negotiations, launched in July 2014, will apply the WTO MFN principle and enter into force only when a 'critical mass' of trading partners (accounting for a minimum portion of global trade in covered product) joins the agreement. The key objective of a critical mass requirement is to reduce concerns about free-riding.[6]

Negotiations would build on the APEC list of Environmental Goods, endorsed in the APEC Leaders' Declaration issued at the 20th APEC Economic Leaders' Meeting in September 2012 in Vladivostok, Russia.[7] Hereafter this list will be referred to as the 'APEC list.' It was developed after APEC leaders had agreed (at their 2011 Annual Meeting in Honolulu, US) to reduce, by the end of 2015, applied rates on environmental goods to 5 per cent or less. The APEC list classifies environmental goods under 54 different HS subheadings, using the term 'ex-out' to indicate that only part of a particular HS subheading may be considered as an 'environmental good' in accordance with additional product specifications and remarks provided by APEC economies (included in Annex C to the Economic Leaders' Declaration, hereafter referred to simply as Annex C). Only environmental goods would be subject to tariff commitments.

An EGA would oblige participants to reduce bound tariffs (see Box 2).

1.1 Environmental Goods in the APEC List

Annex C includes a large number of ex-outs, which should enable APEC economies to identify, within their own tariff schedules, environmental goods to benefit from tariff liberalization. It includes a large range of environmental goods, for example, in the areas of RE (such as solar PV cells, wind-powered generators, and components used in RE generation); clean energy (such as gas turbines for electric power generation from recovered landfills); waste management (such as waste compactors) and air pollution control (such as catalytic converters).

More than one-third of the subheadings provide for trade in parts and components.[8] In most cases, these parts and components may be used in both environmental and non-environmental applications. While this may involve dual-use issues, the inclusion of parts and components may be useful for tariff liberalization in the context of value chains.[9]

Compared with other lists that have been proposed in submissions to the WTO and in ICTSD studies, there may be possible gaps in the APEC list. Additional products may be proposed for inclusion in the EGA, for example, in the area of RE, cleaner energy and energy savings products' (see Chapter 3).

For a tariff and trade analysis, any list of environmental goods has to be linked with information on import tariffs (at the national TL level) and trade flows (for a global trade analysis it is unavoidable to use uniform trade data at the level of HS subheadings).[10]

Some national tariff schedules have certain designated TLs or more detailed statistical codes for environmental goods included in the APEC list, such as solar water heaters (as an ex-out of HS 841919, instantaneous or storage water heaters, nonelectric: other), and wind-turbine blades (as an ex-out of HS 841290, parts of other engines and motors). In some cases, national TLs clearly indicate the environmental end-use of certain products.[11]

Where a specific TL for an environmental good is already available, it is a straightforward

process to reflect tariff commitments in a WTO member's tariff schedule. Many ex-outs on the APEC list, however, are dual-use products that may have both environmental and non-environmental applications. Examples are HS 841182 (gas turbines) and HS 850164 (AC generators). In other cases, environmental goods on the APEC list are hidden under national TLs that also include unrelated products (these TLs often serve as a basket for all 'other' products in the same HS heading or subheading that have not been designated to more specific TLs).

A WTO member may then decide either to eliminate tariffs for all products under a particular TL, including non-environmental products, or create a new TL that captures the environmental product more narrowly (in the case of dual-use products, this could be done by specifying a product's environmental end-use). The first option may at times be chosen, considering that, apart from facilitating access to environmental goods, eliminating and binding tariffs on a broad range of products may have wider benefits for international trade (it may help where countries have a broad export interest in the subheading). Other countries, in particular developing countries, may opt for creating new TLs (despite the costs involved) to keep their right under the WTO to use tariff policies in unrelated sectors.

A major problem in establishing lists of environmental goods for trade purposes is the difficulty involved in establishing a reasonable correspondence between business surveys of markets for environmental goods (and services) and estimates of global trade flows in environmental goods based on COMTRADE.

1.1.1 Trade values and thresholds

Since an EGA may include a large portion of HS subheadings with ex-outs, it may be almost impossible to more or less accurately estimate the value of trade in environmental products (to be) covered.[12] If measured at the level of entire subheadings, trade flows in environmental goods will be heavily overestimated.[13] In addition, there will be noise in the calculation of critical-mass thresholds. If measured only at the level of fully covered subheadings, trade values may be very low.

Such problems are not unique to environmental goods. For example, a significant number of information technology (IT) products are classified as ex-outs of HS subheadings listed in the attachment to the ITA.[14] According to a recent WTO study, including entire HS subheadings in a trade analysis leads to considerable overestimation of the import and export figures covered by the ITA (which could be almost 100 per cent for both exports and imports of IT products).[15] In the case of an agreement on environmental goods, overestimation of import and export values of products covered by the agreement will (if entire subheadings are considered), in general, be much larger. One study argues that 46 of the 54 HS subheadings on the APEC list mainly cover products that are not used primarily for environmental purposes.[16] Consequently, only a small portion of trade flows in HS subheadings may be environmental.[17]

These serious limitations have to be kept in mind in considering the trade analysis presented in this note.

At the level of (6-digit HS) subheadings of the APEC list, it is estimated (based on COMTRADE) that global trade (excluding intra-EU28 trade) amounted to about USD 410 billion (in each direction, i.e. imports or exports rather than the sum of the two) in 2011 and 2012 (Table).[18] This represents approximately 3 per cent of total global trade (Table A1.8). In reality, trade in environmental goods in the 54 subheadings in the APEC list is much smaller. On the other hand, the APEC list includes only part of today's internationally traded environmental goods. In addition, multiple-use products with certain environmental applications may be traded under many HS subheadings not included in analyses of trade in environmental goods.

1.1.2 Critical mass thresholds

For illustrative purposes, this paper presents some thresholds considering all trade in the 54 HS subheadings of the APEC list (including those that are likely to be only partly included in an EGA). It is estimated that the G14 accounted for 86 per cent of global trade (78 per cent of imports and 93 per cent of exports) in the 54 subheadings on the APEC list in 2012 (See Table 6).[19] This figure includes re-imports and re-exports as well as intra-EU28 trade. For analytical purposes, in this paper trade flows (and thresholds) are mostly calculated excluding re-imports and re-exports and excluding intra-EU28 trade).[20]

1.2 Objectives and Methodology

This paper discusses a number of issues that may help enhance understanding of the possible benefits as well as the limitations of the APEC list as a starting point for negotiating an agreement on environmental goods and additional work that needs to be undertaken. Chapter 3 also analyses possible trade liberalization in additional climate-related goods (beyond the APEC list), based on ICTSD work, particularly climate technology mapping studies (MS). As proposed by ICTSD, certain of these products could be added to those included in the APEC list for possible inclusion in the EGA.[21]

The trade analysis is mostly based on COMTRADE, using the World Bank's World Integrated Trade Solution (WITS). This analysis largely focuses on the period 2011-12 (at the time of drafting certain reporters had not yet submitted 2013 trade to COMTRADE). More recent trade data were incorporated as they became available (for example, example in Table A1.9). Trade estimates are largely based on all trade in the 54 subheadings of the APEC list. Unless otherwise mentioned, trade flows exclude intra-EU 28 trade (there are no import duties) as well as re-imports (imports of goods in the same state as previously exported; usually, re-imports are not subject to import duties) and re-exports (exports of goods in the same state as previously imported

More-detailed trade information at the level of national or regional TLs (including statistical codes)[22] is also considered (using, for example, the ITC Trade Map), wherever available and appropriate, to gain some insight into the relative importance of trade in environmental goods in certain HS subheadings, at least in the case of countries for which such information is available.

Information on MFN-applied and bound tariffs (simple-average tariffs and tariff ranges at the level of HS subheadings) is analysed using the WTO Tariff Download Facility.[23] Tariff information is linked with trade flows, using the WTO Tariff Analysis Online Facility.

The EGA negotiations will be conducted on the basis of the 2012 version of the Harmonized System (HS12). This note analyses the most recent tariff information available, using either HS07 or HS12, as appropriate.[24] The trade analysis is mostly based on HS07.

1.2.1 Organization of the rest of the paper

Chapter 2 analyses the APEC list of 54 subheadings, in particular, in terms of trade and tariffs. It explores some ways to help assess the extent to which these subheadings cover trade in environmental products as compared with trade in unrelated products. It also seeks to provide some insights that may help make the analysis of trade more transparent. The Chapter also examines the extent to which G14 trade[25] (exports plus imports) approaches a given threshold percentage of global trade, based on 2011 and 2012 trade data available in COMTRADE.

Chapter 3 seeks to identify a range of additional products with climate-related benefits, focusing on a range of products and components used in RE generation and a few products contributing to energy savings. Some of these products could be added to those on the APEC list for consideration as possible candidates for inclusion in the EGA.

Chapter 4 presents preliminary conclusions and possible ways forward for WTO policymakers.

Annex 1 presents some additional statistics on global and G14 trade in the 54 subheadings of the APEC list, mostly in 2011 and 2012. Annex 2, explores some possible ways to enhance understanding, at the country level, of trade in environmental goods (defined as ex-outs of HS subheadings that may include unrelated products) by using as far as possible available information at the level of national TLs, including more-detailed statistical codes.

Box 1. Energy Supply, Climate Change, and Trade in RE Goods

The energy supply sector is the largest contributor to global greenhouse gas (GHG) emissions (see IPCC 2014). Low-GHG energy supply technologies, such as RE help to reduce the energy supply sector's GHG emissions.

One of the most significant developments in the energy sector in recent years has been the decline in the cost of electricity supply using RE technologies. Falling technology costs have brought REs closer to full competitiveness with fossil-fuel alternatives and are an important driver of RE investment (in a growing number of locations without subsidy support). International trade in RE goods has played an important role in spreading the benefits of technology cost reductions (such as falling prices for solar panels and wind turbines) globally. With lower RE technology costs and a growing number of countries implementing RE policies, REs energies in 2013 accounted for over 41 per cent of new generating capacity globally, while raising the share of renewables to 8.5 per cent of the global electricity supply.[26]

Better policy mechanisms, more public finance, and more private investment are needed to expand these trends.[27] According to the IPCC WGIII AR5, the success of energy policies depends on capacity building, the removal of financial barriers, the development of a solid legal framework, and sufficient regulatory stability.[28]

The elimination or reduction of tariff and non-tariff barriers to trade in RE equipment and components can further facilitate the use of RE technologies in electricity supply. Where import duties are significant, their elimination may reduce the costs of associated equipment and components in the domestic market. Trade liberalization may also provide opportunities for exports and economic development.

The G14 has a dominant role in RE. Global new RE investment (excluding large hydro-power) reached USD 214.4 billion in 2013[29], with six G14 members (China, the EU28, the US, Japan, Canada, and Australia) collectively accounting for 80 per cent of this amount. The G14 countries collectively accounted for almost 90 percent of new wind power and above 90 percent of new solar PV capacity additions.

The G14 accounts for an overwhelming portion of trade in the core RE products — wind turbines and solar PV equipment — in particular in terms of exports. In the period 2011-13, the G14 accounted on average for 96 per cent of the value of world exports (excluding intra-EU28 trade) in wind-powered generating sets (HS 850231), although its share in total world trade (exports plus imports) was less than 70 per cent (because of a smaller share in global imports). Similarly, the G14 portion of world trade (excluding intra-EU28 trade) in HS 854140 (which includes solar PV cells, modules, and panels) was about 90 per cent (its share in world imports fell from 91.5 per cent in 2011 to 84 per cent in 2013). Between 2011 and 2013, the value of G14 exports in HS 854140 to other G14 countries (excluding intra-EU28 trade) fell by more than one third, while the value of G14 exports to non-G14 countries increased by approximately 15 per cent. PV-specific national trade statistics (using the ITC Trade Map) reveal that the portion of Chinese exports of PV cells, in value terms, shipped to other G14 markets fell from 94 per cent in 2011 to 79 per cent in 2013 as the combined result of a more than 60 per cent reduction of exports to G14 markets (in particular the EU and the US) and an almost 70 per cent increase in exports to non-G14 countries (from a relatively low base).

2. THE APEC LIST OF 54 HS SUBHEADINGS

2.1 The APEC List

At their 2011 Annual Meeting (Honolulu, US), APEC leaders resolved to reduce, by the end of 2015, applied tariff rates on environmental goods to 5 per cent or less. At their 2012 Annual Meeting (Vladivostok, Russia), leaders endorsed the APEC list of Environmental Goods.[30]

Annex C includes a large number of optional ex-outs, which provide flexibility to APEC economies to identify, within their own tariff schedules, environmental goods with applied tariffs of more than 5 per cent. The APEC list of

54 HS subheadings is the outcome of a process of consultations among APEC economies, during which products classified under more than 300 HS subheadings nominated by APEC economies have been considered. It contains environmental goods relevant for various environmental categories, such as RE generation; environmental protection (such as air pollution control, management of solid and hazardous waste, and water treatment and waste-water management); and environmental monitoring, analysis, and assessment equipment. The list includes both finished products and parts.

At the 6-digit level of the HS, product descriptions are, in most cases, too general to exclusively or predominantly capture environmental goods. Only one subheading (HS 850231 for wind-powered generating sets) exclusively covers environmental goods. Reinvang argues that 46 of the 54 HS subheadings on the APEC list cover mainly products that are not used primarily for environmental purposes.[31] This has also been commented by other observers.[32] Therefore, ex-outs play a significant role in the APEC list.

Certain ex-outs have been clearly described in Annex C. For example, solar water heaters (SWH) have been included as an ex-out of HS 841919 (non-electric water heaters). However, in the case of several subheadings, for example in the area of environmental monitoring, analysis, and assessment equipment, Annex C lists 'optional ex-outs,' which "may include" a range of products.[33]

Box 2. The APEC Tariff-Reduction Pledge and Negotiations on an EGA

In 2011, APEC economies agreed to reduce MFN-applied tariffs on a negotiated list of environmental goods to 5 per cent or less by 2015, "taking into account economies' economic circumstances and without prejudice to their positions in the WTO." In 2012, APEC Economic Leaders endorsed the APEC List of Environmental Goods, which contains 54 HS subheadings, using the term 'ex-out' to indicate that only part of a particular HS subheading may be considered an 'environmental good,' in accordance with additional product specifications and remarks provided by APEC economies (included in Annex C). The outcome is not legally binding, and implementation is voluntary, yet bolstered by political commitment at the highest level.

To implement this commitment, APEC economies have to determine whether 'environmental goods' or 'ex-outs' are imported under the provisions of a national TL with an applied rate of more than 5 per cent. This may be relatively easy where there is a good correlation between the APEC list and national tariff schedules. It may be more complicated when 'environmental goods' are hidden under a TL that also includes unrelated products (in particular where a TL acts as a 'basket' for all 'other' products under the same subheading, not designated to specific TLs). APEC economies that plan to implement tariff reductions have to decide whether they can do that using existing TLs, or by creating new TLs with a view to reducing tariffs only for 'environmental goods' or ex-outs, but not for unrelated products under the same existing TL.[34]

Box 2. *Continued*

In January 2014, the G14 countries announced their plan to negotiate a plurilateral agreement on environmental goods aimed at eliminating tariffs. Work would start based on the APEC list, also exploring a broad range of additional products.[35] Under such an agreement, participants are committed to bind and completely eliminate tariffs on covered products by an agreed deadline, probably in accordance with an agreed time schedule. Thus, the commitment is on bound tariffs rather than on actually applied tariffs. There will also be a need to estimate trade in covered products to verify whether the participants' share in global trade in such products meets a certain threshold level agreed among participants (in the case of the ITA, verification was carried out by the WTO secretariat (see endnote 19, last sentence)).

The G14 members include ten APEC economies, and, in addition, Costa Rica, the EU, Norway, and Switzerland. The G14 does not include 11 APEC member economies, i.e. Brunei Darussalam, Chile, Indonesia, Malaysia, Mexico, Papua New Guinea, Peru, Russia, the Philippines, Thailand, and Vietnam.

Since certain HS subheadings of the APEC list overlap with the ITA, it is relevant to note that all G14 members are also ITA participants. APEC economies that are non-participants in the ITA include Chile and Mexico.

Reinvang argues that most ex-outs included in Annex C are not sufficiently precise to ensure that tariff liberalization mainly targets environmental goods. Therefore, he suggests more precise description of ex-outs. Even where ex-outs are sufficiently well described to select only (or primarily) environmental goods, it may still be a problem to identify them in terms of existing tariff schedules. For example, 'heliostats' may be a good description of an environmental good within HS 901380 (LCDs, n.e.s. and other optical appliances and instruments n.e.s. in chapter 90), but no G14 WTO member seems to have a specific TL for heliostats in its national (or regional) tariff schedule. The product is then traded under the provisions of some catch-all TL.

2.1.1 Parts and accessories

The APEC list includes 19 subheadings consisting of parts, with trade accounting for about 30 per cent of total G14 trade in the 54 subheadings on the APEC list in 2011-12, based on COMTRADE).[36] Tariff cuts could perhaps include a range of intermediate products. This may help developing countries reduce costs in both environmental and non-environmental sectors, while avoiding problems of inverted duty structures.

Technically, tariff eliminations for machinery, parts, and accessories could be implemented by creating specific TLs for environmental end-use in national tariff schedules. For example, Annex A, section 2 of the ITA (Semiconductor manufacturing and testing equipment and parts thereof) includes a large number of HS subdivisions (almost all with ex-outs). These have been incorporated into several national tariff schedules by creating new TLs 'for the purpose of semiconductor manufacturing' or similar indications. Similarly, new TLs could be created 'for environmental purposes.'[37]

2.2 Tariffs

Table 1 presents a profile of MFN-applied tariffs by the G14 members. To arrive at this profile, a data set was constructed, using the WTO Tariff Download Facility, comprising, at the HS- subheading level, information on tariff averages as well as minimum and maximum tariffs. For the 14 WTO members integrating the G14, the data set thus considers up to 756 (i.e. 14 times 54) subheadings. After excluding HS subheadings with non-ad valorem tariffs, the data set includes only 717 HS subheadings[38] (with 1567 national TLs).[39]

The overall simple average MFN-applied tariff (subheading-averaging method) is only 1.67 per cent. This very low average can to a large extent be explained by the large number of duty-free items: more than half of all subheadings are fully duty free on an MFN basis. Import duties may be applied only in the case of 38 per cent of all HS subheadings, including less than half of all TLs, with tariffs ranging from 1 per cent to 35 per cent. Considering only these dutiable HS subheadings, the average MFN-applied tariff (4.3 per cent) is more significant, although still modest. About one-quarter of all subheadings contain exclusively dutiable TLs (with a simple average MFN-applied of 5.2 per cent).

Table 1: G14 tariff profile (MFN-applied tariffs) of 54 APEC subheadings (Most recent period, HS12)1/ Subheading-averaging method

HS subheadings	Numbers		Simple average	Tariff structure, numbers (%)		MFN-applied tariff rates	
	Sub-headings	Tariff lines		Sub-headings	Tariff lines	Min	Max
Dutiable	276	741	4.30%	38	47	0	35
- Fully	188	358	5.20%	26	23	1	35
- Partially 2/	88	383	2.50%	12	24	0	16
Fully duty-free	441	826	0%	62	53	0	0
Total	717	1567	1.67%	100	100	0	35

Source: WTO Tariff Download Facility.

1/ HS07 for China

2/ HS subheadings with tariff ranges, including both duty-free and dutiable TLs

Using the same methodology, Table 2 presents a profile of bound tariffs by the G14 WTO members. The simple average of bound tariffs for the 54 subheadings is 5.9 per cent. For dutiable HS subheadings only the simple average is 10 per cent.

Table 2: G14 tariff profile (bound rates) of 54 APEC HS subheadings (HS96, HS02)

HS subheadings	Numbers		Simple average	Tariff structure, numbers (%)		Bound tariff rates	
	Sub-headings	Tariff lines		Sub-headings	Tariff lines	Min	Max
Dutiable	412	1091	10.0%	59	68	0	45
- Fully	251	387	13.1%	36	24	1	45
- Partially 1/	161	704	5.1%	23	44	0	45
Fully duty-free	285	526	0.0%	41	33	0	0
Total	697	1617	5.9%	100	100	0	45

Source: WTO Tariff Download Facility.

1/ tariff ranges, including duty-free TLs

Note: Fully bound tariffs only, excluding unbound and only partially bound tariffs

Bound tariff rates are quite high in some G14 countries, in particular in Costa Rica, many TLs face 45 per cent bound rates, and in New Zealand, a large number of TLs face 25 per cent bound rates, although applied tariffs are much lower.[40] MFN-applied and bound G14 tariff averages are shown in Table 3, while Table 4 shows similar tariff averages for key non-G14 countries.

Table 3: G14 Average applied and bound tariffs for the 54 HS subheadings of the APEC List

G14 participants	MFN-Applied tariffs, most recent period HS12				Bound tariffs HS96 and HS02		
	Period	Dutiable items[1/] (number)	Average tariff		Average tariff		Maximum tariff rate
			All items	Dutiable Items	All items	Dutiable Items	
Australia	2013	34	2.61	4.14	6.4	9.3	23
Canada	2014	6	0.26	2.32	3.6	4.8	11.3
China (HS07)	2011	37	4.85	7.08	5.2	7.7	35
Costa Rica	2013	3	0.48	8.67	30.8	37.5	45
European Union	2013	44	1.83	2.25	1.5	2.0	4.7
Hong Kong, China	2013	0	0	0	0.0	0.0	0
Japan	2013	1	0.04	2	0.1	2.7	5
Korea, Republic of	2013	44	5.40	6.63	7.4	9.9	16
New Zealand	2014	37	3.30	4.45	10.9	16.3	30
Norway	2014	0	0	0	2.1	2.8	5
Singapore	2013	0	0	0	4.8	9.0	10
Switzerland [2/]	2013	0	0	0	0.0	0.0	0
Chinese Taipei	2013	35	2.18	3.36	2.1	3.7	10
United States	2013	35	1.50	2.31	1.3	2.2	16
G14		276	1.67	4.34	5.9	10.0	45

Note: simple-average MFN rates can be higher than simple-average bound rates, as the former refer to HS07, while the latter refer to HS96 or HS02 (this may affect the averaging process)

1/ HS subheadings with dutiable TLs

2/ HS subheadings with ad valorem tariffs only

Source: WTO Tariff Download Facility.

Table 4: Non-G14 WTO Members, MFN-applied and bound tariffs (APEC List)

	MFN-applied tariffs			Bound tariffs		
	Year	Simple average	Maximum	Simple average	Minimum	Maximum
Brazil	2013	12.0	20	31.6	0	35
India	2013	6.2	10	20.9	0	40
Indonesia	2013	5.3	10	25.5	0	40
Malaysia	2013	1.9	30	5.7	0	40
Mexico	2013	2.1	15	34.8	10	50
The Philippines	2013	1.8	10	12.8	0	30
Russian Federation	2012	1.7	20	3.7	0	12
Saudi Arabia (HS07)	2011	2.8	5	5.4	0	15
South Africa	2013	1.0	19	10.3	0	30
Thailand	2013	3.7	20	15.2	0	30
Turkey (HS07)	2011	1.7	4.7	8.4	0	31.8
Subgroup		3.7	30	16.1	0	50

Source: WTO Tariff Download Facility.

Box 3. Lessons from the Implementation of the APEC Tariff-Reduction Pledge

APEC economies are currently considering the necessary steps, if any, to implement the APEC tariff-reduction pledge (adopted at Honolulu in 2011) by the end of 2015. Even though commitments are quite different from those to be included in an EGA, the experience gained in this process may provide useful insights into the way in which the APEC list corresponds with national tariff schedules.[41] Five developing countries among the G14 participants are APEC economies. Three of them, i.e. China, Korea, and Chinese Taipei, have MFN-applied tariffs of more than 5 per cent for certain TLs within the HS subheadings of the APEC list. Imports in these TLs accounted for 24 per cent of the value of total imports in the APEC list into the three economies combined in 2011 (see Table and figure below). To the extent that these TLs cover environmental goods (i.e. ex-outs of Annex C), applied tariffs would have to be reduced to no more than 5 per cent by the end of 2015 (for some subheadings, certain tariff reductions would have to be implemented in any case, as all TLs have applied tariffs of more than 5 per cent).

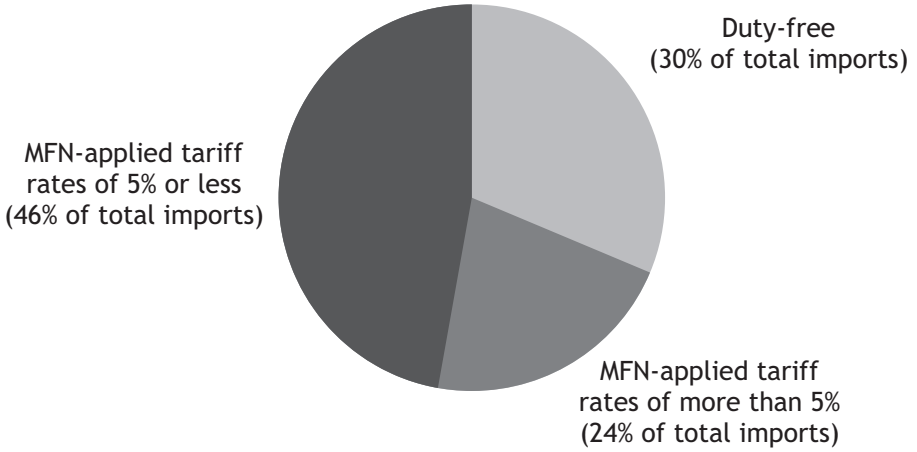
Table 5: China, Korea and Chinese Taipei: Total and dutiable imports in the APEC List, 2011 HS07 (in USD millions)

Reporter	Total imports	Duty free	Dutiable imports (MFN-applied)		
			Total	Above 5%	5% or less
China	88887	25152	63735	14372	49363
Korea	17022	4513	12509	12441	68
Chinese Taipei	8569	4705	3864	178	3686
Total	114478	34370	80108	26991	53116

Source: WTO Tariff Analysis Online, https://tariffanalysis.wto.org/

Another 46 per cent of imports (with MFN-tariffs of 5 per cent or less) are not affected by the Honolulu commitment, but may need tariff elimination in the EGA context. Once the Honolulu commitment is fully implemented (by the end of 2015), 70 per cent of imports (in value terms) in the APEC list into these three economies may still have applied tariffs (tariffs for environmental goods will all be 5 per cent or less). Tariffs for products covered by the EGA will have to be reduced to zero and bound at 0 per cent.

Figure 1. China, Korea and Chinese Taipei: Imports in 54 subheadings of the APEC List, by ranges of MFN-applied tariffs, 2011



Source: Table 5

2.3 Linkages with Trade

Estimating the value of trade flows in environmental goods is very complicated on account of HS classification issues. Taking all trade in all 54 subheadings of the APEC list, it is estimated that global trade (excluding intra-EU28 trade) amounted to about USD 410 billion (in each direction, i.e. imports or exports rather than the sum of the two) in 2011 and 2012 (Table 6).

Table 6: APEC List of 54 subheadings, G14 trade as a portion of world trade, 2011-12 (%)

Trade flow	World trade, USD billions		G14 trade, USD billions		G14 trade as a portion of world trade (%)	
	2011	2012	2011	2012	2011	2012
Including intra-EU28						
Merchandise trade (including re-imports and re-exports)						
Gross imports	489.6	474.3	395.6	375.1	80.8	79.1
Gross exports 1/	513.8	502.3	480.2	467.1	93.5	93.0
Total merchandise trade 1/	1,003.4	976.6	875.9	842.2	87.3	86.2
Trade (excluding re-imports and re-exports)						
Imports	476.6	458.7	382.8	359.5	80.3	78.4
Exports	505.7	493.2	472.5	458.3	93.4	92.9
Total trade	982.3	951.9	855.2	817.8	87.1	85.9
Excluding intra-EU28						
Merchandise trade (including re-imports and re-exports)						
Gross imports	410.7	405.8	316.7	306.5	77.1	75.5
Gross exports 1/	423.8	423.8	390.1	388.6	92.0	91.7
Total merchandise trade 1/	834.5	829.6	706.9	695.1	84.7	83.8
Trade (excluding re-imports and re-exports)						
Imports	398.7	391.2	304.8	292.0	76.4	74.7
Exports	415.6	414.9	382.4	379.9	92.0	91.6
Total trade	814.3	806.1	687.2	672.0	84.4	83.4

1/ Excludes re-exports by Hong Kong
Source COMTRADE, using WITS (HS07), May 2014

Table 6 indicates that the G14 accounted for 86 per cent of global trade (including intra-EU28 trade) in the 54 HS subheadings of the APEC list in 2012 (79 per cent in imports and 93 per cent in exports). Excluding intra-EU28 trade as well as re-imports and re-exports, the G14 share in global trade in the 54 HS subheadings was 83 per cent in 2012.[42] Trade flows of G14 and key non-G14 countries are shown in Tables A1.3 and A1.4.[43] The values of dutiable versus duty-free imports are shown in Tables A1.5 and A1.6.

However, as environmental goods account for only a small portion of trade in most HS subheadings, estimates based on all trade at the HS subheading level may present a misleading picture of trade in environmental goods. In particular, trade in environmental goods included in the 54 APEC subheadings is highly overestimated. A different picture emerges when certain large HS subheadings (in terms of trade) that provide only marginally for trade in environmental goods are excluded from trade flow estimates. For example, Korea's trade flows and trade surplus may be significantly lower than indicated in Table A1.3, while China's imports are probably much lower, and the country is likely to have a significant trade surplus.

2.3.1 Key trade flows

Just eight subheadings make up for more than half the value of global and G14 trade in the 54 subheadings of the APEC list (Table 7). G14 trade accounted for practically 90 per cent of global trade (excluding intra-EU trade) in these subheadings in 2011 and 2012. Seven of these eight subheadings are basket items for 'other' products.

Table 7: G14 trade in key HS Subheadings on the APEC List (USD billions), 2011-12

In descending order of total trade (imports plus exports) values in 2012

HS07	Description	Trade (USD billions) (excluding intra-EU28 trade)						Trade in HS subdivision as a portion of total trade in the APEC list (%)	
		Imports		Exports		Total			
		2011	2012	2011	2012	2011	2012	2011	2012
APEC List (54 subheadings)		304.8	292.0	382.4	379.9	687.2	672.0	100.0	100.0
901380	LCDs, n.e.s. and other optical appliances and instruments n.e.s.	53.3	53.9	75.5	80.1	128.8	134.0	18.7	19.9
854140	Photosensitive semiconductor devices, incl. PV cells; LEDs	55.1	41.0	52.4	38.2	107.5	79.2	15.6	11.8
847989	Machines and mechanical appliances, n.e.s.	21.0	19.6	26.6	27.2	47.6	46.9	6.9	7.0
841199	Parts of gas turbines, n.e.s.	11.2	11.9	16.7	16.0	27.9	27.9	4.1	4.2
903289	Regulating or controlling instruments & apparatus, n.e.s.	13.1	12.7	11.1	11.8	24.2	24.5	3.5	3.7
903180	Instruments, appliances and machines for measuring or checking, n.e.s.	10.4	12.0	11.6	12.5	22.0	24.6	3.2	3.7
847990	Parts of machines and mechanical appliances, n.e.s.	9.0	8.7	12.7	13.3	21.7	22.0	3.2	3.3

Table 7: *Continued*

HS07	Description	Trade (USD billions) (excluding intra-EU28 trade)						Trade in HS subdivision as a portion of total trade in the APEC list (%)	
		Imports		Exports		Total			
		2011	2012	2011	2012	2011	2012	2011	2012
901390	Parts and accessories for LCDs, lasers and other appliances and instruments n.e.s. in chapter 90	7.7	6.9	11.5	12.5	19.2	19.4	2.8	2.9

Source: COMTRADE, using WITS (May 2014)

HS 901380 (LCDs not constituting articles provided for more specifically in other headings: other devices, appliances, and instruments) is by far the most important subheading in terms of trade; it has been included in the APEC list, because the subheading covers heliostats, among other products.[44] However, heliostats may represent only a small part of total APEC trade in the subheading (Table 8).[45]

Chinese trade statistics at the TL level show that more than 99 per cent of both China's exports and imports in the subheading consist of liquid crystal (LC) display panels (i.e. goods mostly used in non-environmental applications) rather than heliostats, with imports and exports together accounting for USD 77 billion in 2012 (Table 8).[46] Also, the overwhelming portion of Chinese Taipei's trade in HS 901380 consists of thin film transistor liquid crystal (TFT-LC) display devices. Similarly, both in China and Chinese Taipei, the overwhelming portion of parts (in value terms) traded under the provisions of HS 901390 are parts for LC display panels (i.e. products mostly used in non-environmental applications) rather than for heliostats.

Table 8: G14 trade in HS 901380, 2011 and 2012 (USD billions)

	Imports		Exports		Total trade	
	2011	2012	2011	2012	2011	2012
G14 total (excluding intra-EU28 trade)	53.3	53.9	75.5	80.1	128.8	134.0
-- China 1/	39.4	40.6	29.7	36.4	69.1	77.0
-- Of which 90138030 LCD panels	39.3	40.5	29.5	36.3	68.8	76.8
-- Korea	2.6	2.6	27.3	27.2	28.6	28.7
-- Chinese Taipei	0.9	0.6	9.7	8.7	10.6	9.3
-- Of which 90138030219 TFT-LCD display panels	0.6	0.5	9.2	8.1	9.8	8.6

1/ Excluding re-imports.
Source: COMTRADE and ITC Trade Map

The second largest subheading is HS 854140. It covers not only solar cells, modules, and panels, but also unrelated products. Solar PV products are trade-intensive and account for a significant portion of total trade in the subheading (see Box 4). Several countries have PV-specific TLs in their national tariff schedules.[47] As discussed below, HS 854140 overlaps with the ITA.

The third largest subheading in terms of trade (HS 847989) is a basket subheading for machines and mechanical appliances having individual functions that are not specified or included elsewhere in HS Chapter 84. Certain G14 countries have national TLs specifically covering trade in some ex-outs mentioned in the APEC list, but trade values are generally very small. Trade in other environmental goods, if any, may be part of catch-all TLs for 'not-elsewhere specified' products within the subheading (such as TL 84798990 in China's tariff schedule, see Table A2.1).[48]

All other five most-traded subheadings of the APEC list presented in Table 7 serve as basket items for products 'not-elsewhere specified' in corresponding HS chapters or headings. TL-level trade statistics show that any environmental products will probably have to be classified under TLs for 'other' products (which may make up for an overwhelming portion of all trade in corresponding HS subheadings).[49]

2.4 Renewable Energy Products

The APEC list provides good coverage of certain RE supply products, in particular in the solar PV and wind-power sectors.[50]

2.4.1 Solar PV

Solar PV cells, modules, and panels are part of HS 854140 (photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes).

The subheading is already fully covered by the ITA (Box 4). Since all G14 members are ITA signatories, they have already eliminated and bound tariffs (as have most other ITA participants). It is nevertheless reasonable to include the subheading in the EGA, which would be incomplete without solar PV, its most important RE sector (in terms of international trade). Also, trade flows in solar cells have been developing quite differently from other product categories of HS 854140, i.e. other photosensitive semiconductor devices and LEDs (See Box 4). Furthermore, a number of trade policy issues have emerged in the solar PV sector and may be addressed in the context of the EGA.[51] It should be noted that certain countries that are non-signatories of ITA may join the EGA.

Box 4. Overlap Between the APEC List and the ITA

Nine subheadings of the APEC list are already fully covered by the ITA (Attachment A, Section 1). Since all G14 members are ITA signatories, they have already eliminated applied and bound tariffs in all these subheadings (as have most other ITA participants). In 2012, global trade (excluding intra-EU28 trade) in these nine subheadings amounted to USD 155 billion, with G14 trade accounting for USD 136 billion (88 per cent). The nine subheadings accounted for more than 20 per cent of global and G14 trade in all subheadings of the APEC list.

HS subheading 854140 (photosensitive semiconductor devices, including PV cells whether or not assembled in modules or made up into panels; light emitting diodes) is fully covered by the ITA. At the time the ITA was negotiated, PV cells, modules, and panels accounted for only a relatively small portion of the value of global trade in HS 854140. This portion has increased over time. For example, in the case of US imports, it increased from only 6 per cent in the period 1996-2001 to 69 per cent in 2011-13. Similarly, in the case of Japan's imports, this portion increased from 17 per cent in 2001-04 to 75 per cent in 2011-13 (based on ITC Trade

Box 4. *Continued*

Map). Solar cells accounted for 59 per cent of China's trade in HS 854140 in 2011 (Table A2.1). The portion of solar PV cells in the value of China's exports in the subheading increased rapidly to 81 per cent in 2011, but fell to 64 per cent in 2013, owing to a sharp decline in the value of China's exports of solar cells, largely as a result of falling prices.

Other HS subheadings on the APEC list that are fully included in Attachment A, Section 1 of the ITA are 902610, 902620, 902680, 902690, 902720, 902730, 902750, and 902780. All G14 members have eliminated and bound 100 per cent of their tariffs under these HS subheadings (with the exception of Australia, which applies a 16 per cent tariff to gauges of a kind used as components in motor vehicles (under the provisions of national tariff lines for HS subheadings 902610, 902620, and 902680) and has explicitly excluded these from its APEC tariff reduction pledge).[52]

The EGA can result in further tariff liberalization in these subheadings only when a non-G14 country that does not participate in the ITA (e.g. Brazil, Chile, Mexico, or South Africa)[53] joins an agreement on environmental goods.[54] Where HS subheadings on the APEC list are only partially covered by Attachment A, Section 1 of the ITA (an example is HS 902790), the APEC list may include additional products not covered by the ITA.

2.4.2 Wind-energy equipment

The APEC list includes both wind-powered generating sets (HS 850231) and certain wind-specific components. Although there are no HS subheadings for wind-specific components, certain national tariff schedules include wind-specific TLs.

The US HTS recently introduced certain 10-digit statistical codes that allow for a rather accurate estimate of the value of imports corresponding to a significant portion of the US wind-power supply chain.[55] Table 9 shows that in 2012 certain wind-specific national codes accounted for a significant portion of US imports measured at the level of corresponding HS subheadings of the APEC list.[56] In one case (parts for AC generators), however, this portion is very small.

The availability of wind-specific national codes helps to assess the possible impact of the elimination of import duties on trade in wind-energy components in the US, traditionally the world's largest importer of wind turbines and components.[57]

Table 9: US imports of wind-powered generating sets and wind-power components, 2012-13 (Products on the APEC List)

HTS-10	HTS-10 description	HTS-10 (USD millions)		HS-6 (USD millions)		HTS-10 as a portion of HS-6		Variation 2013/12	
		2012	2013	2012	2013	2012	2013	HTS-10	HS-6
850231.0000	Other electrical generating sets, wind-powered	976	23	976	23	100%	100%	-98%	-98%
730820.0020 1/	Tubular towers and lattice masts	825	99	1115	177	74%	56%	-88%	-84%
841290.9081	Wind turbine blades and hubs	892	274	2247	1476	40%	19%	-69%	-34%
850164.0021	AC generators for wind-powered generating sets	330	170	627	381	53%	45%	-48%	-39%
850300.9546	Parts for these generators	126	31	1638	1312	3%	2%	-75%	-20%

1/ This code is not entirely wind-specific, but US studies have noted that tubular towers are almost exclusively wind towers (Wiser and Bolinger, 2013).
Source: Data compiled from tariff and trade data from the U.S. Department of Commerce and the U.S. International Trade Commission, using the USITC Trade DataWeb

2.4.3 Solar water heaters

The APEC list also includes solar water heaters (SWHs) as an ex-out of HS 841919 (instantaneous or storage water heaters, nonelectric). This ex-out clearly identifies an environmental good. Global trade (excluding intra-EU28 trade) in the subheading was worth slightly over USD 1 billion per year on average in the period 2011- 2013 (COMTRADE). An analysis of trade in national TLs (using the ITC Trade Map) shows that trade in SWHs accounts for only a relatively small portion of global trade. Similarly, trade in parts of SWHs (an ex-out of HS 841990) likely accounts for only a small part of total trade in the subheading (see box 5).

Box 5. Solar Water Heaters

Some G14 participants (e.g. China, Chinese Taipei, Costa Rica, and the US) have specific national TLs for SWHs. In addition, several non-G14 countries, including Brazil, Jordan, Mauritius, Mexico, and many Caribbean countries have created national TLs.

In the US and Chinese Taipei, SWHs account for only a small part of total trade (in value terms) in subheading HS 841919 (less than 6 per cent in the US and 5 per cent in Chinese Taipei). In China, SWH (TL 84191910) accounted for an insignificant part of imports in the corresponding subheading, but for 86 per cent of exports in HS 841919 in 2011-13.

The APEC list also includes HS 841990 (parts of machinery, plant or equipment of HS heading 8419), listing parts of SWHs as one possible ex-out. In China, parts of water heaters (including SWHs) accounted for an insignificant portion of China's imports, but for about 44 per cent of its exports.

Box 5. *Continued*

China is the largest global SWH market as well as being the primary SWH manufacturing and exporting country.[58] China's annual SWH exports were worth approximately USD 117 million on average in 2011-13. Two-thirds of these exports, in value terms, were directed to a large range of non-G14 developing countries, principally Mexico, South Africa, India, Mauritius, and Chile. About one-fifth was exported to the EU28.

Since China accounted for only 13 per cent of global exports (excluding intra-EU28 trade) in subheading HS 841919 in 2011-13, the dominant role of SWHs in China's exports has so far had only a limited impact on global trade in all nonelectric water heaters taken together. Mexico, the world's largest exporter in HS 841919, almost exclusively exports non-solar water heaters (mostly to the US market; Mexico-US bilateral trade accounts for 30 per cent of global trade in HS 841919). Mirror statistics indicate that SWHs also account for only small portions of imports into other major markets (that do not use specific TLs for SWHs), such as the EU28, Canada, and Switzerland. It can be safely assumed that trade in SWHs still represents only a small portion of global trade in the subheading.

2.5 Critical Mass Thresholds

The critical mass requirement is a standard criterion used in plurilateral initiatives for sector-specific tariff reduction or elimination where the benefits are extended on an MFN basis to all WTO members, including non-participants. The key objective is to reduce concerns about 'free riding' (i.e. that non-participants would benefit from the tariff reduction and elimination of others without having to reduce or remove their own tariffs). It is difficult to judge how stringent the critical mass should be to deal adequately with free-riding concerns. The ITA required that participants covered at least approximately 90 per cent of world trade in IT products included in the agreement. The 90 per cent threshold has sometimes also been mentioned in the context of the EGA, but so far no specific threshold has been agreed among G14 members. In practice, participants could adopt any threshold considered sufficiently large to avoid free-riding by non-participants, as a prerequisite to the agreement's entry into force.

Problems in measuring global trade in environmental goods discussed throughout this paper make it difficult to assess whether, with the current composition of the G14, there may still be a risk of free riding by non-participants. The analysis of global trade based on all trade in the 54 subheadings of the APEC list in recent years does not provide evidence of a strong risk. As shown in Table 6, G14 participants already account for 92 per cent of global exports, i.e. the current participation of non-G14 countries in global exports is only 8 per cent (it is to be noted, however, that current non-participants in the EGA may include certain dynamic developing-country exporters that may significantly increase their share in the future). Also, imports from non-G14 countries account for only about 11 per cent of total G14 imports (excluding intra-EU28 trade) in the 54 subheadings of the APEC list[59] (Table A1.7).

Apart from reducing free-riding concerns, there are other reasons to encourage other major trading partners to enter the agreement. Larger participation may be politically attractive and extend the scope of tariff liberalization. It may also provide new export opportunities (approximately 30 per cent of G14 export trade in the subheadings of the APEC list is with non-G14 countries, Table A1.7).[60]

2.5.1 The APEC list and the threshold

Taking all trade in all 54 subheadings of the APEC list, it is estimated that the EU, the US, and China accounted for USD 425 billion of trade (sum of imports and exports, excluding intra-EU28 trade) in 2012. This would cover more than half (about 53 per cent) of the value of global trade (excluding intra-EU28 trade).

The eight other APEC economies among the G14 collectively accounted for approximately 28 per cent of global trade, and the other G14 members (i.e. Costa Rica, Norway, and Switzerland) for 2.5 per cent. On a very preliminary basis and for illustrative purposes only, it is estimated that the G14 trade falls about USD 30 billion to USD 40 billion short of meeting a 90 per cent (for example) threshold (including intra-EU trade):

Table 10: Global and G14 trade on the APEC List, and threshold values (Imports plus exports, in USD billions)

Trade values	Including intra-EU trade		Excluding intra-EU trade	
	2011	2012	2011	2012
Global trade	982.3	951.9	814.3	806.1
90% threshold	884.1	856.7	732.9	725.5
G14 trade	855.2	817.8	687.2	672.0
Shortfall	28.9	38.9	45.7	53.5

Source: COMTRADE using WITS

By way of comparison, the combined value of key Asian APEC economies among the key non-G14 countries (i.e. Malaysia, Thailand, and Indonesia) was USD 25 billion in 2011 and USD 29 billion in 2012.

3. IDENTIFYING A BASKET BASED ON CLIMATE–MITIGATION AND DEVELOPMENT CONSIDERATIONS

ICTSD has for a long time supported public understanding of the possible environmental, trade, and developmental implications of the WTO negotiations on EGS, in particular for developing countries. In doing so, it has paid particular attention to RE products and products that facilitate access to clean energy. This chapter discusses possible gaps in these areas in the APEC list and identifies (based on ICTSD work) products that could be explored as candidates for possible future additions to the list of products that could be covered by the EGA.

Products identified on the basis of ICTSD work include, for example, RE supply equipment and components identified in technology mapping studies, climate-related single-use environmental goods, and goods relevant for clean-energy access. Apart from products that are predominantly used for environmental purposes, certain multiple-use products with environmental benefits and high volumes of trade have also been identified.

3.1 Renewable Energy Products: Possible Gaps in the APEC List

The APEC list covers a range of products associated with RE. Table 11, in its left-hand column, shows 18 HS subheadings of the APEC list relevant for RE, including certain parts and components. In addition, in its right-hand column, it shows a range of other RE-supply and clean-energy products that have been included in ICTSD mapping studies and also featured in various member country submissions to the WTO, but not in the APEC list. The right-hand column also shows a few products relevant to cleaner transport such as ethanol as well as energy savings in buildings such as heat pumps, thermostats and heat-exchange units. Certain of these products may be added to those included in the APEC list, as possible candidates for RE-related products to be covered by the EGA. As far as possible, products are presented by RE categories (in addition, Table 11 lists certain cross-cutting products and components; these are discussed in other sections of this Chapter).

The most important sector in terms of international trade is solar PV, in particular solar cells, modules, and panels. A range of downstream components used in solar PV systems, such as inverters (which are part of HS 850440) have been included in submissions to the WTO, but not in the APEC list (perhaps because the subheading includes products that are principally applied for other uses). The APEC list does not include upstream components;[61] it may be worth considering certain upstream products in the EGA negotiations, such as, for example, machines for the manufacture of wafers (HS 848610), which may be used in the manufacturing of both solar PV equipment and semiconductors.

In the area of concentrated solar power (CSP), the APEC list includes heliostats as an ex-out of HS 901380 (LCDs, not elsewhere specified, and other optical appliances). However, heliostats may account for only a small portion of total trade in the subheading. Similar products used in CSP are Fresnel mirrors (classified as part of HS 900190) and Fresnel reflector modules (part of HS 900290).[62] Here again, it is difficult to assess (using trade statistics) the relative importance of trade in these products vis-à-vis total trade in the respective subheadings.

In the wind-power sector, the APEC list includes wind-powered generating sets and certain components, such as blades and hubs and AC generators (see also chapter 2). Wind-turbine towers (HS 730820) have not been included, but could be considered in possible future additions.

With regard to geothermal energy, the APEC list includes parts for steam and other vapour turbines (HS 840690), because, among other reasons, such turbines may be used for the production of geothermal energy, but not the steam turbines (HS 840681 and HS 840682) themselves. The APEC list also does include ground-source heat pumps (HS 840681).

Certain equipment used in hydropower applications are not included in the APEC list, although HS subheadings are available. Global trade (excluding intra-EU28 trade) in HS heading 8410 (hydraulic turbines and parts thereof) is about USD 1.5 billion per year.[63] The APEC list also does not include fuel-cell technologies.

In the area of biomass, the APEC list includes certain subheadings that contain multiple-use products that may be used in RE generation from biomass (such as certain boilers, gas turbines, and parts thereof), but also in non-environmental applications. As discussed in Chapter 2, the APEC list also includes SWH. No possible additional products in the biomass and SWH sectors are discussed in this paper.

Table 11: RE products included in the APEC List and in ICTSD mapping studies.

Included in APEC List		**Not included in the APEC List**	
Solar PV			
854140*	Solar cells, modules and panels	848610	Machines for the manufacture of wafers
Concentrated solar power (CSP)			
901380	Solar heliostats	900190	Fresnel mirrors
901390	Parts for solar heliostats	900290	Fresnel reflector modules
Solar water heating			
841919*	Solar water heaters		
841990	Parts for solar water heaters		
Wind power			
850231*	Wind-powered generating sets	730820*	Towers
841290	Engine and motor parts, n.e.s.	848340*	Gearboxes
850164	AC generators (alternators)	848360	Clutches
850300	Parts		
Other electric generating from renewable sources			
850239	Electric generating sets		
Biomass			
840290	Steam or vapour-generating boilers parts		
840410	Auxiliary plant for use with boilers		
840490	Parts for auxiliary plant for boilers		
841182	Other gas turbines of a power > 5.000 kW		
841199	Parts of gas turbines		
Geothermal			
840690	Part for steam and other vapour turbines	840681	Steam and other vapour turbines, and parts thereof
		840682	Steam and other vapour turbines, and parts thereof
		841861*	Ground source heat pump

Table 11: *Continued*

Included in APEC List		Not included in the APEC List	
Environmental monitoring, analysis and assessment equipment			
902680	Parts and accessories	903210*	Thermostats
Hydropower			
		841011*	Hydraulic turbines (micro < 1 MW)
		841012*	Hydraulic turbines (small 1-10 MW)
		841013*	Hydraulic turbines (large > 10 MW)
		841090*	Parts
Fuel-cell technologies			
		850680	Fuel cells
Biofuels 1/			
		220710-20* (2 subheadings)	Fuel ethanol
Cross-cutting products			
850490	Parts, e.g. of static converters and inductors	841950*	Heat exchange units
		848220-80* (5 subheadings)	Ball bearings
		850421-23	Liquid dielectric transformers
		850431-34	Other transformers:
		850440*	Static converters
		853710-20	Switchboards and control panels

Source: APEC List and ICTSD studies, such as Wind (2008); Sugathan (2013) and Jha (2014).

** included in the MS-RE list.*

1/ Unlike other products mentioned in this Table, biofuels are not used for electricity generation; they are RE products relevant for the transport sector (see next section). Similarly heat pumps provide renewable heating (as do solar water heaters) and cooling and thermostats are relevant for energy savings in buildings. They are listed here because they are derived from RE supply products listed in earlier ICTSD studies.' Some of these products may have both RE as well as non-RE application (eg; ball-bearings) or an additional energy savings application (e.g. switchboards and control panels).

3.2 Climate-Related Technologies in Other Sectors

Beyond RE goods, climate-related technologies are deployed in other sectors, such as the building and transport sectors. Environmental goods in the building sector include, for example building insulation materials.[64] Environmental goods in the transport sector may include, for example, batteries used in electric cars and biofuels. Such products have been proposed in submissions to the WTO, but are not included in the APEC list.[65]

3.3 Products that Enhance Access to Clean Energy

The APEC list contains certain goods that play a key role in enhancing access to clean energy. For example, as stated in Annex C, generating sets of HS 850239 (electric generating sets, not with internal combustion piston engines and not wind-powered) could include small hydro, ocean, geothermal, and biomass gas turbine generating sets (these generating sets make an important contribution to providing access to electricity to populations in rural areas in developing countries). Similarly, China has listed biogas generating sets as an ex-out of the same subheading.

Recent ICTSD studies[66] have highlighted other products that contribute to improved access to clean energy, in particular off-grid solar appliances. Off-grid markets and trade flows for solar home systems, mini-grids, solar pumps, solar cooking stoves, and solar lighting appliances[67] are

difficult to trace. Apart from PV modules (which are included in the APEC list[68]), other products may be required in off-grid solar applications, such as batteries, charge controllers, and energy converters. Such products have been included in submissions in the WTO, but not in the APEC list. They could be part of possible additions to the APEC list for EGA purposes.

3.4 Dual-Use Products, Including Parts and Components

The APEC list contains a number of HS subheadings that include parts and components, which may often be used in both environmental and non- environmental applications. The reduction and eventual elimination of tariffs and NTBs affecting trade in such products may reduce their costs to producers in importing countries while at the same time allowing certain developing countries to participate in global value chains. Sugathan proposes a 'dual-pronged' approach for developing environmental goods lists that could help trading partners reap both 'environmental' and 'development' benefits.[69] In such an approach, it would be important to identify products with certain environmental applications and where developing countries have an export interest, even if some or all of these products have dual-use. Therefore, ICTSD has included certain multiple-use products with environmental benefits and high volumes of trade in certain lists of environmental goods selected for the analysis of possible benefits of liberalization of trade (for example, gearboxes and ball bearings as components used in wind-power sector). The selection of any such products should, however, be driven primarily by environmental considerations.

3.5 Lists Based on ICTSD Work in the Area of RE and Clean-Energy Technologies

This section analyses trade in two lists of RE products based on ICTSD work.

One list (called Mapping Studies RE (MS-RE)) focuses on RE supply products, in particular products used to generate electricity from solar, wind, hydro, biomass, and geothermal sources. These products include solar cells and modules, hydroelectric turbines, and wind-powered generating sets, including various components used in RE systems, including multiple-use components that may be applied in wind-powered generating systems. Also included are a few RE relevant products not directly used for electricity generation but important for renewable heating, cooling, and energy savings (such as thermostats and heat pumps) and as fuel for cleaner transport (e.g. ethanol). Products included in the MS-RE list are classified under 20 HS subheadings (marked in Table 11 with an asterisk). Some of these overlap with the APEC-RE list. This list has been used, for example, in a recent ICTSD paper analysing the possible effects of the removal of trade barriers affecting selected RE supply products, fuel ethanol, and parts of a wind-energy generation system (Jha 2014).[70]

Another list (called Mapping Studies Sustainable Energy Technologies (MS-SET)) exclusively includes RE- and certain other climate-related products, classified under 39 HS subheadings (shown in Table 12), that are not included in the APEC list. Apart from the HS subheadings shown in the right-hand column of Table 11, it includes certain climate- related products identified in ICTSD studies on the building and transport sectors. Certain products of this list could be added to the APEC list for consideration as possible candidates for inclusion in the EGA. The list is non-exhaustive.

Both the MS-RE and MS-SET lists include dual-use products with large trade volumes, such as static converters and gearboxes. One heavily-traded HS subheading included only in the Additional-RE list is HS 853710 (which includes electronic control equipment used, among other applications, in the wind-power sector (see Table 12). Clearly the inclusion of all trade in HS subheadings with dual-use products in a trade-flow analysis overestimates goods used for environmental purposes traded under the provisions of these subheadings. If included in the EGA, such products may need to be classified as 'ex-outs.'[71]

Table 12: Trade in HS subheadings relevant for renewable energy and clean energy, 2011-12
MS-SET List: Products not included in the APEC List

Products and HS subheadings		Trade (excluding intra-EU28 Trade) In USD millions				G14 trade as a portion of global trade (%)			
		Global trade		G14 trade		Excluding Intra-EU Trade		Including intra-EU trade	
		2011	2012	2011	2012	2011	2012	2011	2012
Biofuels	220710	6,528	8,591	3,343	4,191	51.2	48.8	74.6	67.5
	220720	4,827	3,557	3,424	2,484	70.9	69.8	75.6	78.6
Building insulation materials	680610	1,920	2,076	1,334	1,413	69.5	68.1	85.2	83.1
	680690	1,809	1,967	1,400	1,477	77.4	75.1	86.4	83.9
	700800	1,353	1,385	1,043	1,084	77.1	78.3	87.8	87.8
	701939	2,000	2,009	1,566	1,593	78.3	79.3	86.7	86.8
Wind towers	730820	4,057	5,603	1,932	3,004	47.6	53.6	68.7	67.9
Steam turbines	840681	2,496	3,478	1,041	1,325	41.7	38.1	47.1	40.5
	840682	1,887	1,570	1,028	1,082	54.5	68.9	58.6	72.0
Hydraulic turbines and parts	841011	146	194	71	112	48.6	57.7	59.5	66.9
	841012	267	206	121	94	45.3	45.6	50.2	52.9
	841013	429	414	162	119	37.8	28.7	41.6	31.9
	841090	2,207	2,063	1,393	1,353	63.1	65.6	69.2	71.2
Heat pumps	841861	1,910	1,888	1,506	1,361	78.8	72.1	90.8	87.4
Heat exchange units	841950	11,709	13,381	8,797	10,124	75.3	75.7	82.8	82.2
Ball bearings	848210	19,950	18,409	15,671	14,468	78.6	78.6	84.9	84.8
	848220	6,679	6,314	5,213	4,847	78.1	76.8	85.1	83.9
	848230	3,718	3,501	3,037	2,751	81.7	78.6	87.9	85.5
	848240	1,824	1,880	1,495	1,513	82.0	80.5	87.2	85.8
	848250	4,598	4,219	3,815	3,284	83.0	77.8	87.7	83.9
	848280	3,241	2,824	2,318	1,984	71.5	70.3	77.9	76.7
Gearboxes	848340	25,100	25,516	20,593	20,781	82.0	81.4	86.9	86.3
Clutches	848360	4,520	4,452	3,466	3,392	76.7	76.2	82.9	82.1
Machines for wafers	848610	11,526	3,988	11,223	3,713	97.4	93.1	97.4	93.2
Liquid dielectric transformers	850421	2,316	2,481	1,152	1,168	49.7	47.1	63.9	59.9
	850422	1,983	2,075	1,089	1,175	54.9	56.6	67.4	67.4
	850423	8,462	8,810	5,087	5,400	60.1	61.3	65.4	66.2
Other transformers:	850431	7,590	7,450	5,804	5,624	76.5	75.5	81.3	80.2
	850432	1,714	1,170	747	686	43.6	58.6	52.5	65.6
	850433	2,158	2,162	1,227	1,170	56.9	54.1	62.8	59.5
	850434	2,283	2,639	1,462	1,647	64.0	62.4	73.0	70.4
Static converters	850440	73,626	72,346	62,099	60,413	84.3	83.5	87.3	86.4
Fuel cells	850650	3,317	3,568	2,790	2,863	84.1	80.2	86.1	82.6
Lead-acid batteries	850720	7,768	8,434	5,675	6,145	73.1	72.9	80.4	79.2

Table 12: *Continued*

Products and HS subheadings		Trade (excluding intra-EU28 Trade) In USD millions				G14 trade as a portion of global trade (%)			
		Global trade		G14 trade		Excluding Intra-EU Trade		Including intra-EU trade	
		2011	2012	2011	2012	2011	2012	2011	2012
Switchboards, control panels	853710	55,211	60,950	41,637	45,474	75.4	74.6	80.9	79.8
	853720	9,429	10,607	5,869	6,572	62.2	61.5	67.9	66.6
Fresnel mirrors	900190	13,904	15,257	13,029	14,313	93.7	93.8	94.0	94.0
Reflector modules	900290	2,722	3,005	2,468	2,698	90.7	89.8	93.5	92.8
Thermostats	903210	4,218	4,348	3,025	3,147	71.7	72.4	81.6	81.0
Total		321,402	324,787	248,152	246,044	77.2	75.8	82.6	81.1

Source: Lako (2008); Wind (2008); Sugathan (2013); Jha (2014), COMTRADE, using WITS

The G14 accounts for a large portion of global trade in certain subheadings. These include HS 848610 (machines for the manufacture of wafers); HS 900190 (which provides for trade in Fresnel mirrors, among other products); and HS 900290 (which includes reflector modules). If such products were added, the G14 would move somewhat closer toward meeting a given threshold. For most subheadings of Table 12, however, the G14 accounts for a smaller portion of global trade than for the 54 subheadings of the APEC list as a whole. Therefore, more countries would have to join the agreement to meet the threshold.

3.6 Trade Flows

3.6.1 The APEC-RE and MS-RE lists

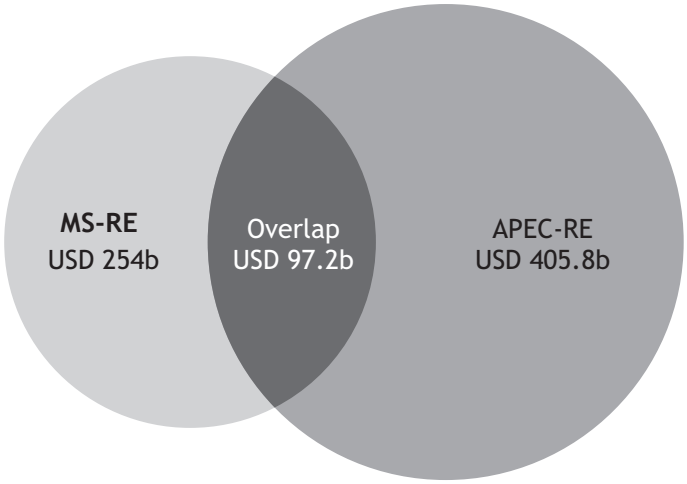
Global trade (excluding intra-EU trade) in the 18 RE-related subheadings of the APEC list shown in Table 11 (hereafter called APEC-RE list) was worth USD 405.8 billion in 2012, compared with USD 254 billion of trade in 20 key HS subheadings of the MS-RE list (Table 13). There is limited overlap as only three HS subheadings, i.e. HS 854140 (which includes solar cells, modules, and panels); HS 850231 (wind-powered generating sets) and HS 841919 (which includes SWH), appear on both lists. This indicates that approaches to the identification of RE-related ex-outs may differ. The APEC list includes certain ex-outs that account for only a small portion of trade in corresponding HS subheadings and national TLs (most importantly heliostats as an ex-out of HS 901380). The 20 HS subheadings of the MS-RE list) contain certain dual-use products with high trade volumes, including developing-country exports. Whereas most of such products can be clearly identified in HS classifications, only a (largely unknown) portion may be used in RE applications. In the case of both the APEC list and the MS-RE list, taking all trade in corresponding HS subheadings will very significantly overestimate trade in RE products. Therefore, there may be a need to create new and additional TLs to capture the specific RE- related characteristics of the product or to specify its use in RE applications.

Table 13: Trade in RE products; overlap between the APEC and ICTSD research, 2011-12

Trade flow	World trade, USD billions		G14 trade, USD billions		G14 trade as a portion of world trade (%)	
	2011	2012	2011	2012	2011	2012
Including intra-EU28						
APEC-RE List (18 subheadings)	496.9	465.1	447.2	412.8	90.0	88.8
MS-RE List (20 subheadings)	369.9	326.8	325.2	280.3	87.9	85.8
- Overlap (3 subheadings)	159.8	119.6	147.8	108.4	92.5	90.6
Excluding intra-EU28						
APEC-RE List (18 subheadings)	423.3	405.8	373.5	353.4	88.2	87.1
MS-RE List (20 subheadings)	281.0	254.0	236.2	207.3	84.1	81.6
- Overlap (3 subheadings)	125.9	97.2	113.8	86.0	90.4	88.5

Source COMTRADE, using WITS (HS07), July 2014

Figure 2. Global Trade in HS Subheadings on the APEC-RE and MS-RE Lists, 2012



Source: COMTRADE, using WITS

3.6.2 Additional RE products not included in the APEC List

This section discusses possible scenarios for adding HS subheadings associated with SE technologies to those that are already part of the APEC list. These subheadings, which have been largely selected based on ICTSD research discussed in Chapter 3, are listed in Table 12 (hereafter this list is referred to as the MS-SET List).

Table 14: MS-SET List, G14 trade as a portion of world trade, 2011-12 (%)

Trade flow	World trade, USD billions		G14 trade, USD billions		G14 trade as a portion of world trade (%)	
	2011	2012	2011	2012	2011	2012
Including intra-EU28						
Imports	211.8	210.7	162.9	159.4	76.9	75.7
Exports	210.0	206.9	185.6	179.4	88.4	86.7
Total trade	421.8	417.5	348.6	338.8	82.6	81.1
Excluding intra-EU28						
Imports	167.1	169.2	118.2	117.9	70.7	69.7
Exports	154.3	155.6	130.0	128.1	84.3	82.3
Total trade	321.4	324.8	248.2	246.0	77.2	75.7

Source COMTRADE, using WITS (HS07), July 2014

As shown in Table 15, G14 trade in the RE-related subheadings of the APEC and MS-SET lists taken together represents a somewhat lower portion of global trade in the same subheadings (compared with trade in the APEC list alone). This implies that more countries would have to join the agreement to reach a certain critical mass threshold.

Table 15: Global and G14 trade in Combined APEC and mapping studies lists 2011-12

	Lists	World trade (exports plus imports) USD billions		G14 trade (exports plus imports) USD billions		G14 trade as a portion of world trade (%)	
		2011	2012	2011	2012	2011	2012
Including intra-EU28 trade							
1	APEC List (54 HS subheadings)	983.1	953.0	855.2	817.8	87.0	85.8
2	APEC-RE List (18 HS subheadings)	496.9	465.1	447.2	412.8	90.0	88.8
3	MS-SET List	421.8	417.5	348.6	338.8	82.6	81.1
1+3	Combined APEC+ MS-SET List	1404.9	1370.5	1203.8	1156.6	85.7	84.4
2+3	Combined APEC-RE+MS-SET List	918.7	882.7	795.7	751.5	86.6	85.1
Excluding intra-EU28 trade							
1	APEC List (54 HS subheadings)	815.1	807.2	687.2	672.0	84.3	83.3
2	APEC-RE List (18 HS subheadings)	423.3	405.8	373.5	353.4	88.2	87.1
3	MS-SET List	321.4	324.8	248.2	246.0	77.2	75.7
1+3	Combined APEC+ MS-SET List	1136.5	1132.0	935.4	918.0	82.3	81.1
2+3	Combined APEC-RE+MS-SET List	744.7	730.6	621.7	599.4	83.5	82.0

APEC-RE List: HS subheadings of the APEC List including products that may have renewable- and clean-energy applications
MS-SET List: additional subheadings proposed by ICTSD to the APEC-RE List for possible consideration in the EGA

3.7 Tariffs

Using the same methodology developed in the tariff analysis presented in Chapter 2 (see Tables 1 and 2), it is estimated that G14 tariffs for the MS-SET list are, in general, somewhat higher than for the APEC list, with a simple average MFN-applied rate of 2.7 per cent and a maximum MFN-applied tariff of 15 per cent (Table 16). Compared with the APEC list, the MS-SET list has a larger portion of HS subheadings with (MFN- applied) dutiable TLs (50 per cent), with a simple average of 5.4 per cent. Of 483 subheadings, 110 include MFN-applied tariffs of higher than 5 per cent (86 subheadings include only MFN-applied tariffs of more than 5 per cent).

Table 16: G14 tariff profile (MFN-applied tariffs) for the MS-SET list (39 HS subheadings, excluding HS 220710-20 fuel ethanol) (Most recent period, HS12)1/ Subheading-averaging method

HS subheadings	Numbers		Simple average	Tariff structure, numbers (%)		MFN-applied tariff rates	
	Sub-headings	Tariff lines		Sub-headings	Tariff lines	Min	Max
Dutiable	243	529	5.4%	50	58	0	15
- Fully	204	366	6.0%	42	40	1	15
- Partially 2/	39	163	2.2%	8	18	0	10
Fully duty free	240	382	0%	50	42	0	0
Total	483	911	2.7%	100	100	0	15

Source: WTO Tariff Download Facility.
1/ HS07 for China
2/ HS subheadings with tariff ranges, including both duty-free and dutiable tariff lines

Bound rates are also higher than for the APEC list of 54 HS subheadings, with a simple average applied rate of 8.5 per cent (Table 17).

Table 17: G14 tariff profile (bound rates) of the MS-SET list (Excluding HS 220710-20 fuel ethanol) (HS96, HS02)

HS subheadings	Numbers		Simple average	Tariff structure, numbers (%)		Bound tariff rates	
	Sub-headings 1/	Tariff lines		Sub-headings	Tariff lines	Min	Max
Dutiable	435	1050	10.8%	78	84	0	45
- Fully	287	440	13.6%	52	35	1	45
- Partially 2/	148	610	5.5%	27	49	0	45
Fully duty free	121	202	0%	22	16	0	0
Total	556	1252	8.5%	100	100	0	45

Source: WTO Tariff Download Facility.
1/ including certain HS96 and HS02 subheadings as per the correlations tables shown by using the WTO Tariff Download Facility
2/ tariff ranges, including duty-free TLs
Note: Fully bound tariffs only, i.e. excluding unbound and only partially bound tariffs

4. CONCLUSIONS AND POSSIBLE WAYS FORWARD FOR POLICYMAKERS

4.1 Conclusions

4.1.1 The APEC List

A major challenge in creating lists of environmental goods for trade purposes is to establish a reasonable correspondence between business surveys of markets for environmental goods (and services) and estimates of global trade flows in environmental goods based on the HS and COMTRADE.

Most HS subheadings of the APEC list provide for trade in products that are not used primarily for environmental purposes. In most cases, it is therefore necessary to define environmental goods as 'ex-outs.' In certain cases ex-outs described in Annex C (to the APEC Economic Leaders' Declaration) can be clearly defined in terms of specific TLs in national or regional tariff schedules. A number of these TLs provide for goods that are exclusively or predominantly used in environmental applications. In most cases, however, these tariff lines provide for trade in products that can be used both in environmental and non-environmental applications. WTO members should then decide either to eliminate tariffs for all products under a particular TL or to create a new TL that captures the environmental product more narrowly. In certain cases this could be done by creating new TLs for a product's environmental end-use (as certain WTO members have done to facilitate implementation of their ITA obligations (in particular in terms of section 2 of Annex A of the ITA, semiconductor manufacturing and testing equipment and parts thereof).

In many cases there is no clear correspondence between ex-outs of Annex C and existing TLs in national and regional tariff schedules. Ex-outs may then need to be classified under TLs that serve as a basket for all products not elsewhere specified in a particular HS subheading. Such TLs often account for large trade flows and environmental benefits of tariff liberalization are uncertain. In such cases, it may be particularly relevant to create TLs for specific environmental goods.

Trade liberalization driven by an agreement in environmental goods may go beyond just environmental goods, because, among other reasons, it is may be difficult to specifically target the latter. In general, this is a welcome development, because trade liberalization has wider potential economic benefits. Yet, WTO members joining an EGA should be able to create ex-outs in their own tariff schedules, wherever possible, in a manner that allows them to keep their right under WTO rules to apply tariffs to unrelated products.

4.1.2. Trade flows and thresholds

Including all trade in the 54 subheadings on the APEC list, it is estimated that the G14 accounted for 86 per cent of global trade (78 per cent of imports and 93 per cent of exports) in 2012. This portion is lower if intra-EU trade is excluded. Many subheadings, however, do not primarily provide for trade in environmental goods.

Because a future EGA may include a large portion of HS subheadings with ex-outs, it may be difficult to estimate the value of trade in environmental products (to be) covered. If measured at the level of entire HS subheadings, trade flows will be heavily overestimated and there will be noise in the calculation of critical-mass thresholds.[72]

4.1.3. Impacts

A future EGA may contribute to significant tariff liberalization in a range of environmental goods (for example, wind-powered generating sets and other generating sets face high import duties in some G14 countries). However, the overall impact on tariff levels in environmental goods is likely to be relatively small. MFN-applied tariffs in most G14 countries are quite low. In addition, bound tariffs in the largest G14 countries are also already low. The simple and trade-weighted averages of bound tariffs (in the subheadings of the APEC list) are only about 1.5 per cent in both the EU and the US; they are higher in China (5.2 per cent). Eliminating and binding import duties

may nevertheless facilitate trade by providing greater predictability as well as reducing the nuisance aspect of tariffs, including the impacts of cumulative tariffs facing products that cross borders several times in the context of value chains.[73] Even where tariffs are already low, their elimination may make certain technologies more cost-competitive. Bound rates in key non-G14 countries are, in general, considerably higher and there is a lot of water in the tariffs (i.e. the difference between bound and applied duties).

All G14 members are also participants in the ITA. Nine subheadings of the APEC list (accounting for about 20 per cent of G14 trade in the APEC list) are already 100 per cent duty free and bound under the ITA. Therefore, the EGA can only result in further tariff liberalization in these subheadings to the extent non-G14 participants that are non-ITA signatories join the agreement on environmental goods.

4.2 Possible Way Forward

A lot of work is needed to make negotiations on an EGA more transparent, in particular in terms of tariff classifications.

Research and technical discussions should be carried out aimed at establishing a reasonable correspondence between business surveys of markets for environmental goods and services on the one hand and estimates of global trade flows in environmental goods based on COMTRADE on the other.

There is a need to enhance transparency in the process of establishing lists of environmental goods:

- Governments may wish to exchange information on how environmental goods on the APEC list (and additional products proposed to be included in the EGA) are classified in terms of their own tariff schedules)
- APEC economies could exchange information on how they are implementing any changes, where necessary, to comply with their commitments in the APEC context.

Given that a future EGA may include a large number of subheadings with ex-outs, there is a need to explore ways to arrive at a more accurate picture of trade in environmental goods. This could be done, for example by exploring model lists of subheadings, including fully-covered subheadings plus a number of subheadings with ex-outs (as the WTO Secretariat has done in the context of its analysis of trade in IT products).[74] In doing so, large catch-all subheadings and TLs that provide only marginally for trade in environmental goods may have to be excluded from trade analysis.[75]

There may be a need for technical work to assist interested countries in creating TLs that specifically capture a product's environmental end-use. For example, IT products listed in Annex A, section 2 of the ITA (semiconductor manufacturing and testing equipment and parts thereof) have been incorporated into national tariff schedules by creating new TLs 'for the purpose of semiconductor manufacturing' or similar indications.

Tariff cuts could include a large range of intermediate products, including those that are relevant for RE value chains. This may help developing countries reduce costs in both environmental and non-environmental sectors while avoiding problems of inverted duty structures.[76] It may, therefore, be a good thing that many subheadings on the APEC list include parts and components.

Non-tariff barriers to trade in environmental goods, which could be more relevant than tariffs, could also be addressed in an EGA. Such an agreement could also play a role in enhancing a common understanding on the use of permissible domestic support measures

The G14 includes certain developing countries that generally possess sufficient export capacity to benefit from trade creation that may be generated by tariff elimination in G14 markets. Certain other developing countries may not currently have enough capacity to participate in export markets, but may have potential to build up manufacturing and export capacities in certain environmental goods.[77] Some of these countries are using tariff policies or other measures to boost domestic manufacturing, where economically viable, which may be gradually reduced as domestic manufacturers become internationally competitive. Such countries may be interested in joining the EGA in the future. In order to encourage the participation of more developing countries in the EGA, it may be possible to consider special and differential treatment (SDT) and other development-oriented provisions in an EGA in a manner that allows developing countries to derive both environmental and economic benefits from joining such an agreement.[78]

ENDNOTES

1 At the time of drafting there is no agreement on this; environmental services may also be addressed in the ongoing plurilateral negotiations on the Trade in Services Agreement (TiSA).

2 See, for example, National Board of Trade. 2014. "Making Green Trade Happen - Environmental Goods and Indispensable Services." *National Board of Trade*. http://w w w.kommers.se/Documents/dokumentarkiv/publikationer/2014/Making-Green-Trade-Happen_webb.pdf.

3 In this paper, trade data shown for the EU include Croatia, which became the 28th member state on 1 July 2013. Trade between Croatia and the EU 27 is calculated as intra-EU28 trade.

4 With one exception in the case of Australia, see Box 3.

5 According to their Joint Statement, participant would also "seek agreement to eliminate tariffs for goods that we all need to protect our environment and address climate change" (USTR. 2014. "Joint Statement Regarding Trade in Environmental Goods." 24 January 2014. Davos, Switzerland. http://w w w.ustr.gov/sites/default/files/EGs-Announcement-jointstatement-012414-FINAL.pdf).

6 For example, the WTO ITA required that participants cover at least 90 per cent of world trade in IT products included in the agreement.

7 Asia Pacific Economic Cooperation. Leader's Declaration. 2012. "Vladivostok Declaration - Integrate To Grow, Innovate To Prosper." Vladivostok, Russia. 8-9 September 2012.

8 Trade in these subheadings accounting for about 30 per cent of total G14 trade in all subheadings of the APEC list (see Chapter 2).

9 ICTSD. 2014a. "A Conversation on Green Goods Trade With Ronald Steenblik And Grant Ferrier." *ICTSD Bridges Trade BioRes,* 8 (1), 7 February 2014. http://w w w.ictsd.org/downloads/bioresreview/biores8-1.pdf

10 The Harmonized Commodity Description and Coding System, also known as the Harmonized System (HS), is an internationally standardized system for classifying traded products. Global trade statistics are available only at the 6-digit level (called subheadings) and can be found in the UN Comtrade database, which contains uniform data on all reported international trade flows worldwide. National (and regional) tariff schedules may extend the 6-digit subheadings by adding additional digits, which are, however, not internationally harmonized. Trade in certain TLs, including statistical codes, has been analysed mostly using the ITC Trade Map.

11 For example, Chinese Taipei has a national TL (84798950009) for "equipment for prevention of air pollution, noise treatment, vibration prevention, water contamination prevention and treatment of materials caused by factory wastage" (ITC Trade Map).

12 A recent United States International Trade Commission (USITC) study observes that data on global trade in different RE technologies are largely unavailable, because most RE technologies are classified in basket categories that contain other products within HS at the 6-digit level. (USITC. 2013a. "Renewable Energy And Related Services: Recent Developments." USITC, Investigation No. 332-534, Publication 4421. August 2013. http://w w w.usitc.gov/publications/332/pub4421.pdf). An earlier USITC study observed that "[T]here is no sound method for separating trade data for items classified under the same HS

number." (USITC. 2005. "Renewable Energy Services: An Examination Of U.S. And Foreign Markets." USITC, Investigation No. 332-462, Publication 3805. October 2005. pp.7 http:// w w w.usitc.gov/publications/332/pub3805.pdf).

13 A global trade analysis is possible only using the UN Comtrade database, which contains comparable data on exports and imports of (almost) all countries, at the level of HS subheadings.

14 IT products and corresponding HS subheadings are listed in Attachment A to the ITA. Section 1 (Major IT products) contains 110 HS1996 subheadings, 88 of which are fully included. Section 2 (Semiconductor manufacturing and testing equipment and parts thereof) correspond to 45 HS1996 subheadings, 7 of which are fully included. The remaining 60 subheadings only partly cover ITA goods. (WTO Secretariat. 2012. "15 Years Of The Information Technology Agreement: Trade, Innovation And Global Production Networks." *WTO Publications*. http://www.wto.org/english/res_e/publications_e/ita15years_2012full_e.pdf).

15 Ibid. at 99. The WTO Secretariat has defined a "(third) model list" of HS Subheadings including fully covered subheadings plus some subheadings with ex-outs to arrive at a more accurate although certainly not perfect picture of trade in IT products.

16 Rasmus Reinvang. 2014. "The APEC List of Environmental Goods: An Analysis of Content And Precision Level." *Vista Analysis SA*, Report Number 2014/08. 18 February 2014. http://vista-analyse.no/site/assets/files/6727/va-rapport_ 2014-08_apec_list_assessment.pdf.

17 See ICTSD, above n 9.

18 The estimated value of trade depends on how trade flows are defined. Including re-imports and re-exports as well as intra-EU28 trade, the value of global trade is estimated at about USD 495 billion (Table 6). In a recent WTO study, trade flows (in IT products) are estimated, including intra-EU trade and excluding re-exports of Hong Kong, China (based on the standard regional definitions used in the WTO International Trade Statistics. (See WTO, above n 14, at 63.).

19 By comparison, when the Ministerial Declaration on Trade in Information Technology Products was signed by 29 countries (including 15 EU member states) in Singapore in December 1996, the original signatories' coverage was only 83 per cent. In the ensuing months, a number of other countries expressed an interest in becoming participants in the ITA and notified their acceptance. (See Craig VanGrasstek. 2013. "The History And Future Of The World Trade Organization." *WTO Publications*). In March 1997, the WTO Secretariat determined that 25 schedules for the 40 participants accounted for more than 92 per cent of world trade in the sector. See WTO document G/L/159/Rev.1. (See WTO, above n 14, at 23.).

20 If intra-EU28 trade is excluded, estimated threshold levels are, in general, a few percentage points lower than when intra-EU28 trade is included. The difference is more significant in HS subheadings where intra-EU28 trade is relatively large. For example, the G14 portion of global trade in HS 850231 (wind-powered generating sets) in 2011 is 86.5 per cent if intra-EU28 trade is included versus 74.6 per cent if intra-EU28 trade is excluded (in 2012, these portions were 89.6 per cent and 81.2 per cent respectively).

21 ICTSD. 2014b. "Written Submission On Environmental Goods Trade Agreement: Advice On The Probable Effects Of Providing Duty-Free Treatment For Imports." *International Centre for Trade and Sustainable Development*. Investigation No. TA-131-039. August 2014.

22 For this paper, the term TL-level refers to classification codes applied by individual countries (and the EU) that are longer than the HS 6-digit level, used for tariff or other (e.g. statistical) purposes. While the tariff analysis is based exclusively on TLs used for tariff purposes, the trade analysis also considers more-detailed statistical codes. For example, for the 54 subheadings of the APEC list, the US Harmonized Tariff Schedule (HTS) has 152 codes (at the eight-digit level) for tariff purposes and, a larger number (252 for imports and 157 for exports) of codes at the 10-digit level, i.e. adding two additional digits, for statistical purposes.

23 Average tariffs are presented for illustrative purposes only. In practice, tariffs are applied only to TLs.

24 For the 54 HS subheadings of the APEC list there have been no major changes in HS12 compared with HS07, except for certain revisions in HS 847989, which refer exclusively to clearly non-environmental goods.

25 The term G14 trade is used for all trade (exports plus imports) by G14 participants, not for trade among G14 participants.

26 Frankfurt School-UNEP Center/BNEF. 2014. "Global trends in Renewable Energy Investment 2014." *Frankfurt School of Finance and Management*.

27 Ibid.

28 IPCC. 2014. "Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change." Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

29 See Frankfurt School - UNEP Center/BNEF, above n 26.

30 See APEC, above n 7.

31 Reinvang, above n 16, argues that two subheadings cover mainly environmental goods and that five subheadings cover both environmental goods and non-environmental goods in fair amounts.

32 See ICTSD, above n 9.

33 For some other subheadings, mostly under HS heading 9027 (instruments and apparatus for physical or chemical analysis, etcetera), Annex C does not list any 'ex-out.' This may be because applied tariffs are very low and various subheadings are already covered by the ITA.

34 Rene Vossenaar. 2013. "The APEC List of Environmental Goods: An Analysis of the Outcome & Expected Impact." *International Centre for Trade and Sustainable Development*. Issue paper No. 18. June 2013.

35 See USTR, above n 5.

36 These subheadings include not only parts of different machines and appliances listed as 'environmental goods,' but also parts with wider applications, e.g. appliances covered by broader HS subheadings or headings. For example, only a very small part of HS 841990 (parts of machinery, plant and equipment of HS heading 8419) may be used for maintenance and repair of solar water heaters (which are part of HS 841919).

37 For example, the tariff schedule of Chinese Taipei includes a designated TL (84799020003) for "parts of equipment for prevention of air pollution, noise treatment, vibration prevention, water contamination prevention, and treatment of materials caused by factory wastage." Trade in this TL accounted for less than 6 per cent of the value of total trade in the subheading in 2011-2013.

38 About half of these subheadings have only one TL, i.e. the HS subheading provides the most-detailed tariff information available. With the possible creation of new TLs (with a view to implementing the EGA) the number of TLs may increase significantly.

39 In the case of Switzerland the data set includes only 19 subheadings with ad valorem tariffs.

40 In Costa Rica, MFN tariffs are applied in only three subheadings (e.g. 9 per cent in the case of SWHs). In New Zealand, 37 APEC HS12 subheadings include MFN-applied tariffs, with a maximum of 5 per cent.

41 For example, certain APEC economies would have to implement tariff reductions for products, such as wind-powered generating sets (HS 850231) and other generating sets (HS 850239). See Vossenaar, above n 34.

42 As shown in Table A1.8, this share ranged from 47 per cent in the case of HS 851430 (Industrial and laboratory electric furnaces and ovens) to 97 per cent in the case of HS 901380 (Other optical devices, appliances, and instruments).

43 While the G14 collectively has a trade surplus in the 54 HS subheadings of the APEC list (Table A1.3), some G14 countries (e.g. Australia and Canada) have deficits. Almost all non-G14 trading partners have a deficit (Table A1.4). It is noted, however, that most non-G14 countries have trade deficits in non-mineral manufactured products as a group (one exception is Malaysia). The Philippines, South Africa (in 2011-12), and Macedonia are the only non-G14 countries with a trade surplus (Malaysia and Israel showed a small surplus in 2013). The surplus of the Philippines is due largely to exports of solar PV cells and modules (to Japan and the US), while those of South Africa and Macedonia are explained by exports of catalytic converters (South Africa exports to the US and the EU and Macedonia to the EU).

44 Heliostats orient mirrors in concentrated solar power (CSP) systems to reflect sunlight on to a CSP receiver.

45 There is a very large difference between global import and export values in this subheading: In 2011-12, the average annual value of global exports (excluding intra-EU28 trade) in HS 901380 was USD 79 billion, compared with imports worth USD 58 billion (COMTR ADE). One possible explanation of the difference is that exporting and importing countries may classify the same or similar products differently. For example, China reported exports in HS 901380 worth USD 34 billion per year on average in 2011-13, but trading partners reported imports from China in the same subheading worth less than USD 10 billion. Only a very small part of this difference can be explained by missing observations (i.e. imports into countries not having reported trade statistics to COMTR ADE). For example, while China reported average annual exports to the EU-28 worth almost USD 4 billion, EU-28 statistics showed imports from China worth less than USD 200 million.

46 China, Korea, and Chinese Taipei collectively accounted for 85 per cent of total G14 trade in the subheading in 2011-12.

47 These include Argentina; Brazil; China (as from 2009); Chinese Taipei; Colombia; Ghana; India; Japan (for imports); Morocco; Peru; Thailand (as from 2007); and the US. Indonesia and South Africa introduced national TLs in their 2012 schedules.

48 The US HTS has some national TLs, for example for air humidifiers or dehumidifiers (HTS 847989.1000) and trash compactors (HTS 847989.5500), but trade is small. Most imports are under HTS 847989.9899, a catch-all TL for machines and mechanical appliances that are not specified elsewhere. Similarly, China has certain designated TLs corresponding to ex-outs on the APEC list, but trade values are very small (See Table A2.1). Chinese Taipei has national TLs for air humidifiers or dehumidifiers as well as for "equipment for prevention of air pollution, noise treatment, vibration prevention, water contamination prevention and treatment of materials caused by factory wastage" (84798950009), but most trade in the subheading is under a catch-all TL.

49 Under HS 847990, the US HTS has designated TLs for parts of trash compactors, while China has a code for parts of air humidifiers and dehumidifiers. In both cases, trade is very small, and in both countries most trade in the subheading is under a catch-all TL.

50 Simple average MFN-applied tariffs for 18 APEC HS subheadings containing RE products vary from 0 per cent in solar PV cells to 5.5 per cent in HS 841919 (non-electric water heaters). China's 35 per cent for SWH is the highest rate of the entire APEC list. The simple average MFN-applied tariff for HS subheadings including RE products (2 per cent) is slightly higher than for the APEC list as a whole. China, Chinese Taipei and Korea have MFN-applied tariffs for HS 850231 (wind-powered generators) and HS 850239 (electric generating sets, not with internal combustion piston engines and not wind-powered) of 8 to 10 per cent. In accordance with the APEC tariff-reduction pledge, these tariffs would have to be reduced to 5 per cent or less by the end of 2015.

51 The question then arises whether the creation of the EGA might justify a future revision of HS 854140 with a view to creating separate subheadings for solar PV equipment for trade-analysis purposes

52 The WTO Tariff Download Facility shows bound tariffs using HS96 or HS02. In very few cases, tariff schedules of G14 participants (based on more recent HS versions, i.e. HS07 or HS12) may show a positive MFN-applied tariff in these subheadings, owing to reclassifications. For example, the US tariff schedule includes a 1.2 per cent MFN-applied tariff for exposure meters (HTS 902750.10), a product not covered by the ITA (in HS02 exposure meters were classified under HS 902740, but this subheading was deleted in HS07 because of the low volume of trade).

53 Bound rates for HS 854140 are 35 per cent in Argentina and Mexico, 25 per cent in Chile, and 10 per cent in South Africa; In Brazil, bound rates range from 0 to 35 per cent (WTO Tariff Download Facility).

54 Among the largest non-G14 WTO members (in terms of trade in HS subheadings of the APEC list), the Russian Federation and Saudi Arabia are also non-ITA participants, but they have already bound their import tariffs for HS 854140 at 0 per cent.

55 In 2012, about 25 per cent of US imports (in value terms) of wind-powered generating sets and 70 per cent of US imports of the wind-energy components listed in Table 9 were imported from developing countries. China and India were the key developing-country suppliers of generating sets, while components were imported mainly from Brazil, Korea, Mexico, Vietnam, and Indonesia. (UNEP. 2014. "South-South Trade In Renewable Energy:

A Trade Flow Analysis Of Selected Environmental Goods." *United Nations Environment Programme).*

56 US imports of wind-powered generating sets and wind components dropped significantly in 2013, largely owing to a more than 90 per cent drop in new US wind-power installations. This can, in turn, largely be attributed to uncertainty concerning the production tax credit. Imports of generating sets and components moved in tandem (i.e. all showing large declines), as trade is largely driven by wind-power installations. Imports recovered significantly in 2014 (based on figures for January-May 2014).

57 China's tariff schedule includes a specific national TL (85030030) for 'parts of the motors of subheading 850231' (Table A2.2). As in the case of the US, imports represent a very small portion case of China's imports in subheading 850300. However, wind-specific parts accounted for almost one-quarter of China's exports in value terms.

58 See UNEP, above n 55

59 Compared with 37 per cent for all manufactured products (Table A1.7)

60 Compared with 45 per cent for all manufactured products.

61 PV cells are included in HS 854140 'whether or not assembled in modules or made up into panels.'

62 See Paul Lako. 2008. "Mapping Climate Mitigation Technologies/Goods Within The Energy Supply Sector - Study On State Of The Art Of Renewables For ICTSD." *ICTSD Programme On Trade and Environment*. ECN-E-08-072. http://w w w.ictsd.org/sites/default/files/research/2010/01/mapping-climate-mitigation-technologies-and-associated-goods-within-the-renewable-supply-sector.pdf. See also Izaac Wind. 2008. "HS Codes And The Renewable Energy Sector." *ICTSD Programme on Trade and Environment*.

63 The G14 as a group accounts for a very large portion of global exports, but only a small portion of global imports. The G14 share in global trade (excluding intra-EU28 trade) in heading 8410 was 59 per cent in 2012; its share in global trade in small hydraulic turbines alone was 51 per cent. Because of concern about the potential adverse environmental impact of large-scale hydropower applications, some lists of environmental goods do not include large hydraulic turbines, in particular 841013 (Hydraulic turbines of a power exceeding 10,000 kW).

64 These may include rock wool (HS 680610); insulating materials and articles (HS 680690); multiple-walled insulating units of glass (HS 700800); and glass-fibre insulation products (HS 701939).

65 The latter two categories could be considered also in light of the provision of a separate code for biodiesel in the 2012 version of the HS. The relevant subheadings are HS12 subheading 271020 (biodiesel containing by weight 70 per cent or more of petroleum oils or of oils obtained from bituminous minerals) and heading 3826 (biodiesel and mixtures thereof, not containing or containing less than 70 per cent by weight of petroleum oils or oils obtained from bituminous minerals). HS12 also includes new subheadings for accumulators (HS 850750 for nickel-metal hydride accumulators and HS 850760 for lithium-ion accumulators).

66 Madhavan Nampoothiri and Hari Manoharan. 2013. "International Trade And Access To Sustainable Energy: Issues And Lessons From Country Experiences." *International Centre for Trade and Sustainable Development*. December 2013.

67 There are no specific HS subheadings for solar lighting appliances. Solar lamps have been traded mostly under HS 940540 (other electric lamps and lighting fittings) and HS 940550 (non-electric lamps). Portable solar lamps may also be traded under HS 851310 (portable electric lamps designed to function by their own source of energy (for example, storage batteries)). None of these HS subdivisions, however, specifically provide for trade in solar lamps. India has created a specific national TL (94055040) for solar lamps. Some other developing countries, in particular Jordan, Mauritius, and Sri Lanka also have national TLs, but imports reported (mainly from China) are small according to the ITC Trade Map See UNEP, above n 55.

68 The APEC list includes solar PV modules in general, with the vast majority being used in grid-connected applications. PV modules used in off-grid installations may be underrepresented in trade statistics.

69 Mahesh Sugathan. 2013. "List Of Environmental Goods: An Overview." *International Centre for Trade and Sustainable Development*. 20 December 2013.

70 Veena Jha. 2013. "Removing Trade Barriers On Selected Renewable Energy Products In The Context Of Energy Sector Reforms: Modeling Environmental And Economic Impacts In A General Equilibrium Framework." *International Centre for Trade and Sustainable Development*.

71 A number of these subheadings also provide for trade in additional products proposed by ITA members to be subject to the obligations set out in the ITA. (USITC. 2013b. "The Information Technology Agreement - Advice And Information On The Proposed Expansion: Part 2." *USITC*, Investigation No. 332-536, Publication 4382. February 2013. http://www.usitc.gov/publications/332/pub4382.pdf).

72 Impacts on estimated threshold values are uncertain. The estimated G14 portion in global trade would be lower if certain heavily-traded HS subheadings that only marginally include environmental goods (in particular HS 901380 and HS 901390) were excluded. However, the inclusion of unrelated products may also obscure the dominant role of major G14 countries in trade in more narrowly defined environmental goods within certain HS subheadings.

73 See ICTSD, above n 9.

74 In the case of environmental goods, however, there are very few fully covered HS subheadings.

75 The objective is not to second guess the environmental benefits of (optional) ex-outs mentioned in the APEC list, but rather to reduce certain distortions in the trade analysis resulting from the unavoidable use of 6-digit HS subheadings for a global trade analysis. Although this method is far from satisfactory, it removes some of the largest distortions in the trade analysis.

76 Where components face higher import tariffs than final products, which may discourage the development of local manufacturing capacity.

77 Where new market entrants from developing countries may find it difficult to compete (for example in the manufacturing of PV cells), they could focus on specific parts of the manufacturing chain such as module assembly and the manufacture of certain balance of system (BoS) components (such as mounting structures); downstream services (such as installation) are also becoming increasingly important parts of the PV system value chain See UNEP, above 55.

78 In this context, discussions on SDT provisions in the ITA and possible sector-specific initiatives in the WTO negotiating group on Non-Agricultural Market Access may be relevant. (South Center. 2013. "The Information Technology Agreement (ITA): Considerations From A Development Perspective." Trade For Development Programme Of The South Center, Analytical note SC/TDP/AN/ITA/1).

79 Annex C of the 2012 APEC Leader's Declaration' in Vladivostok that lists the 54 HS sub-headings (in the column corresponding to HS Code Description), includes national TL codes for China, corresponding to 28 of the 54 subheadings. Although the exact objective and status of this information (probably provided by China), is not fully clear, it offers some useful insights (in the case of China) in the trade coverage of ex-outs. However, even at the national TL-level unrelated products may still be included, probably making it necessary to include further ex-outs, even at the TL level.

80 With regard to exports, the USITC Trade DataWeb returns data for US domestic exports in 157 10-digit HTS codes corresponding to the 54 subheadings of the APEC list.

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ANNEX 1: TRADE AND TARIFF INDICATORS CONCERNING THE APEC LIST

Table A1.1: G14 simple and trade-weighted MFN-applied tariff averages
For all and for dutiable items of the 54 HS subheadings of the APEC List, 2011
TL averaging method (HS07)

	Tariff lines		Simple average tariffs		Trade-weighted average tariffs	
	All items	Dutiable items	All items	Dutiable items	All items	Dutiable items
Australia	71	38	2.68	5.00	1.70	5.00
Canada	109	9	0.38	4.61	0.14	5.09
China	135	87	4.81	7.46	3.98	5.55
Costa Rica	95	5	0.53	10.00	0.06	9.44
European Union	107	76	1.82	2.57	0.93	2.50
Hong Kong, China	90	0	0	0	0	0
Japan	73	1	0.23	0.27	0	2
Korea, Republic of	247	175	5.49	7.75	5.86	7.98
New Zealand	77	43	2.79	5.00	2.54	5.00
Norway	85	0	0	0	0	0
Singapore	159	0	0	0	0	0
Switzerland	19	0	0	0	0	0
Chinese Taipei	129	63	1.98	4.06	1.48	3.29
United States	152	67	1.42	3.58	0.87	1.97
G14	1548	562	2.04	5.67	2.00	4.55

Source WTO Tariff Analysis Online, https://tariffanalysis.wto.org/

Table A1.2: Non-G14 countries: simple and trade-weighted tariff averages
For all and for dutiable items of the 54 HS subheadings of the APEC List, 2011
Tariff line averaging method (HS07)

	Tariff lines		Simple average tariffs		Trade-weighted average tariffs	
	All items	Dutiable items	All items	Dutiable items	All items	Dutiable items
Brazil	185	138	10.66	14.29	11.86	14.38
Malaysia	84	16	3.51	18.44	n/a	n/a
Mexico	250	67	3.52	13.13	0.90	8.86
India-2010	130	95	5.18	7.59	4.59	7.36
India-2012 (HS12)	*130*	*104*	*6.12*	*7.53*	*5.82*	*7.32*
Indonesia	161	151	5.19	5.53	5.18	5.57
South Africa	63	11	2.21	12.64	0.78	10.01
South Africa-2012 (HS12)	*67*	*12*	*2.12*	*12.00*	*0.69*	*9.05*
Thailand	159	111	3.61	5.27	3	4.38
Turkey	166	102	1.55	2.65	2.09	2.46

Source WTO Tariff Analysis Online, https://tariffanalysis.wto.org

Table A1.3: G14 participants: trade in 54 APEC subheadings (USD billions), 2011-12
In descending order of total trade (imports plus exports) in 2012

Reporter	Imports		Exports		Total trade		Trade balance	
	2011	2012	2011	2012	2011	2012	2011	2012
China	88.8	88.7	86.8	84.3	175.6	173.0	-2.1	-4.4
European Union 1/	72.6	55.7	92.0	91.7	164.6	147.4	19.3	35.9
United States	49.0	52.1	49.2	51.9	98.2	104.0	0.2	-0.3
Japan	14.8	15.6	48.7	47.6	63.5	63.2	33.9	32.0
Korea	17.6	18.0	42.6	43.9	60.2	61.9	25.0	25.9
Chinese Taipei	8.7	7.0	27.4	25.3	36.1	32.4	18.7	18.3
Singapore	10.6	10.8	14.3	14.5	24.9	25.3	3.7	3.8
Canada	12.1	11.7	6.9	7.1	19.1	18.8	-5.2	-6.7
Hong Kong, China	15.3	16.2	0.1	0.1	15.4	16.3	-15.2	-16.1
Switzerland	5.2	4.9	10.1	9.2	15.4	14.1	4.9	4.2
Australia	6.6	7.6	1.7	1.4	8.3	9.1	-4.8	-6.2
Norway	2.6	2.7	2.3	2.7	4.8	5.4	-0.3	0.0
New Zealand	0.7	0.7	0.2	0.2	0.8	0.9	-0.5	-0.5
Costa Rica	0.2	0.2	0.0	0.0	0.3	0.2	-0.2	-0.2
G14 1/	304.8	292.0	382.4	379.9	687.2	672.0	77.6	87.9

Source COMTRADE, using WITS (HS07), May 2014
1/ Excluding intra-EU28 trade

Table A1.4: Key non-G14 countries: trade in 54 APEC subheadings, 2011-12 (USD billions)
In descending order of total trade (imports plus exports) in 2012

Reporter	Imports		Exports		Total trade		Trade balance	
	2011	2012	2011	2012	2011	2012	2011	2012
Mexico	14.3	15.5	8.1	8.8	22.4	24.3	-6.2	-6.7
India	9.9	9.8	3.0	2.8	12.9	12.5	-6.9	-7.0
Malaysia	6.3	6.3	5.6	6.0	11.9	12.3	-0.6	-0.3
Thailand	5.8	8.4	3.0	3.4	8.8	11.7	-2.8	-5.0
Russia	9.4	9.9	1.1	1.5	10.5	11.4	-8.3	-8.4
Brazil	6.5	6.7	1.8	2.3	8.4	9.0	-4.7	-4.4
Turkey	4.6	5.2	0.9	1.0	5.5	6.2	-3.7	-4.2
Indonesia	3.4	4.2	0.7	0.7	4.1	4.9	-2.7	-3.4
Saudi Arabia	3.8	4.8	0.0	0.1	3.8	4.9	-3.8	-4.8
South Africa	2.1	2.2	3.3	2.6	5.4	4.7	1.2	0.4
Philippines (HS02)	1.4	1.4	1.1	2.5	2.5	3.9	-0.3	-1.1
Total	67.5	74.4	28.6	31.7	96.2	105.8	-38.8	-42.7

Source COMTRADE, using WITS (HS07), May 2014
These figures are based on data reported to COMTRADE.

Table A1.5: Total and duty-free G14 imports in the APEC List, 2011 (MFN-applied tariffs, HS07)

Reporter	Tariff lines (number)		Import values (USD millions)			Duty-free imports as a portion of the value of total imports (%)
	Total	Duty free	Total	Duty free	Dutiable	
Australia	71	33	6587	4342	2245	66
Canada	109	100	12156	11816	340	97
China	135	48	88887	25152	63735	28
Costa Rica	95	90	195	194	1	99
EU(27)	107	33	65315	41176	24139	63
Hong Kong, China	90	90	15268	15268	0	100
Japan	73	72	14771	14757	14	99
Korea, Republic of	247	72	17022	4513	12509	27
New Zealand	77	34	647	318	329	49
Norway	85	85	2563	2563	0	100
Singapore	159	159	10594	10594	0	100
Switzerland 1/	19	19	1162	1162	0	100
Chinese Taipei	129	66	8569	4706	3863	55
United States	152	85	47440	26624	20816	56
Total G14	1548	986	291176	163185	127991	56

/ TLs with ad valorem rates of duty only
Source: WTO Tariff Analysis Online, https://tariffanalysis.wto.org/

Table A1.6: Non-G14 countries: Total, duty-free and dutiable imports in the APEC List 2011 (MFN-applied tariffs)

In descending order of import values

Reporter	Tariff lines (number)		Import values (USD millions)			Duty-free imports as a portion of the value of total imports (%)
	Total	Duty free	Total	Duty free	Dutiable	
Mexico	250	183	14264	12821	1443	90
India-2010	130	35	7099	2678	4421	38
India-2012 (HS12)	130	26	9624	2176	7448	23
Brazil	185	47	6469	1131	5338	17
Brazil-2012 (HS12)	185	47	7250	811	6440	11
Thailand	159	48	5812	1828	3984	31
Turkey	166	64	4612	695	3917	15
Malaysia-2008	84	68	4594	4404	190	96
Saudi Arabia	88	47	3774	752	3022	20
Indonesia	161	10	3404	235	3169	7
South Africa	63	52	2084	1932	152	92
Total*	1286	554	52112	26476	25636	51

Source WTO Tariff Analysis Online, https://tariffanalysis.wto.org/
** In the calculation of the total, 2012 reporting data for India and Brazil based on HS 12 nomenclatures have been excluded*

Table A1.7: Trade in the APEC List among G14 participants and G14 with the Rest of the World

Trade flows (USD billions) 54 HS subheadings of the APEC List						
Trade flow	G14 trade		Intra-G14 trade		Extra-G14 trade (trade with non-G14 countries)	
	2011	2012	2011	2012	2011	2012
Including intra-EU28						
Imports	382.8	359.5	350.3	328.4	32.5	31.1
Exports	472.5	458.3	356.8	336.1	115.7	122.1
Total trade	855.2	817.7	707.1	664.5	148.1	153.2
Excluding intra-EU28 trade						
Imports	304.8	291.6	272.3	260.6	32.5	31.1
Exports	382.4	379.9	266.7	257.8	115.7	122.1
Total trade	687.2	671.6	539.0	518.4	148.1	153.2
Intra-G14 and extra-G14 trade as a portion of global G14 trade (%)						
Including intra-EU28 trade						
Imports	100	100	91.5	91.4	8.5	8.6
Exports	100	100	75.5	73.4	24.5	26.6
Total trade	100	100	82.7	81.3	17.3	18.7
Excluding intra-EU28 trade						
Imports	100	100	89.3	89.3	10.7	10.7
Exports	100	100	69.7	67.9	30.3	32.1
Total trade	100	100	78.4	77.2	21.6	22.8
Reference categories (Excluding intra-EU28 trade)						
Manufactured products						
Imports	100	100	70.2	71.4	29.8	28.6
Exports	100	100	55.0	54.6	45.0	45.4
Total trade	100	100	62.5	63.0	37.5	37.0
All products						
Imports	100	100	62.8	62.6	37.2	37.4
Exports	100	100	66.2	65.4	33.8	34.6
Total trade	100	100	64.4	63.9	35.6	36.1

Source: COMTRADE (data reported by G14 participants), using WITS (August 2014)

Table A1.8: APEC List, global and G14 trade by 54 HS subheadings, 2011-12

HS-2007 Subheading	Global trade, excluding intra-EU28 trade (USD millions) (Imports plus exports)		G14 trade, excluding intra-EU28 trade (USD millions) (Imports plus exports)		Value of G14 trade as a portion of the value of global trade (%)	
	2011	2012	2011	2012	2011	2012
APEC List	814,288	806,067	687,229	671,961	84.4	83.4
441872	2,100	2,066	1,618	1,608	77.1	77.8
840290	6,552	6,163	4,779	4,474	72.9	72.6
840410	1,815	1,599	1,322	1,043	72.8	65.2
840420	329	507	184	334	56.0	65.8
840490	1,676	1,458	1,153	910	68.8	62.4
840690	10,010	7,896	8,031	6,034	80.2	76.4
841182	12,299	14,013	9,342	10,787	76.0	77.0
841199	34,531	34,701	27,907	27,889	80.8	80.4
841290	8,957	10,154	8,012	9,195	89.5	90.6
841780	2,657	2,360	1,597	1,403	60.1	59.4
841790	3,465	3,558	2,444	2,481	70.5	69.7
841919	2,084	2,166	1,341	1,430	64.3	66.0
841939	3,247	3,331	2,343	2,327	72.1	69.9
841960	1,503	1,370	897	998	59.7	72.8
841989	13,334	13,701	9,124	9,777	68.4	71.4
841990	8,807	9,465	7,288	7,572	82.8	80.0
842121	9,968	10,154	7,349	7,341	73.7	72.3
842129	10,979	11,256	8,612	8,796	78.4	78.1
842139	24,315	23,765	15,864	15,816	65.2	66.6
842199	16,166	16,545	13,186	13,186	81.6	79.7
847420	6,906	7,274	4,048	4,272	58.6	58.7
847982	6,494	6,492	4,750	4,787	73.1	73.7
847989	58,600	58,525	47,585	46,857	81.2	80.1
847990	25,405	25,729	21,660	22,050	85.3	85.7
850164	5,476	5,981	4,115	4,554	75.1	76.1
850231	6,766	7,022	5,050	5,705	74.6	81.2
850239	9,294	12,131	5,678	6,602	61.1	54.4
850300	24,369	25,814	18,191	18,982	74.6	73.5
850490	15,615	14,719	12,857	12,102	82.3	82.2
851410	3,226	2,756	2,843	2,283	88.1	82.8
851420	884	880	611	654	69.1	74.3
851430	1,862	1,978	1,232	932	66.2	47.1
851490	2,695	2,525	2,271	2,094	84.3	82.9
854140	116,953	88,327	107,452	79,204	91.9	89.7
854390	14,583	14,487	12,526	12,002	85.9	82.8
901380	133,201	137,933	128,785	134,007	96.7	97.2
901390	20,809	21,416	19,241	19,431	92.5	90.7
901580	8,352	8,994	6,953	7,335	83.2	81.6

Table A1.8: *Continued*

HS-2007 Subheading	Global trade, excluding intra-EU28 trade (USD millions) (Imports plus exports)		G14 trade, excluding intra-EU28 trade (USD millions) (Imports plus exports)		Value of G14 trade as a portion of the value of global trade (%)	
	2011	2012	2011	2012	2011	2012
902610	7,044	7,201	5,610	5,634	79.6	78.2
902620	9,449	10,435	7,641	8,409	80.9	80.6
902680	3,693	4,371	2,965	3,463	80.3	79.2
902690	6,492	6,776	5,575	5,709	85.9	84.2
902710	5,080	5,966	4,364	5,119	85.9	85.8
902720	3,786	3,894	3,241	3,335	85.6	85.6
902730	5,477	5,741	4,787	4,945	87.4	86.1
902750	10,071	10,061	9,184	9,178	91.2	91.2
902780	17,194	18,220	15,188	16,077	88.3	88.2
902790	15,457	15,691	14,311	14,422	92.6	91.9
903149	7,794	8,122	6,652	6,880	85.3	84.7
903180	27,134	30,368	21,990	24,563	81.0	80.9
903190	10,221	11,008	8,730	9,076	85.4	82.4
903289	31,646	32,460	24,169	24,546	76.4	75.6
903290	11,449	11,182	9,753	9,298	85.2	83.1
903300	6,016	5,359	4,830	4,054	80.3	75.7
Reference items						
Total trade	26,519,872	26,608,469	18,623,219	18,892,420	70.2	71.0
Manufactures	18,319,395	18,257,498	13,831,603	13,770,276	75.5	75.4
APEC List as a portion of total trade and of manufactures trade (%)						
Total trade	3.1	3.0	3.7	3.6		
Manufactures	4.4	4.4	5.0	4.9		

Source: COMTRADE, using WITS (May 2014)

Table A1.9: Trade in the APEC List and G14 participation in global trade, 2013 (USD billions)

Reporters	Imports	Exports	Total trade	Trade balance
China	89.7	85.5	175.1	-4.2
European Union 1/	41.7	82.8	124.5	41.1
United States	47.9	51.1	99.0	3.1
Korea, Rep.	19.7	41.6	61.3	21.9
Japan	18.8	40.5	59.3	21.7
Chinese Taipei	7.2	24.5	31.7	17.3
Singapore	10.8	14.2	25.0	3.3
Canada	11.9	7.7	19.6	-4.2
Hong Kong, China (2012) 2/	16.2	0.1	16.3	-16.1
Switzerland	5.3	9.4	14.7	4.1
Australia	6.9	1.3	8.2	-5.6
Norway	2.6	2.7	5.3	0.1
New Zealand	0.7	0.2	0.9	-0.5
Costa Rica	0.2	0.1	0.3	-0.2
G14 Subtotal	279.5	361.5	641.1	82.0
Mexico	16.3	8.9	25.2	-7.4
Malaysia	6.5	6.9	13.3	0.4
Russian Federation	11.6	1.8	13.4	-9.8
India	8.8	3.0	11.8	-5.8
Thailand	6.9	3.8	10.8	-3.1
Brazil	7.4	1.6	9.1	-5.8
Turkey	6.0	1.1	7.1	-4.9
South Africa	3.4	2.5	5.8	-0.9
Indonesia	4.3	0.7	5.1	-3.6
Saudi Arabia	4.8	0.0	4.8	-4.8
Subtotal - Ten Largest Non-G14 traders	76.0	30.3	106.3	-45.7
Other reporters 3/	31.5	8.8	40.2	-22.7
Global trade 4/	387.0	400.6	787.7	13.7
G14 trade as a portion of global trade (%)	72.2	90.2	81.4	

Source: COMTRADE, using WITS (October 2014)
1/ Excluding intra-EU28 trade
2/ Hong Kong, China had not yet reported 2013 trade data at the time of drafting
3/ All other countries having reported trade data to COMTRADE. Where 2013 trade data are missing available 2012 data are used.
4/ Obtained by aggregating subgroup estimates. Global trade does not include information on countries not having reported any trade data in 2012-2013. This is likely to impact import data more than export data and may to some extent explain why global exports are larger than global imports.

ANNEX 2: USING TL-LEVEL STATISTICS IN ESTIMATING TRADE FLOWS

At the country level, understanding of trade in environmental goods (defined as ex-outs of HS subheadings that may include unrelated products) can be improved somewhat by using available TL-level information. This Annex uses, by way of example, TL-level trade information for China and the US. The analysis is subject to revision.

First, China's trade in environmental goods within the 54 subheadings of the APEC list is estimated (using the ITC Trade Map) based on information on imports and exports at the level of more specific TLs wherever available, and based on HS subheadings only where more specific TL-level information is unavailable (Table A2.1).[79] This method considers all HS subheadings of the APEC list, but eliminates as much noise as possible (caused by trade in unrelated products), based on available TL- level information. It considerably reduces the overestimation of trade in environmental goods in the APEC list, but still includes a large margin of error (for example, catch-all TLs still play an important role in HS subheadings 847989, 903289, and 903180). Annual trade is estimated at about USD 37 billion on average in 2011-13. This is considerably lower than estimates based on all trade in the 54 HS subheadings. Solar cells are by far the largest item in terms of trade, despite a very significant decline in the value of China's exports in recent years.

Second, it uses, by way of example, detailed information on US imports at the 10-digit level of the US HTS (in an attempt to gain some preliminary insight into the relative significance of imports of environmental goods in total US imports in the 54 subheadings of the APEC list). Taking into account the ex-outs of the APEC list (Annex C) and HTS product descriptions (at the 10-digit level), all trade in each of 252 statistical codes (estimated using the USITC Trade DataWeb), is allocated to one of three distinct categories: (a) exclusively or predominantly environmental goods; (b) non-environmental goods; or (c) both (Box 6 and Tables A2.2 and A2.3).[80] The results shown clearly depend on the author's own interpretation.

Table A2.1: China, trade in HS subheadings and TLs corresponding to the APEC List, 2011-13

HS subheading/	Description	Trade (in USD millions)					
		Imports 1/			Exports		
		2011	2012	2013	2011	2012	2013
44187210	Other assembled flooring panels, multilayer, of bamboo	0	0	0	89	89	118
840290	Parts of steam vapour generating boilers nes	53	54	29	2104	1546	1272
840410	Auxiliary plant for use with boilers of heading 8402 or 8403	44	19	8	676	489	555
840420	Condensers for steam or other vapour power units	4	1	2	41	36	112
840490	Parts of auxiliary plant of heading 8402 or 8403, condensers	34	36	5	547	291	174
840690	Parts of steam and other vapour turbines, n.e.S	593	468	248	1349	1000	1099
841182	Gas turbines of a power > 5.000 kW	41	337	341	25	33	88
84119990	Parts of other gas turbines nes	528	833	761	395	402	342
84129090	Parts of engines/motors of heading 8412 (excl 84121010)	381	249	224	533	765	734
84178020*	Incinerators for radioactive waste	0	0	2	0	1	0
84178050	Incinerators for waste	0	0	0	0	0	4
EX-84178090*	Industrial/lab furnaces/ovens, non-electric, nes	257	177	120	154	194	161
84179090	Parts of other appliances of heading 8417	97	63	49	190	215	281
84191910*	Solar water heaters	0.1	0.2	0.1	124	116	113
84193990	Other dryers, nes	317	364	284	221	266	250
841960	Machinery for liquefying air or other gases, nes	33	40	93	104	129	82
84198990*	Other machinery, n.e.s.	792	941	1067	403	532	584
84199010	Parts of water heaters	13	12	11	398	361	370
842121	Machinery and apparatus for filtering or purifying water	268	271	291	361	382	507
84212910	Press filters	38	64	69	42	51	53
EX-84212990*	Filtering, purifying machinery & apparatus for liquids nes	749	891	772	380	410	455
84213910*	Filtering, purifying machines for gases nes, household type	25	31	79	474	479	514
84213921*	Electrostatic dust collectors for industry uses	24	22	15	36	39	52
84213922*	Baghoused dust collectors for industry uses	23	17	23	100	123	128

Table A2.1: *Continued*

HS subheading/	Description	Trade (in USD millions)					
		Imports 1/			Exports		
		2011	2012	2013	2011	2012	2013
84213923*	Cyclone dust collectors for industry uses	17	14	14	7	8	11
84213929*	Other dust collectors for industry uses, nes	49	41	50	20	20	36
84213930	Exhaust air filtering/purifying apparatus for ICE	307	239	167	13	33	70
84213940*	Flue gas desulfurization apparatus	10	11	18	4	5	7
EX-84213990*	Other dust collectors, nes	505	415	537	182	217	354
84219910*	Parts for filtering, purifying machines of household type	76	86	111	243	257	289
847420	Crushing or grinding machines for solid mineral substances	316	255	284	838	779	959
847982	Machines for mixing/kneading/ crushing/grinding, etc.	683	653	564	281	322	299
84798920*	Air humidifiers or dehumidifiers	22	23	22	73	87	134
84798950*	Machines for squeezing radioactive waste	2	29	8	0	0	0
EX-84798999*	Other machines, appliances	4704	4509	4374	881	1078	1202
84799020*	Part of air humidifiers or dehumidifiers	7	6	5	29	17	14
84799090	Parts of other machines/ appliances of heading 84.79, nes	806	711	654	509	510	495
85016410	AC generators, 750 KVA< output=350 MVA	165	165	147	290	263	366
850231	Wind-powered electric generating sets	12	3	10	351	467	468
EX-850239*	Electric generating sets, nes	120	188	180	130	105	88
85030020	Parts of electric motors of subheading No. 85016420, 85016430	177	147	84	258	151	121
85030030*	Parts of the motors of subheading 850231	54	23	21	627	979	931
85049090	Parts of ballasts, static converters and other inductors	937	937	1927	671	834	1984
85141010*	Controlled atmosphere heat treatment furnace	346	277	181	30	60	37
85141090*	Industrial/lab electric resistance heated furnaces & ovens, nes	588	475	383	100	138	145
851420*	Industry/lab electric induction or dielectric furnaces & ovens	123	145	141	36	40	45

Table A2.1: *Continued*

HS subheading/	Description	Trade (in USD millions)					
		Imports 1/			Exports		
		2011	2012	2013	2011	2012	2013
851430*	Industrial & laboratory electric furnaces & ovens nes	253	135	147	83	92	92
85149090	Parts of other equipment of heading No. 8514	91	161	67	114	87	81
85414020*	Solar cells	1980	1232	1823	22565	12788	10151
85439090*	Parts of oth machines/apparatus of heading 8543 nes	457	307	296	692	501	710
90138090	Crystal devices nes; optical appliances/instruments nes	96	74	180	131	124	117
90139090	Parts & accessories of other appliances/instruments of 9013	318	227	117	286	173	118
901580	Survey,hydro-/oceano-graphic, instruments nes	480	596	498	400	412	440
902610*	Instruments/apparatus for measure/checking liquid flow/ level	439	480	501	202	233	258
90262090	Other instruments/apparatus for measuring/checking pressure	219	439	550	233	240	297
902680	Instr/apparatus for measuring/ checking var of liquids/gases, nes	184	245	293	100	101	102
902690*	Parts and accessories of instruments/appliances of 9026	540	424	443	391	466	455
ex-902710	Gas or smoke analysis apparatus	276	474	728	59	73	135
902720	Chromatographs and electrophoresis instruments	644	680	751	104	117	124
902730	Spectro/spectrophotometers & spectrographs	437	484	522	83	101	121
Ex-902750*	Other instruments & apparatus using optical radiations, nes	765	915	1069	56	65	80
90278019*	Other mass spectrograph	507	437	477	24	37	43
90278099*	Other instruments & apparatus for 9027, other than microtomes	1308	1487	1568	438	512	520
902790*	Microtomes; parts & access of instruments/appliances of 9027	497	604	654	298	336	388
90314920*	Optical grating measuring device	33	32	34	1	2	3
90314990*	Optical instruments & appliances, nes	1462	1505	1663	132	186	191
90318090	Measuring or checking instruments, appliances & machines, nes	2631	3409	3532	897	1437	1336

Table A2.1: *Continued*

HS subheading/	Description	Trade (in USD millions)					
		Imports 1/			Exports		
		2011	2012	2013	2011	2012	2013
903190*	Parts & accessories of instruments/appl/machines of 9031	669	828	738	257	282	358
90328990	Other automatic regulating/ controlling instruments & apparatus	4377	3656	3709	1423	1450	1632
903290	Parts & accessories of instruments/appliances of 9032	1487	851	641	602	581	622
903300	Parts & access nes for machines, etc, of Chapter 90	783	359	212	672	542	439
Total		35273	34284	35589	44053	34747	34421
References:							
APEC List: all trade in 54 subheadings, based on COMTRADE (USD millions)		88849	88675	89791	86765	84306	85461
Trade in HS subheadings and national tariff lines as a portion of all trade (%)		40	39	40	51	41	40
Examples of products not included							
85414010	Light emitting diodes	3643	4185	4488	2073	2508	3473
85414090	Other photosensitive semiconductor devices (excl. solar cells)	1096	1021	1286	3306	2206	2138
90138030	Liquid crystal display panel	39273	40479	39494	29513	36254	35859
90139020	Parts & accessories of appliances of 9013.8030	3960	3609	3586	1377	1703	1904

Source: Annex C and ITC Trade Map
1/ Excluding re-imports (reported in the ITC Trade Map as imports from China)
** Listed in Annex C (See endnote 79)*

Box 6. Ex Outs on the APEC List and the US HTS

For the 54 HS subheadings on the APEC list, the US HTS has 152 national TLs (at the eight-digit level) for tariff purposes. More detailed trade information on US imports is available for 252 codes at the 10-digit level (including two additional digits for statistical purposes). Total US imports accounted for USD 50 billion in 2012 (Table A2.2 below).

- About 50 (10-digit) statistical codes (accounting for some USD 6 billion in US imports) include only non-environmental goods. These include, for example, parts of aircraft gas turbines, non-solar water heaters and their parts; light-emitting diodes; flat panel displays; parts of printed circuit assemblies; and equipment for testing the characteristics of internal combustion engines:

- Some 20 statistical codes (with imports accounting for some USD 11 billion) exclusively (or predominantly) include environmental goods. These include solar PV cells, modules and panels; wind-powered generating sets; wind turbine blades and hubs; catalytic converters; dust collection and air purification equipment and parts; machinery and apparatus for filtering or purifying water, including parts; and parts of trash compactors.

- The largest group, with some 180 statistical codes, provides for trade in goods that may include both environmental and non-environmental goods (worth USD 33 billion). This group includes some clearly-defined ex-outs of the APEC list, such as parts of steam turbines; parts for non-aircraft gas turbines; and crushing and grinding machines. A number of codes in this group, however, are basket items for products not elsewhere specified in the HTS, and that may include ex-out items included in the APEC list. Trade in such basket items (e.g. of subheadings 841199, 847989, and 847990) makes up a relatively large portion of total trade in this group. For example, heliostats (an ex-out on the APEC list) may be imported under the provision of HTS 9013809000 (other devices, appliances and instruments: others), but it is impossible to know from trade statistics what portion of trade corresponds to the ex-out on the APEC list).

The analysis presented here focuses on statistical codes of the APEC subheadings of HS Chapters 84 and 85 and HS 901380, HS 901390, and HS 903180 (163 statistical codes). Trade in statistical codes providing exclusively or predominantly for environmental goods accounted for about 28 per cent (in value terms) of US imports in the corresponding HS subheadings on the APEC list. For more than half (in value terms) of US imports, it is difficult, if not impossible, to assess the portion of trade in environmental goods (vis-à-vis non-environmental goods). Regarding other APEC HS subheadings of Chapter 90, which largely includes optical, measuring, checking and precision instruments and apparatus, including parts and accessories thereof, for the purposes of the analysis presented here, all statistical codes are considered to have both environmental and non-environmental applications.

Table A2.2: Ex-outs on the APEC List and the US Harmonized Tariff Schedule (HTS)

	TLS 1/	Imports (USD billions)			Portion of total imports (%)			
		2011	2012	2013	2011	2012	2013	2011-13
Subheadings of HS Chapters 84 and 85, plus HS 901380, HS 901390 and HS 903180								
Non-environmental	54	5.6	6.5	6.3	16	17	19	17
Environmental	19	10.9	10.6	7.6	31	28	23	27
Environmental and non-environmental	90	18.6	20.4	19.7	53	54	59	55
Total	163	35.1	37.5	33.6	100	100	100	100
All 54 HS subheadings								
Non-environmental	54	5.5	6.5	6.3	12	13	14	13
Environmental	19	11.0	10.7	7.7	23	21	16	20
Environmental and non-environmental	179	32.0	33.5	32.9	65	66	70	67
Total	252	47.4	50.4	46.5	100	100	100	100

1/ statistical codes
Source: author's elaboration, based on Annex C of 2012 Vladivostok APEC Leader's Declaration (APEC 54 HS subheadings list containing environmental goods) and data compiled from tariff and trade data from the U.S. Department of Commerce and the U.S. International Trade Commission, using the USITC Trade DataWeb

Table A2.3: The APEC List and the Harmonized Tariff Schedule (HTS) of the United States (Examples)

HS subheadings				National tariff lines that may include environmental goods on the APEC List			
Subheading	US Imports (USD billions)			Ex-outs Harmonized Tariff Schedule (HTS)	US Imports (USD billions)		
	2011	2012	2013		2011	2012	2013
840690	594	297	268	Part of steam turbines 8460902000;3000;4000;4540;4580	575	282	252
841182	430	256	172	Gas turbines, except for aircraft 8411828000	387	192	92
841199	2,949	3,449	3,032	Parts for gas turbines, non-aircraft 8411991010;1080;9030;9081;9083	1997	2400	2026
841290	1,552	2,247	1,470	Wind turbine blades and hubs 8412909081	n/a	892	274
841919	388	382	327	Solar water heaters 8491910040	24	38	6
850164	527	627	387	AC generators for wind-powered generating sets 8501640021	n/a	330	170
850231	1,234	976	23	Other electric generating sets, wind-powered 8502310000	1234	976	23
850239	344	403	385	Other electric generating sets 8502390000	344	403	385
850300	1474	1636	1514	Parts for AC generators for wind-powered generating sets 8503009546	n/a	126	31
854140	7104	7127	5609	PV cells, modules and panels 8541406020; 6030	4975	5076	3629

Source: Data compiled from tariff and trade data from the US Department of Commerce and the US International Trade Commission, using the USITC Trade DataWeb

Other Publications from the Environment theme include:

- The APEC List of Environmental Goods: An Analysis of the Outcome & Expected Impact. Issue Paper No. 18 by Rene Vosenaar, 2013.
- Market Access Opportunities for ACP Countries in Environmental Goods. Issue Paper No. 17 by D. Laborde and C. Lakatos, 2012.
- Facilitating Trade in Services Complementary to Climate-friendly Technologies. Issue Paper No. 16 by Joy Aeree Kim, 2011.
- Deploying Climate-Related Technologies in the Transport Sector: Exploring Trade Links. Issue Paper No. 15 by Rene Vosenaar, 2010.
- Harmonising Energy Efficiency Requirements. Issue Paper No.14 by Rod Janssen, 2010.
- Climate-related single-use environmental goods. Issue Paper No.13 by Rene Vossenaar, 2010.
- Technology Mapping of the Renewable Energy, Buildings, and Transport Sectors: Policy Drivers and International Trade Aspects. An ICTSD Synthesis Paper. Issue Paper No.12 by Rene Vossenaar, 2010.
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