TRADE IN ENVIRONMENTAL GOODS AND SERVICES:

OPPORTUNITIES AND CHALLENGES

ITC

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TRADE IN ENVIRONMENTAL GOODS AND SERVICES:

OPPORTUNITIES AND CHALLENGES

Abstract for trade information services

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The report provides an overview of environmental goods and services markets, intended for trade support institutions, business associations and firms in environmental goods and services sectors - discusses trends and factors underpinning growth in the global market for environmental goods and services; draws attention to the impact of increasing environmental awareness, regulation and enforcement; discusses international efforts to agree on environmental goods and services lists for trade negotiating purposes especially in APEC and the World Trade Organization (WTO); highlights the opportunities and challenges for small and medium-sized enterprises (SMEs) in developing countries; features a case study from the Philippines; includes bibliographical references (pp 32-35).

Descriptors: **Environmental Industries, Environmental Services, Trade in Services, Trade Liberalization, Sustainable Development, Environmental Legislation, Case Studies, Supply Chains.**

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Contents

Abstract for trade information services i

Acknowledgements ii

Acronyms v

Introduction 1

1. Importance of environmental goods and services 2

1.1. The environmental sustainability challenge 2

1.2. Green economy 2

1.3. Role of trade in achieving a green economy 3

2. Classification and data gathering challenges 4

2.1. Environmental goods lists 4

2.2. Environmental services 7

2.3. Data-gathering challenges 8

3. Growth in environmental goods and services markets 9

3.1. The market for environmental services 10

3.2. Growth in the environmental goods trade 10

4. Main drivers and obstacles to trade 12

4.1. Regulatory regimes and international coordination 12

4.2. Tariffs on environmental goods 13

4.3. Non-tariff barriers to trade 15

4.4. Trade remedies 16

5. Buyers and sellers 17

6. Potential for developing countries 18

6.1. Developing an export sector 18

6.2. Joint ventures and supplying multinational corporations 20

6.3. Linking into regional and global value chains 20

6.4. Import solutions 21

6.5. Regional trade 22

6.6. Employment and enterprises 22

7. Challenges for developing countries 23

7.1. Regulation 23

7.2. Need for transparency and competition policy 24

7.3. Trade barriers 24

7.4. Sector associations and institutional support services 24

8. Summary of findings 25

Appendix I: Tariffs applied on environmental goods 27

Bibliography 32

Table 1:	Comparison of environmental goods lists and classifications	5
Table 2:	Comparison of environmental services lists and classifications	8
Table 3:	Market size and growth for environmental goods and services by region	9
Table 4:	Market size and growth for environmental goods and services by sub-sector	9
Table 5:	Average applied MFN tariffs on environmental goods imports by region	14
Table 6:	Selected environmental goods with the highest applied MFN tariffs worldwide	14
Table 7:	Major buyers of environmental goods and services rated by prospects for sales	17
Table 8:	Examples of suppliers of environmental goods and services	19
Table 9:	Selected countries' low carbon and environmental goods and services	23

Figure 1:	Key aspects of 'decoupling' economic growth from environmental impact	3
Figure 2:	Global exports of environmental goods 2001-2012 (US$ billion)	10
Figure 3:	Leading exporters of environmental goods: average of yearly export value	11
Figure 4:	Leading importers of environmental goods: average of yearly import value	11
Figure 5:	Selected developing countries' exports of environmental goods	12
Figure 6:	Market development of environmental goods and services	13
Figure 7:	Selected environmental goods exports from the Philippines	21

Box 1:	How are environmental services traded?	16
Box 2:	Example of firm in mining waste services	20

Acronyms

The following acronyms are used:

APEC	Asia Pacific Economic Cooperation
BOT	Build-operate-transfer
EBI	Environmental Business International
EBJ	Environmental Business Journal
EU	European Union
eWASA	e-Waste Association of South Africa
FTA	Free Trade Agreement
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GVC	Global Value Chain
IISD	International Institute for Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
ITC	International Trade Centre
LED	Light-emitting diode
MFN	Most-favoured-nation
MNC	Multinational corporation
MWp	Megawatt peak
nes	not elsewhere specified
NTB	Non-tariff barrier
OECD	Organization for Economic Co-operation and Development
R&D	Research and Development
REMA	Rwanda Environmental Management Authority
SMEs	Small and medium-sized enterprises
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNWTO	United Nations World Tourism Organization
WTO	World Trade Organization

Introduction

This report provides an overview of environmental goods and services markets and related trade trends. Trade plays a vital role in the diffusion of environmental goods and services. Advances in technology and transportation have reduced the costs of trade, making previously disparate goods and services globally available. Given growing global awareness of the importance of environmental sustainability, the demand for environmental goods and services has been increasing rapidly. The global market for environmental goods and services was estimated to have reached US$ 866 billion in 2011[1] and is expected to rise to US$ 1.9 trillion by 2020.[2]

Despite the growth of environmental goods and services markets and increasing acceptance of the need to switch to a green economy, comprehension of potential opportunities and challenges of trade in environmental goods and services remains inadequate. This is in part due to the size and complexity of the sector, encompassing goods and services related to clean-technology, energy and energy-efficiency, pollution control, water and wastewater amongst others. It is also hampered by the lack of an internationally-agreed definition and classification of the sector, which makes data capture and comparability a challenge.

Improved understanding of this rapidly changing and dynamic sector could open up potential new export business opportunities for developing countries' small and medium-sized enterprises (SMEs). Environmental goods and services figure importantly in international trade policy discussions, with moves already underway to liberalize the market and reduce both tariff and non-tariff barriers to environmental goods. Notable progress was achieved in the Asia Pacific Economic Cooperation (APEC) 2012 Vladivostok Declaration, which committed all APEC members to reduce tariffs on a list of 54 environmental goods to a maximum of 5% by 2015. This may provide new momentum for the efforts of the World Trade Organization (WTO) to come to an agreement on an initial environmental goods classification to progress negotiations in this area.

This contribution is an initial background research and literature review oriented to providing an overview of the market, along with opportunities and challenges for developing countries. The paper is intended primarily for the benefit of developing country policymakers, trade support institutions, business associations and firms in the environmental goods and services sector.

1 Environmental Business International (2012).

2 Blazejczak, J., Braun F., Edler D. (2009).

1. Importance of environmental goods and services

1.1. The environmental sustainability challenge

A number of reports, notably the Brundtland Report, the Stern Review and the Assessment Reports by the Intergovernmental Panel on Climate Change (IPCC) have highlighted, in global public policy debate, the fundamental challenge of balancing economic growth with environmental sustainability and the growing global risk of continuing on a 'business as usual' path, if climate change and other environmental impacts are to be avoided.[3]

The global population has, meanwhile, grown exponentially since the early 20th century. The UN estimates that global population will increase to 9.6 billion by 2050, with others putting this figure as high as 11 billion, signifying an additional 3 billion consumers in 36 years. Mirroring the growth in population, energy consumption has shown a similar increase since the early 20th century. Renewable energy makes up an increasing share of energy consumption, but fossil-fuel based energy consumption nonetheless continues to grow and CO_2 emissions are expected to continue to rise. Studies on the implications of this trend point to changes in weather patterns and the increased risk of extreme weather events; ocean acidification, increased pressures on water resources and changes in rain patterns, which in turn will have impacts on agricultural productivity, food security and biodiversity.[4] These issues particularly affect developing countries, as the poor and marginalized are often the most vulnerable to climate change and related natural disasters.[5]

Another challenge associated with growing population and consumption levels is the increase in global waste production, which, according to World Bank estimates, will triple between 2012 and 2100.[6] While the quantity of waste, in itself, is a challenge, as many countries still have underdeveloped waste management systems, another difficulty lies in the changing composition of waste. With economic development and urbanization, the composition of waste increasingly includes plastics and packaging, paper and consumer products and decreasingly biodegradable products. Collection services around the global electronic waste stream are also predicted to triple by 2020 from 2010 levels.[7]

1.2. Green economy

The question is therefore how the world can ensure the socio-economic wellbeing of a growing population without undermining the environmental and ecological sustainability of the planet on which our wellbeing depends. The idea is captured by the concept of the Green Economy, which UNEP defines 'as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive'.[8]

Bringing these competing objectives together requires decoupling economic growth from environmental impact. This concept implies that for the same unit increase in economic growth and human wellbeing, the same or fewer natural resources are used, coupled with a reduced impact on the environment.

[3] UNWCED (1987); Stern Review (2006); IPCC (2014).

[4] Schellnhuber (2013).

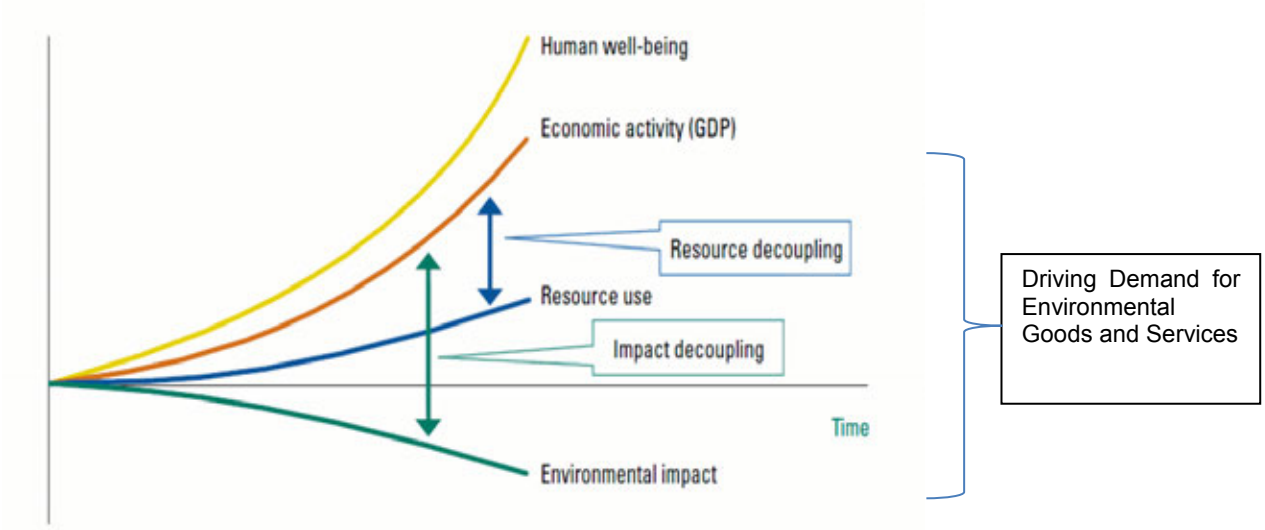
[5] IPCC quoted in Goldenberg S. (2014).

[6] Hoornweg, Perinaz (2012).

[7] SBI Energy (2011).

[8] Available from: UNEP website 'What is the Green Economy?'

Figure 1: Key aspects of 'decoupling' economic growth from environmental impact



Source: UNEP (2011). 'Decoupling Natural Resource Use and Environmental Impacts from Economic Growth'.

1.3. Role of trade in achieving a green economy

Environmental goods and services play a leading role in this shift to a green economy. Environmental goods and services can be broadly defined as consisting of activities 'that produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air, soil, as well as problems related to waste, noise and eco-systems'.[9] In reality, such goods and services can cover any number of areas such as air pollution control, renewable energy, water and waste management, environmental monitoring, assessment and analysis, environmental consulting, remediation and clean-up services, cleaner technologies or carbon capture and storage.

It is clear that environmental goods and services are essential in a switch to a green economy and this understanding is reflected in the increasing levels of environmental regulation, investments into green technologies and infrastructure and incentives for related Research and Development (R&D). To date, the production, diffusion and uptake of these goods and services have been slower than required to achieve a relative decoupling.

Trade is vital in accelerating the diffusion and uptake of environmental goods and services. Few countries have all the necessary resources, technology and expertise available domestically to switch easily to a green economy. Trade can ease the access to affordable and appropriate environmental goods and services to enable a faster and less costly adjustment to a green economy; while at the same time creating new business and job opportunities.

The importance of facilitating trade in environmental goods and services has been recognized in a number of international agreements such as the 2012 Rio +20 outcome document 'The Future We Want' which states: that 'we reaffirm that international trade is an engine for development and sustained economic growth, and also reaffirm the critical role that a universal, rules-based, open, non-discriminatory and equitable multilateral trading system, as well as meaningful trade liberalization, can play in stimulating economic growth and development worldwide, thereby benefiting all countries at all stages of development, as they advance towards sustainable development. In this context, we remain focused on achieving progress in addressing a set of important issues, such as, inter alia, trade distorting subsidies and *trade in environmental goods and services'*.[10]

The Ministerial Declaration of the WTO Doha Round in 2001, explicitly mandates negotiations aimed at the 'reduction, or as appropriate, *elimination of tariff and non-tariff barriers to environmental goods and*

[9] UNSTATS, OECD (1999).

[10] UNCSD (2012).

services' (paragraph 31 (iii)), albeit without specifying which goods and service would fall under this terminology.[11]

Arguably, the most concrete international agreement on environmental goods trade to date, the APEC 2012 Vladivostok Declaration, makes commitments to reduce tariff rates to five per cent or less on an agreed list of environmental goods by 2015. It states: 'We reaffirm our commitment to promote green growth and to seeking practical, trade-enhancing solutions to address global environmental challenges. In 2012, we made considerable progress in this regard. We welcome and endorse the APEC List of Environmental Goods that directly and positively contribute to our green growth and sustainable development objectives... *We reaffirm our commitment to reduce our applied tariff rates to five per cent or less on these environmental goods by the end of 2015*, taking into account economies' economic circumstances without prejudice to their positions in the WTO. By reducing tariffs on environmental goods, we will help our businesses and citizens to access important environmental technologies, which will facilitate their deployment, and use contributing significantly to our green growth and trade liberalization objectives'.[12]

2. Classification and data gathering challenges

2.1. Environmental goods lists

While a consensus may exist on the overall importance and even the broad function of environmental goods and services, obtaining an agreement on a precise classification or grouping has proven much more challenging. This is partly due to the heterogeneity of products and services required to achieve an environmental objective.

The broad coverage of environmental goods in most classifications includes both goods that have an obvious environmental function (e.g. photovoltaic cells), as well as goods which may have a dual usage, i.e. which can be used for both environmental and non-environmental purposes (e.g. pumps). Environmental goods classifications can include commodities (e.g. lime) while the other end of the spectrum, encompassing complex manufactured products, may include several sub-components and services in its value chain (e.g. solar panels).

Classifications of environmental goods will frequently consider particular stages of the life-cycle of the goods to determine its environmentally-beneficial characteristics. A product may be considered environmental if:

- It is produced in a manner which causes less environmental harm than a comparable/like product (e.g. organic products).
- Its use or consumption has an environmentally beneficial end-effect (e.g. bicycles).
- It contributes to cleaning up or reducing damage to the environment (e.g. end-of-pipe pollution treatment and monitoring equipment).

In addition, depending on the stage of development of a country or the environmental pressures it faces, different environmental products may be given different levels of importance. So while developed countries are prioritizing energy efficiency, renewable energy and reduction of CO_2 emissions, developing and particularly least developed countries will probably place a higher priority on investments in waste and wastewater management.

The heterogeneity of the types of products as well as differences in environmental priorities play a factor when attempting to produce a comprehensive list of environmental goods, as one easily concludes with an expansive list, including items considered by some as controversial (e.g. ethanol) or seemingly banal (e.g. hand-held brooms) for the purposes of ensuring the environmental wellbeing of the planet. In addition, the

[11] WTO (2001).

[12] APEC (2012).

speed of technological innovation in the sector implies that the list would need reviewing at regular intervals to ensure older products are removed when higher performing environmental goods have entered the market (e.g. compact fluorescent lights, compared to LEDs).[13]

This difficulty in achieving an internationally-agreed classification has implications for the goal of facilitating trade in environmental goods. The Doha mandate explicitly calls for a reduction, or elimination of tariffs and non-tariff barriers (NTBs) on such goods. However, without an agreement to which sets of goods this applies, negotiations will remain stalled.

Commonly, the OECD and APEC lists, or variations thereof, have been used in preparation for negotiations at the WTO. The APEC list of environmental goods encompasses mostly goods that reduce environmental damage (end-of-pipe pollution treatment and monitoring equipment). The APEC list was conceived with the end goal of policy negotiations in mind; hence the composition of goods within the list is a reflection of a political decision, rather than a conceptual exercise in identifying a comprehensive list of goods.[14] The OECD list is broader and was initially a conceptual exercise to better define the scope of the environmental industry. The overlap at HS 6 level of the two lists of goods is rather limited with approximately a 30% overlap of HS 6 level goods.[15] This highlights the difficulty of producing an internationally-agreed list.

In addition, a list of environmentally-preferable products has been presented, initially by UNCTAD, which also shows substantial divergence from the OECD and APEC list. Environmentally-preferable products are defined slightly differently from environmental goods and services, as 'products which cause significantly less environmental harm at some stage of their life cycle (production, processing, consumption, [or] waste disposal) than alternative products that serve the same purpose'.[16] Table 1 below provides a quick comparison of the OECD, APEC and UNCTAD lists on environmental goods.

Table 1: Comparison of environmental goods lists and classifications

	OECD – Environmental Goods and Services	**APEC – Environmental Goods**	**UNCTAD – Environmentally Preferable Products**
Definition	The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use.	Environmental goods and services is an industry sector devoted to solving, limiting or preventing environmental problems.	Products which cause significantly less environmental harm at some stage of their life cycle (production, processing, consumption, [or] waste disposal) than alternative products that serve the same purpose, or products, the production and sales of which contribute significantly to the preservation of the environment.
Number of (HS 6) products	164	54	25

[13] Cosbey (2014).

[14] Sugathan (2004).

[15] Steenblik (2005).

[16] Tothova (2006).

	OECD – Environmental Goods and Services	APEC – Environmental Goods	UNCTAD – Environmentally Preferable Products
Classification	**A. Pollution Management** 1. Air pollution control 2. Wastewater management 3. Solid waste management 4. Remediation and clean-up 5. Noise and vibration abatement 6. Environmental monitoring, analysis and assessment **B. Cleaner Technologies and Products** 1. Cleaner/resource efficient technologies and processes 2. Cleaner/resource efficient products **C. Resources Management Group** 1. Indoor air pollution 2. Water supply 3. Recycled materials 4. Renewable energy plant 5. Heat/energy savings and management 6. Sustainable agriculture and fisheries 7. Sustainable forestry 8. Natural risk management 9. Eco-tourism 10. Other	1. Renewable energy 2. Environmental monitoring, analysis and assessment equipment 3. Environmental protection 4. Environmentally preferable products (bamboo).[17]	1. Products which are more environmentally friendly than petroleum-based competitors 2. Products which are produced in an environment-friendly way 3. Products which contribute to the preservation of the environment.
Characteristics and Issues	1. For cleaner technologies there is currently no agreed methodology for measurement. This is why products defined in terms of for example their energy efficiency were not included in the original OECD list. 2. The list is not exhaustive. 3. Some goods have dual-usage (i.e. also used in non- environmental applications) 4. Limited to HS 6–digit level.[18]	1. Products identified based on country interests in liberalization 2. Countries sensitive to the issue of 'dual- usage' and therefore many products left out – which do form part of the OECD list. 3. Absence of chemical products used in water treatment as these are covered in a separate negotiations process. 4. Overlaps for certain products with medical equipment and instruments and energy.	1. The list was limited to those products with an intrinsically superior environmental quality (e.g. sisal, bamboo) or products where the usage has an unambiguous environmental end-use (e.g. bicycle).[19]
Status	List conceived primarily for conceptual or analytical purposes rather than for the purposes of environmental goods and services negotiations.	At the APEC meeting in Vladivostok, Russian Federation on the 9 September 2012, the leaders of the 21 economies agreed on liberalizing tariffs on the 54 environmental goods. The applied tariffs will be cut to five per cent or less. The agreement is voluntary and not legally binding.[20]	There is a lack of clarity amongst governments as to whether the 2001 Doha Ministerial Mandate on environmental goods and services [paragraph 31(iii)] covers, or could be interpreted to include environmentally preferable products.

Sources: OECD, ICTSD, APEC.

[17] Vossenaar (2013).

[18] Steenblik, op. cit., 6.

[19] Tothova, op. cit.

[20] Vossenaar, op. cit.

As a consequence of the heterogeneity of the products and the range of political interest involved in the negotiation processes, a multilateral agreement on a classification of environmental goods is still under discussion. In this context, the progress that the APEC group has achieved in terms of a classification of goods and in setting a clear target for tariff reductions may also create a new momentum in the multilateral discussions.

The first indications of this momentum can be seen in the fact that at the last Davos meeting in January 2014, a group of countries including APEC member states and Costa Rica, the European Union (EU), Norway and Switzerland agreed to 'build on the ground-breaking commitment to reduce tariffs on the APEC list of environmental goods by the end of 2015…to achieve global free trade in environmental goods' and that this deal '…would take effect once a critical mass of WTO members participates..' and that '…we are committed to exploring a broad range of additional products'.

2.2. Environmental services

While much of the discussion on liberalization has focused on environmental goods, the services aspect has been somewhat overshadowed. For example, the APEC Vladivostok Declaration does not include environmental services and limits the commitments to goods, despite the close synergy between trade in environmental goods and environmental services that one observes in reality. The different modes whereby goods and services are traded and the complexity in identifying barriers to environmental services trade, has led to a clear separation of the two parts in international negotiations, with a resulting lack of attention to services.

The WTO classification of environmental services was established during the Uruguay Round negotiations in 1991 (see Table 2). Given the rapid development of the environmental goods and services sector since then, many have voiced concern that the classification is too narrowly defined, and despite alternative submissions, no agreement has been made on a revised version thus far.

Table 2: Comparison of environmental services lists and classifications

	WTO – Environmental Services	Eurostat - Environmental Goods and Services [21]	OECD – Environmental Goods and Services
Classification	1. Sewerage services 2. Refuse disposal services 3. Sanitation and similar services and 4. Other (cleaning services for exhaust gases, noise abatement services, nature and landscape protection, and other environment services not elsewhere classified).	**Environmental protection** 1. Protection of ambient air and climate 2. Wastewater management 3. Waste management 4. Protection and remediation of soil, groundwater and surface water 5. Noise and vibration abatement 6. Protection of biodiversity and landscape 7. Protection against radiation 8. Research and development 9. Other environmental protection activities Resource management 10. Management of waters 11. Management of forest resources 11 A. Management of forest areas 11 B. Minimisation of the intake of forest resources 12. Management of wild flora and fauna 13. Management of energy resources 13 A. Production of energy from renewable sources 13 B. Heat/energy saving and management 13 C. Minimisation of the intake of fossil resources as raw material for uses other than energy production 14. Management of minerals 15. Research and development 16. Other natural resource management activities	**A. Pollution Management** 1. Air pollution control 2. Wastewater management 3. Solid waste management 4. Remediation and clean up 5. Noise and vibration abatement 6. Environmental monitoring, analysis and assessment **B. Cleaner Technologies and Products** 1. Cleaner/resource efficient technologies and processes 2. Cleaner/resource efficient products **C. Resources Management Group** 1. Indoor air pollution 2. Water Supply 3. Recycled materials 4. Renewable Energy Plant 5. Heat/energy savings and management 6. Sustainable agriculture and fisheries 7. Sustainable forestry 8. Natural risk management 9. Eco-tourism 10. Other
Status	Conceived in 1991 during the Uruguay Round as a basis for negotiations. Many submissions have been discussed but no new classification agreed.	Published in 2009 for purposes of harmonised data collection for members of the European Union. Replaces the OECD/ Eurostat manual of 1999.	List conceived primarily for conceptual or analytical purposes rather than for the purposes of negotiations.

Sources: OECD, ICTSD.

2.3. Data-gathering challenges

Partly due to the disagreement on classifications, comparable cross-country data of environmental goods and services also remains difficult to produce. Countries tend to use different categories to collect specific statistics on environmental goods and services. Even amongst EU countries, data is not strictly comparable.[22] Industry-specific data also tends to be scarce.

While gathering data on environmental goods can be complex, data on environmental services is often even more problematic. Data collections are generally available only for developed countries and large emerging economies.

[21] Eurostat (2009).

[22] Available from: Eurostat Website: 'Environmental Goods and Services Sector'.

3. Growth in environmental goods and services markets

However one defines these international goods and services, and irrespective of the lists or classifications one employs, one clear trend is the fast-paced growth of the market. The environmental goods and services market was estimated at US$ 866 billion in 2011 according to Environmental Business International (EBI),[23] with some analysts expecting it to rise to US$ 1.9 trillion by 2020.[24]

EBI provides figures on the size and growth of the environmental goods and services markets, though using a different classification from the OECD or WTO. The trends indicate that the market is already substantial in developed countries, but growth rates are particularly high in developing countries. Comparing the markets by segment region, one finds that the biggest markets are concentrated in the United States of America, Western Europe and Japan. The fastest growth rates are found in developing countries in Asia, the Middle East and in Africa, which exhibited growth rates between 9-10% during 2011.

Table 3: Market size and growth for environmental goods and services by region

By region	Market in US$ billion (2011)	% Growth (2011)
United States of America	311.3	5%
Western Europe	256.0	2%
Japan	103.3	-1%
Rest of Asia	78.0	9%
Latin America	28.5	5%
Australia/New Zealand	13.6	2%
Central & Eastern Europe	13.7	4%
Middle East	17.5	9%
Africa	10.3	10%

Source: Environmental Business International (2012).

According to EBI, the fastest growing sub-sectors in 2011, (across both goods and services) were resource recovery, clean energy systems and power and waste management equipment. The largest markets in 2011 were in solid waste management, water treatment works, water utilities and clean energy systems and power.

Table 4: Market size and growth for environmental goods and services by sub-sector

		Market in US$ billion (2011)	% Growth (2011)
Equipment	Water equipment & chemicals	69.7	1%
	Air pollution control	50.2	2%
	Instruments & Info systems	9.4	4%
	Waste management equipment	36	10%
	Process & prevention technology	4.2	6%
Services	Solid waste management	145.1	3%
	Hazardous waste management	21.8	-1%
	Consulting & engineering	54.8	5%
	Remediation/Industrial services	39.5	5%
	Analytical services	5.4	3%
Resources	Water treatment works	116.6	-1%
	Water utilities	130.0	0%
	Resource recovery	56.5	13%
	Clean energy systems & power	127.0	11%

Source: Environmental Business International (2012).

[23] Environmental Business International, op. cit.

[24] Blazejczak, op. cit.

3.1. The market for environmental services

Environmental services have been estimated by EBI to make up approximately 65 per cent of the environmental industry as a whole.[25] It is conceptually difficult to discuss environmental goods and services separately. Many environmental services require some environmental goods in their provision. Likewise, the sale of an environmental product usually involves embedded environmental services content or requires some form of associated installation, maintenance service and monitoring.

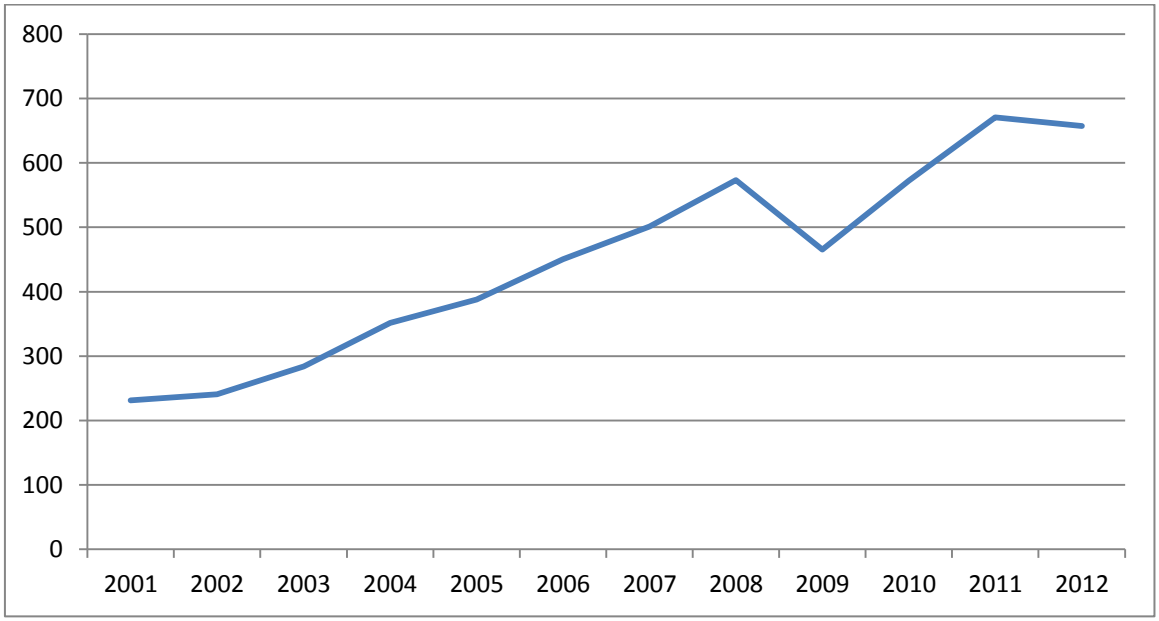
For example, in the photovoltaic industry, it is estimated that the rooftop installation cost of photovoltaic modules accounts for 60% of the total cost of purchase.[26] Others have estimated that for every megawatt peak (MWp) of photovoltaic module installed, on average twenty manufacturing and thirteen installation/maintenance job years will be created.[27] With improved efficiency and massive expansion in production over the last 10 years, the unit cost of photovoltaic modules has been falling.[28] This trend is likely to incentivize greater sales of photovoltaic modules, which in turn would signify a growing demand for related installation and maintenance services.

Consensus exists that the environmental services sector will become increasingly more important in the coming years. Many developing countries, because of their developmental stage, are now beginning to invest more in environmental infrastructure and to put in place stronger regulatory frameworks. Combined with increasing environmental awareness internationally, these trends are creating new and constantly-evolving markets for environmental services.

3.2. Growth in the environmental goods trade

Using the OECD classification, one finds that exports of environmental goods (excluding services) have risen from approximately US$ 231 billion in 2001 to US$ 656 billion in 2012 (see Figure 2) -- despite the short-lived decline in 2008-2009, reflecting the global economic crisis. Overall, this indicates almost a tripling of trade volumes of since 2001.

Figure 2: Global exports of environmental goods 2001-2012 (US$ billion)



Source: ITC Trade Map, Using OECD Classification of Environmental Goods.

[25] Geloso-Grosso (2005).

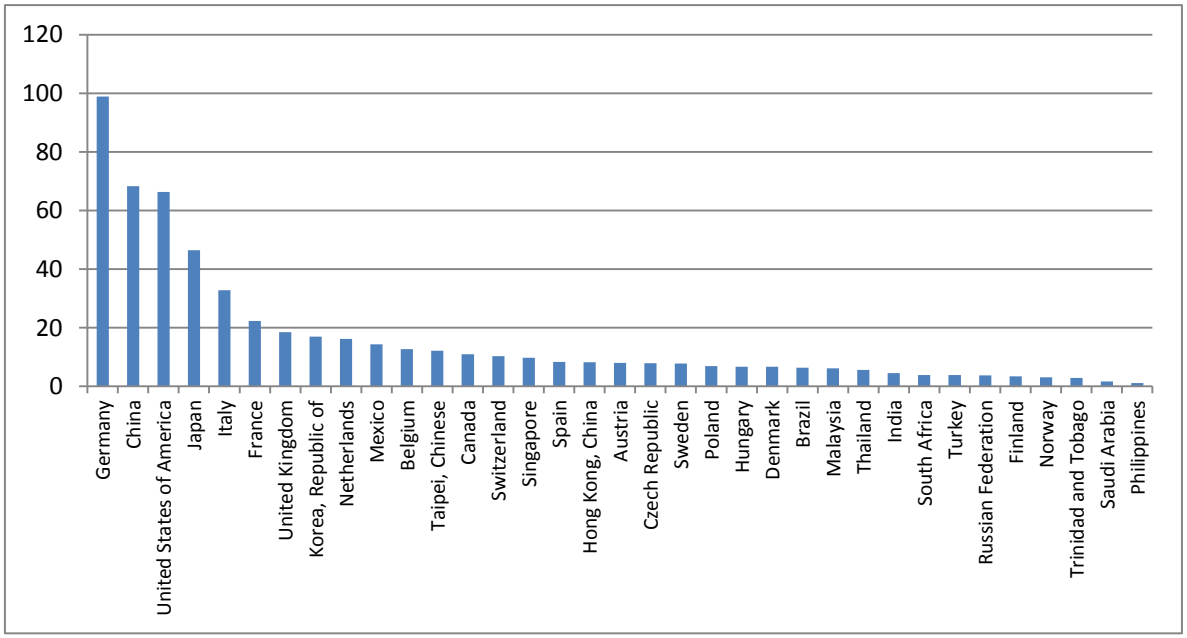
[26] Yong (2014).

[27] Ban-Weiss (2004).

[28] Platzer (2012).

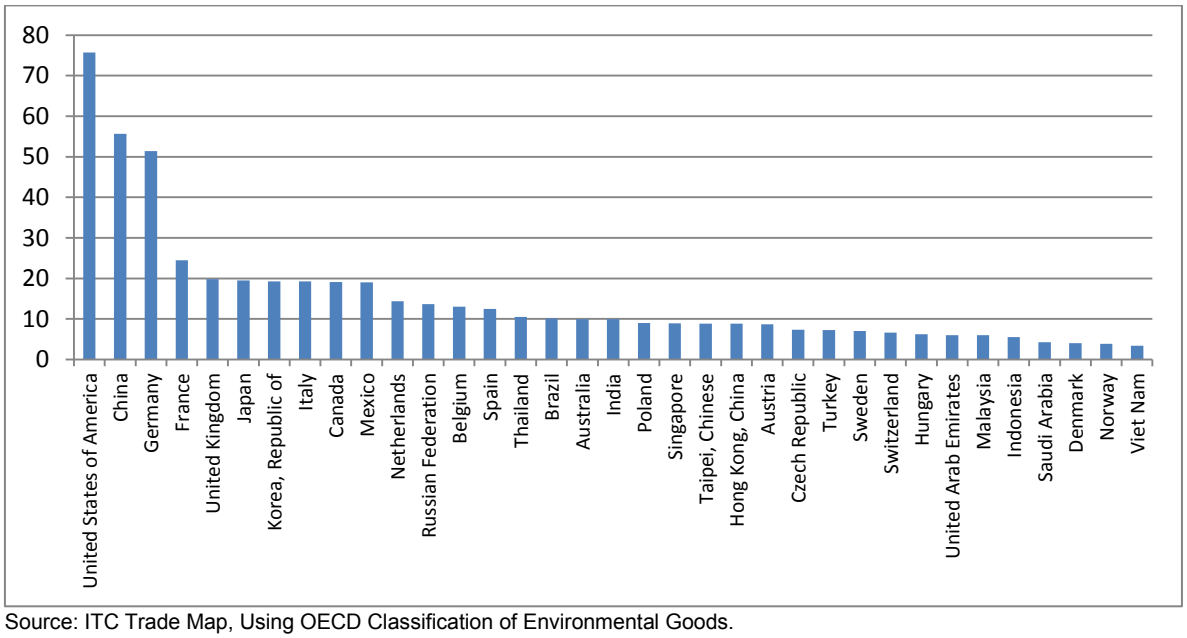
The trade in environmental goods remains, predominantly, as occurring between developed countries. European countries, the United States of America and Japan are the main exporters of environmental goods globally. However some emerging economies, especially in East Asia and among the BRICS, are already important export and import markets. China, the Republic of Korea, Mexico, Brazil, Malaysia, the Russian Federation, Chinese Taipei and Thailand are significant global players (see Figures 3 and 4).

Figure 3: Leading exporters of environmental goods: average of yearly export value 2008-2013 (US$ billion)



Source: ITC Trade Map, Using OECD Classification of Environmental Goods.

Figure 4: Leading importers of environmental goods: average of yearly import value 2008-2013 (US$ billion)

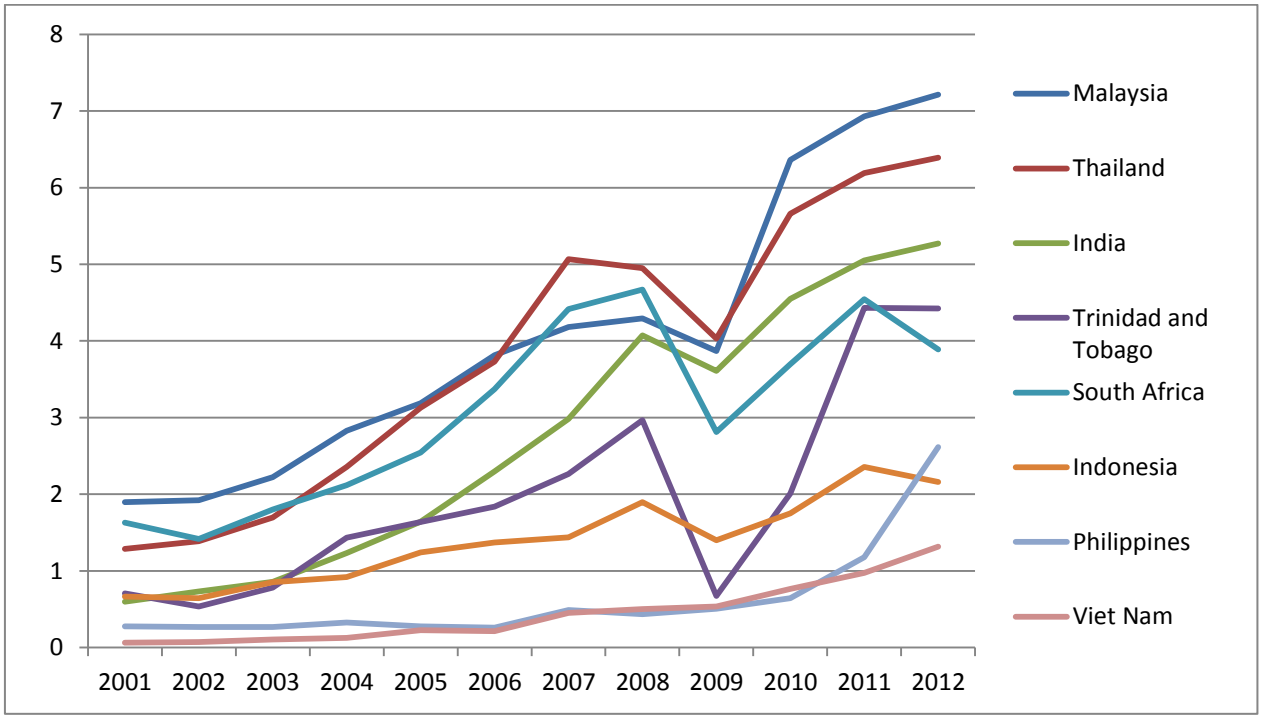


Source: ITC Trade Map, Using OECD Classification of Environmental Goods.

Given the fast-paced growth in international demand for environmental goods and technologies and the local growth of greener industries in developing countries, one expects that the role of developing countries (as both exporters and importers of environmental goods) will continue to grow. The growth in export value

is notable since 2001. Malaysian and Thai exports, for example, increased from below US$ 2 billion in value during 2001 to just over US$ 7 billion and US$ 6 billion, respectively, in 2012.

Figure 5: Selected developing countries' exports of environmental goods 2001-2012 (US$ billion)



Source: ITC Trade Map, Using OECD Classification of Environmental Goods.

4. Main drivers and obstacles to trade

4.1. Regulatory regimes and international coordination

The uptake of and innovation in environmental goods and services is dependent on the incentives in place for the private sector to apply technologies to adjust production processes and for suppliers to produce relevant and affordable technologies and services.

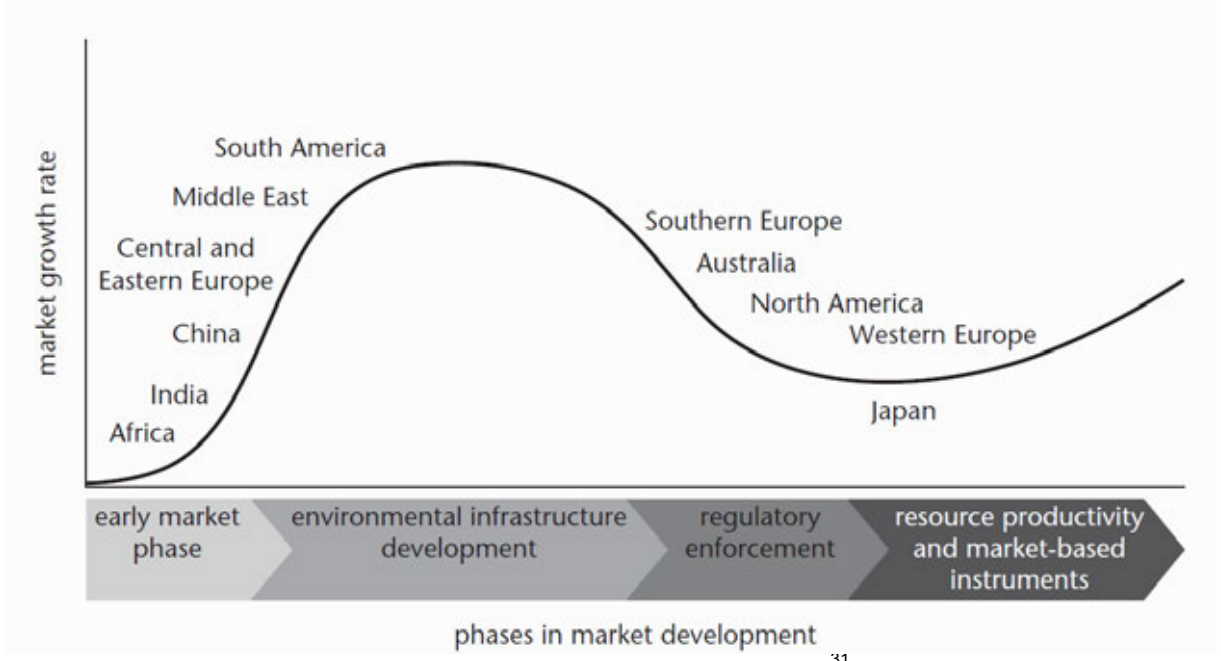
Literature on the topic has shown that growth of the environmental goods and services markets is strongly driven by environmental regulation.[29] While the need for these goods and services is often abundantly clear, based on the seriousness of environmental challenges faced globally and at a national level, nonetheless, there often exists a gap between this need and the actual market demand and profit potential for environmental goods and services in developing countries. This is largely explained by the lack of environmental regulation, or the lack of implementation thereof.

Generally, in the early stages of market development, with pressures of increased urbanization and industrialization, governments invest in environmental infrastructure development (typically waste and wastewater). As industrial development progresses, there is a concomitant tightening in environmental regulation and enforcement, as societal pressure on government to improve these services increases. These two factors drive the early market development of environmental goods and services. In more developed countries, governments frequently implement additional economic incentives to drive innovation in the green sector (e.g. tax incentives for industries to employ cleaner technologies and renewable energy).

[29] Sinclair-Desgagné (2008).

In 2010, an example of environmental regulation impacting market development: provisions on atmospheric emissions were operationalized in South Africa, making air quality standards more stringent. Given the prevalence of coal fired power plants in South Africa, demand for technologies related to removing sulphur dioxide (SO_2) have increased, such as flue-gas desulfurization. Suppliers of such goods and technologies, for example producers of lime, are thus benefiting and have noted an increase in demand for their product from energy suppliers.[30]

Figure 6: Market development of environmental goods and services



Source: N. Dihel (2010) 'Understanding Trade in Environmental Services', World Bank. [31].

Environmental regulation is a major driver of demand for environmental goods and services. In some instances, governments have intervened specifically to regulate trade in particular goods which are considered damaging to the global environment. The Basel Convention regulates the movement of hazardous waste, in the interests of protecting health and the environment. Importantly, it has also provided guidance allowing for the development of associated environmental services to assist the process of moving hazardous waste safely.

4.2. Tariffs on environmental goods

Substantial tariff and non-tariff barriers continue to exist in the sector. Nevertheless, trade has grown substantially in the last 10 years. These trade measures increase the cost of accessing relevant inputs for making production and consumption more environmentally sustainable.

An average of the applied most-favoured-nation (MFN) tariffs using the full list of environmental goods group provides an overview, albeit a rough one, of the tariff landscape across regions. At a general level, it is noticeable that all regions include at least one country which is much liberalized (average tariffs on environmental goods below 5% - shown in the minimum column in table 5). Conversely, almost all regions contain at least one country applying relatively high tariff rates across the environmental goods grouping, with at least one country's average reaching 41%. East Asia, North America and the EU apply the lowest tariffs, on average, to environmental goods, while South Asia, Sub-Saharan Africa, the Caribbean and Central America apply the highest.

[30] Based on discussions by author with environmental goods provider in South Africa.

[31] Cattaneo, Engman, Saez and Stern (2010).

Table 5: Average applied MFN tariffs on environmental goods imports by region

Importing region	Minimum	Simple average	Maximum
North Africa and Middle East	4%	7%	17%
Sub Saharan Africa	1%	8%	14%
South East Asia + Pacific	0%	6%	15%
South Asia	5%	11%	21%
Central Asia + Eastern Europe	1%	7%	20%
East Asia	0%	3%	7%
Caribbean and Central America	2%	8%	41%
South America	1%	7%	12%
North America + European Union	1%	3%	7%
Note: figures are not trade-weighted			
- Minimum indicates the lowest average applied tariffs of the environmental goods grouping, by a country in the region specified.			
- Maximum indicates the highest average applied tariffs of the environmental goods grouping by a country in the region specified			
- Average indicates simple average of applied tariffs across all countries for the environmental goods grouping for the region specified.			

Source: ITC Market Access Map using OECD Environmental Goods list.

From a product perspective, there is great variation amongst the tariffs applied across countries. Annex I provides an overview of the environmental goods with the highest applied tariffs, by region. Products with the highest applied tariffs across all regions are listed in table 6.

Table 6: Selected environmental goods with the highest applied MFN tariffs worldwide

HS Code	Environmental goods with the highest applied tariffs worldwide	Environmental uses
220110	Mineral and aerated water not including sugar or sweetening matter nor flavourings	Resource Management Group: Potable water supply and distribution
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excluding mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	Resource Management Group: Potable water supply and distribution
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	Resource Management Group: Ethanol
320910	Paints and varnishes based on acrylic/vinyl poly,dspr in an aqueous medium	Cleaner/resource efficient products
320990	Paints and varnishes based on polymers, dispersed in an aqueous medium, nes	Cleaner/resource efficient products
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	Waste collection equipment
851629	Electric space-heating and soil-heating apparatus (excl. storage heating radiators)	Remediation and Clean-up
853931	Fluorescent lamps, hot cathodes	Heat/energy savings and management
960310	Brooms/brushes of twigs/other veg mat bound together, with/w/o handles	Waste collection equipment

HS Code	Environmental goods with the highest applied tariffs worldwide	Environmental uses
841911	Instantaneous gas water heaters (excl. boilers or water heaters for central heating)	Renewable energy: Solar
841919	Instantaneous or storage water heaters, non-electric, not elsewhere specified (nes)	Renewable energy: Solar
580190	Woven pile fabrics and chenille fabrics (excl. those of man-made fibres, wool or fine animal hair, terry towelling and similar woven terry fabrics, tufted textile fabrics and narrow woven fabrics of heading 5806)	Sewage treatment
681099	Articles of cement, of concrete or of artificial stone, nes	Hazardous waste and storage and treatment equipment
700800	Multiple-walled insulating units of glass	Heat/energy savings and management

Source: ITC Market Access Map using OECD Environmental Goods list.

4.3. Non-tariff barriers to trade

A number of studies have indicated that current trade is more significantly influenced by non-tariff barriers (NTBs) than by tariffs. Aaron Cosbey from the International Institute for Sustainable Development (IISD) argues that this is also the case with the trade in environmental goods in particular, trade remedies such as countervailing duties; anti-dumping policies (see below) and other non-trade related policies.[32]

Furthermore, a 2007 OECD survey of 136 exporting environmental companies in ten OECD and non-OECD countries found that firms face various non-tariff barriers in foreign markets, which can be perceived as significant.[33] Testing and certification, as well as regulations on payment, were frequently cited NTBs. Also, customs procedures were frequently described as barriers present, especially in developing and transition economies. These findings match similar enterprise surveys, such as ITC's Company Perspectives on Non-Tariff Measures.[34]

In reference to Box 1 (below) the most common means of trading in environmental services are via 'Mode 3, Commercial Presence' or 'Mode 4, Movement of Natural Persons'.[35] Hence, barriers to trade in environmental services are also likely to be more common in these approaches. In the OECD survey, for example, firms mentioned difficulties deploying their own personnel to install equipment and facing the difficulties associated with the administration required for technicians' international travel (Related to Mode 4).

Global discussions on facilitating trade in environmental goods and services have focused almost exclusively on identifying a goods list for tariff reductions. There have been relatively few discussions on the nature and extent of obstacles to environmental services trade. Also, the 2007 OECD study is the only study which has systematically identified the barriers to trade faced by environmental service exporters. This disparity in knowledge is partly due to the difficulty in defining environmental services and capturing data on the sector. Nonetheless, given the growing importance of the sector, there is a need to better understand what facilitates and what impedes trade in environmental services and to move beyond the current limited focus on environmental goods.

[32] Cosbey, op. cit.

[33] Fliess and Kim (2007).

[34] International Trade Centre - NTM Business Surveys.

[35] Dihel (2010)

Box 1: How are environmental services traded?

Trade in environmental services is governed by the General Agreement on Trade in Services (GATS), which was negotiated in the World Trade Organization (WTO) and came into force in 1995. The GATS distinguishes between four modes of supplying services: cross-border trade, consumption abroad, commercial presence, and presence of natural persons. These modes provide a framework to research and measure services trade and to craft agreements on liberalization:

Mode of supply		Examples of environmental services
Mode 1	Cross-border supply	Company in country A monitors wastewater treatment in Country B online
Mode 2	Consumption abroad	Tourist from country A travels to consumes eco-tourism services in country B
Mode 3	Commercial presence	Waste management company in country A establishes a subsidiary office in country B
Mode 4	Movement of natural persons	Environmental consultant from country A temporarily moves to country B to provide advisory services to a wastewater treatment company

Example - Environmental services export from South Africa:

Objective: the excavation and removal of 6,5 million m^3 of waste from the New Doha International Airport (NDIA) site, Qatar.

Service: South African company **(**Envitech Solutions) was appointed to perform environmental monitoring services during the waste excavation and removal contract.

Activities:

The Company supplied and operated all environmental monitoring equipment and software for the project, including an automated weather station, noise monitoring instruments, a dust analyser, a landfill gas-analyser, water-quality testing instruments, and asbestos-monitoring instruments.

The Company also developed the project's environmental management plan (EMP) and all associated method statements and procedure documentation, prior to waste excavation.

Responsible for monitoring the contractor's performance in accordance with the EMP throughout the waste excavation contract, 24 hrs/day, with staff on day and night shifts.

Source: http://www.envitech.co.za/

4.4. Trade remedies

There has been a significant increase in the number of trade remedy cases targeted at renewable energy products in the last five years.[36] This has particularly affected solar energy and bio ethanol production. Partly, this reflects the fast growing demand and trade in this sector; the incentives in stimulating production and the number of new actors trying to position themselves in the global market. A recent paper by Cimino and Hufbauer enumerated 41 cases of trade remedies in renewables being pursued since 2008: with an estimated reduction in trade totalling US$ 14 billion annually. Considering the five-year time frame for these penalties, this amounts to an estimated trade loss of approximately US$ 68 billion over five years.[37]

Similar analyses have led to concerns of the potentially distorting effects these remedies can have, such as increasing the prices for environmental goods, which may increase the cost of switching to more sustainable forms of energy consumption and may lessen the incentives of companies to apply energy-

[36] Cimino and Hufbauer (2014). .

[37] Ibid., 11.

efficient processes.[38] Concurrently, trade remedies are the established exceptions to WTO rules that have an accepted function of allowing countries to protect domestic industries from dumping, offset subsidies or enable emergency safeguard measures, temporarily limiting imports. These considerations have led to renewed discussions on trade and environment issues and to some concern that the prolonged focus on the environmental goods classification has distracted from other -arguably more relevant - developments in trade and environment policy.

5. Buyers and sellers

Given the size of the sector, it is useful to look at the main buyers and sellers in the sector, to better understand the business potentials. Among the main buyers of environmental goods and services are traditionally 'dirty' industries such as oil and gas, mining and metals. These have also been the major drivers behind the environmental-industry expansion in recent years.[39] Governments also make up a major client group, such as in the provision of services of wastewater treatment, refuse collection and disposal. Multilateral and regional development banks are significant actors, particularly in financing large-scale environmental infrastructure projects in developing countries.[40]

The Environmental Business Journal (EBJ) conducts regular surveys of environmental companies, asking them to rate customer areas in terms of prospects for sales growth in environmental markets over the next two to three years. The outcome of the 2012 survey is shown below, indicating that particularly oil and gas, mining, power utilities and metals are most likely to show very strong sales growth prospects.

Table 7: Major buyers of environmental goods and services rated by prospects for sales growth in environmental markets

	Very strong	Strong	Good	Slow growth	Flat	Modest decline	Big decline
Oil & Gas	37%	26%	22%	4%	11%	0%	0%
Mining	20%	36%	24%	8%	12%	0%	0%
Power utilities	15%	26%	26%	15%	19%	0%	0%
Metals	9%	14%	45%	18%	14%	0%	0%
Chemical industry	4%	19%	41%	19%	15%	4%	0%
Water/wastewater utilities	7%	15%	26%	30%	22%	0%	0%
Renewable energy development	0%	26%	26%	13%	26%	4%	4%
Solid waste utilities & companies	0%	21%	13%	25%	42%	0%	0%
Consumer products/Retail	10%	10%	19%	29%	24%	5%	5%
Investors, Banks & Law Firms	13%	0%	26%	13%	39%	4%	4%
Transportation mfg (auto/aero)	0%	4%	35%	30%	26%	4%	0%
Other manufacturing	0%	5%	38%	14%	38%	5%	0%
Electronics/computer mfg.	0%	4%	22%	39%	30%	4%	0%
International development agencies	4%	4%	13%	26%	48%	4%	0%
Multi-lateral banks or lenders	5%	5%	10%	25%	50%	5%	0%
Property developers, builders	4%	0%	17%	33%	29%	8%	8%
Federal governments	0%	4%	18%	25%	36%	14%	4%
Pulp & paper	0%	5%	11%	21%	47%	16%	0%
Local or city governments	0%	7%	18%	18%	32%	18%	7%
State or provincial governments	0%	4%	19%	15%	41%	15%	7%

Source: Environmental Business International: Global Market Survey 2012.

[38] Hufbauer and Cimino (2014)

[39] Environmental Business International, op. cit.

[40] Note that the GATS 'includes any service in any sector except services supplied in the exercise of government authority'. Hence while governments may make up a major purchaser as well as supplier of environmental goods and services, these are exempted from GATS negotiations.

Businesses range from small and medium-sized enterprises to large multinational companies with subsidiaries around the world. This reflects the fact that there are numerous modes of delivery of environmental goods and services in different countries and between sectors. Infrastructure environmental services, such as wastewater treatment or refuse collection, are commonly associated with governmental services. In water and waste-water services, for example, municipal government utilities are the main service providers. Nonetheless, there are various modes of private sector participation such as through Build-operate-transfer (BOT) schemes or public private partnerships. In Morocco, for instance, landfilling and waste management services are mostly provided by private companies, many of which are foreign-owned subsidiaries.[41]

In non-infrastructure environmental services, such as environmental consultancy services, or in eco-tourism, the private sector is very active and businesses are often SMEs. These enterprises will frequently service other businesses, including multinational companies (e.g. Safeco in Table 7) or will service consumers directly in the case of eco-tourism.

Large-scale projects such as those dealing with enhancing the energy efficiency of large industry complexes or urban wastewater treatment, often involve several companies with different expertise working together to find an optimal solution. In addition, few environmental problems can be solved with standardized products or services, but often require country-specific knowledge to ensure appropriate solutions in each context. This explains the frequency of joint venture projects between foreign and domestic companies in environmental projects (e.g. TEAM Maroc in Table 7). Foreign companies can bring new technologies and expertise while domestic companies are able to translate these into workable solutions in their countries.

6. Potential for developing countries

The potential for the environmental goods and services sector in developing countries is vast, as already seen in the high market growth and trade trends. Despite the growth in these markets and related trade, there is still a substantial disparity between developed and developing countries in terms of production and trade capacity as well as consumption of environmental goods and services.

6.1. Developing an export sector

Developing countries have a strong export potential in non-infrastructure environmental goods and services such as in consulting services which require less capital and are often supplied by SMEs.[42] This particular services market segment has been estimated, by EBI, globally at US$ 54.8 billion in 2011 (see table 4). Countries with a well-educated work-force and a strong higher education sector, particularly in sciences and engineering, can develop a capacity for export in this sector.

Some developing countries have developed successful environmental industries, which are either already exporting or have the potential to do so. The manner in which these have developed differs substantially depending on the sector and country. In many instances, industries develop naturally, as services provided to other industries or public institutions increase. Some develop by diversifying out of similar industrial sectors. Some develop from interactions with Multinational Corporations (MNCs) and through integrating into global value chains, while others develop through state-led initiatives.

South Africa for example, has a strong domestic environmental goods and services industry which developed around the mining industry. Given the strength of the mining sector in South Africa, coupled with increasing environmental regulations in the country, environmental goods and services firms developed a strong expertise domestically. Today, firms that are active in mining-waste and clean-up services include both large companies and SMEs, some of which have also started supplying these services internationally. (See Box 2).

[41] Bouchareb (2010).

[42] Geloso-Grosso (2007).

Table 8: Examples of suppliers of environmental goods and services

	Services provided	Clients and geographic location
Companies in developing countries		
Zoomlion Ghana limited (Ghana) Environmental services company	- Solid waste collection - Street & drain cleaning - Fabrication and sales of waste management equipment - Cesspit emptier services - Tricycle waste collection services - Landfill site management - Landscaping and beautification services	- Governments, development agencies, businesses - Ghana - Equatorial Guinea - Angola - Liberia - Togo - Zambia
Enviro Business Asia Sdn Bhd (Malaysia) Environmental consulting firm	- Environmental management plan /compliance/ monitoring & auditing - Environmental impact assessment - Resource management studies - Water resource management - Environmental management systems/ISO 14001 - Environmental risk assessment	- Multinational corporations in Malaysia (e.g. Philips, Matsushita Industrial Corporation, Mitsubishi Electric) - Government - Malaysian domestic businesses
Safeco (Philippines) Environmental services company	Manages industrial waste processes: clean-up, packaing & transport - soil and site remediation - Treatment/recycling	- Local businesses - MNCs in the Philippines e.g. Keppel, Shell, Lexmark, Hitachi
EnviroServ (South Africa) Environmental Services Company	- Asbestos stripping - Land remediation and rehabilitation - On-site waste management - Safe disposal process - Treatment and disposal solutions - Waste assessment - Waste transportation	- Domestic and foreign businesses/industry - South Africa and 18 other African countries (incl. Angola, Botswana, Burundi, Cameroon, the Democratic Republic of the Congo, Ethiopia, Ghana)
Aquatan lining system (South Africa) Environmental goods producer	Production of geosynthetic materials and their professional installation used in landfills, leach pads, toxic liquid waste containment, storage tank	Africa & Indian Ocean Islands
Team Maroc (Morocco)	Engineering and environmental assessment and analysis services for water and environmental management.	- Joint venture with Jacobs Engineering SA - Morocco and West African Countries (incl. Côte d'Ivoire)
Companies active Worldwide		
AECOM Technology	Includes: - Air quality - Environmental, health and safety management - Impact assessment and permitting, - Remediation services and site restoration - Waste services - Water and natural resources	Worldwide
WorleyParsons Ltd (Australia)	- Services in the area of infrastructure, power/energy, hydrocarbons, minerals, metals & chemicals Includes: - Environmental management - Water resources - Renewable energy	Worldwide

Box 2: Example of firm in mining waste services

Company: Metago Environmental Engineers (Pty) Ltd, a South African SME specialized in mining; mineral-processing; energy and chemical sectors; groundwater and water resources strategy development, etc.

Goods/services offered: Mine-residue design; construction supervision; waste characterization; mine closure planning; heap leach facility desig; surface-water hydrology studies, including flood lines; the design of water dams; the auditing of waste management facilities, etc.

Markets served: South Africa, Ghana, Namibia and Australia.

Source: http://www.metago.co.za/about_us_MEE_SA.shtm.

In South Africa, environmental services firms developed naturally around a domestic mining industry. There are other examples, such as the photovoltaic industry in China which was developed with an overt export orientation and with strong state-led support. Beginning in 2002, the Chinese Government actively promoted R&D and invested in the production capacity of its photovoltaic industry. According to Sun et. al (2014) the manufacture of photovoltaic modules increased 1000 times from 3MW in 2000 to 23 GW in 2012. Until 2009, domestic use of photovoltaic products remained relatively low, with wind energy being the preferred source of alternative energy. The Chinese photovoltaic industry grew particularly in the international solar energy market, which was driven by strong demand in Europe, from incentive schemes such as feed-in tariffs itemised (notably) in Germany's renewable energy legislation (EEG).[43]

6.2. Joint ventures and supplying multinational corporations

Developing country enterprises can benefit from joint ventures with foreign environmental goods and services firms and can act as suppliers to larger firms. The investment and expertise brought in by foreign firms can enable job creation (e.g. in post-sales services) and skills and technology transfers.

Many environmental services such as waste or wastewater management require a large number of environmental goods as inputs, such as pipes, tanks and chemicals. Many of these can be sourced more easily and cheaply domestically. In an example cited in an OECD paper by Steenblik, Drouet and Stubbs, Veolia Environnement, a French company providing solid-waste management services in Brazil, sourced the majority of its products and equipment domestically (estimated at 75% of the total investment).[44] In many instances, MNCs also require a niche expertise or country-specific knowledge which they may lack - whether this be in terms of domestic regulation, understanding specific consumer demands or distribution channels for their products and services.

Ideally, the collaboration between a foreign environmental goods and services provider and local suppliers leads to product-upgrading in the domestic partnering enterprises. This helps both the foreign services provider in obtaining quality products at the standards required, while domestic enterprises benefit from innovation and upgrading.[45]

6.3. Linking into regional and global value chains

Particular environmental sectors (such as the photovoltaic industry) frequently outsource parts of the production process to other countries, thereby creating regional or global value chains. Some developing countries have already successfully linked into these environmental value chains.

As an example, the Philippines has increased its exports of photovoltaic cells from a very low base in 2006 to just over US$ 1 billion in 2013 (see Figure 7). This development can be attributed to a number of foreign companies, such as US SunPower or Solaria, outsourcing parts of the manufacturing processes to the

[43] Sun (2014).

[44] Steenblik (2005).

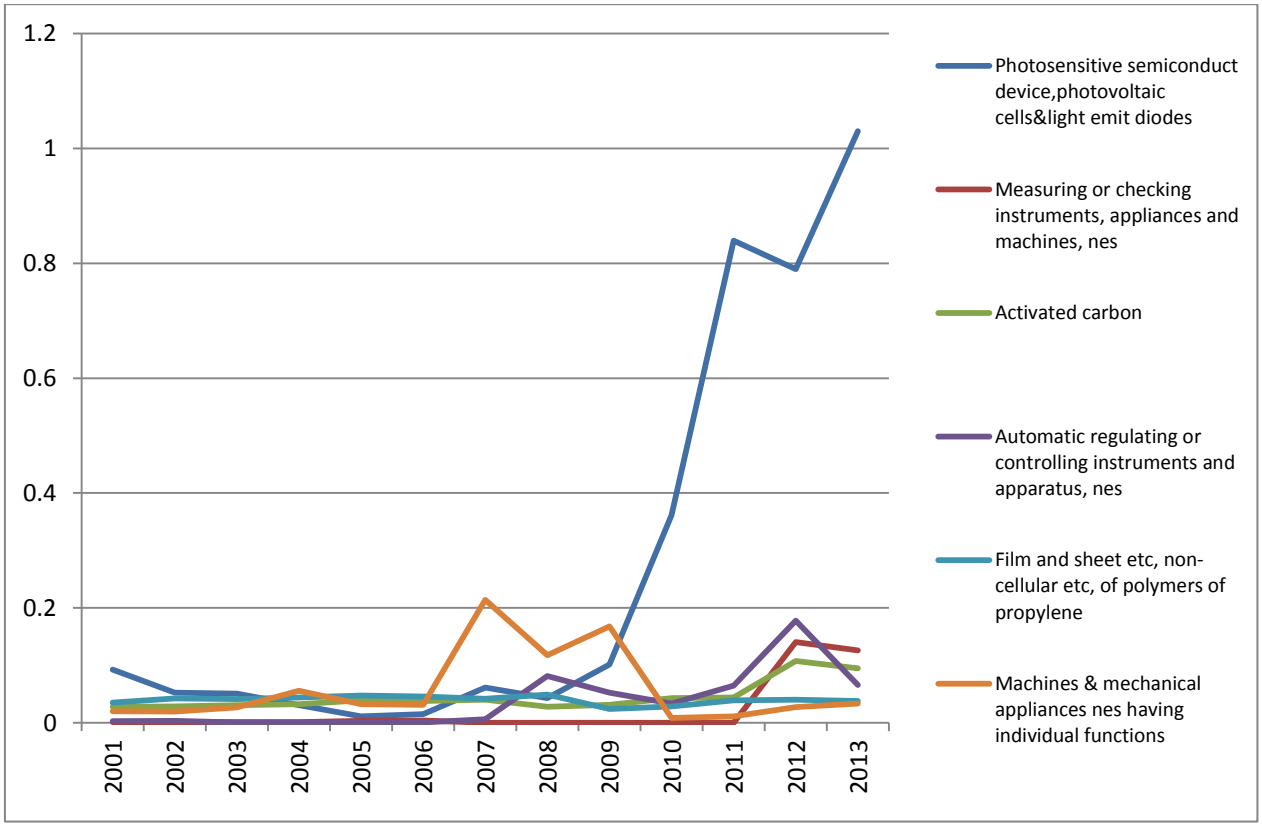
[45] Ibid.

Philippines. The companies have cited the highly-educated labour force, in particular, large numbers of engineers and the electronics industry infrastructure as incentives for locating in the country.[46]

The Philippines is a major exporter of semi-conductors. The considerable experience in this manufacturing sub-sector, which requires a similar set of labour skills and infrastructure, facilitated the diversification into the photovoltaic cell-manufacturing sector and attracted the related investment.

In addition, the conditions appear to be good for Philippine companies and Filipino workers to benefit from technology-transfers through integration into Global Value Chains (GVCs), and to use this knowledge to diversify products and services in the domestic Philippine market and potentially to export markets. Philippine companies have access to innovative finance schemes, such as the 'Sustainable Energy Finance Pogram' implemented by the Bank of the Philippines. Also, the Renewable Energy Act has been in force since 2008, which incentivizes private sector engagement in the renewables subdivision.

Figure 7: Selected environmental goods exports from the Philippines 2006-2013 (US$ billion)



Source: ITC Trade Map, Using OECD Classification of Environmental Goods.

6.4. Import solutions

Developing countries can also benefit from imports in environmental goods and services, particularly where alternative domestic environmental inputs for industry are expensive or non-existent. The economic arguments for improving environmental performance in manufacturing and other economic sectors are significant. Estimates in Peru for example, have shown that costs resulting from poor environmental management are equivalent to 3.9% of the country's GDP,[47] while in Morocco estimates are as high as 8% of Morocco's annual GDP.[48]

[46] Posadas (2008).

[47] Cited in UNIDO (2013).

[48] Touahri (2009).

Strategically liberalizing key environmental goods or service inputs can enhance the efficiency and competitiveness of other industries, especially if this lowers the cost of adapting to environmentally-sustainable processes. This can also enhance the competitiveness of important export sectors, which may rely on a green image to reach new markets or market segments or seek efficiency-enhancing solutions to save on production costs. For example, the tourism industry is highly susceptible to consumer demands for environmentally sustainable production. One pre-condition for developing a competitive tourism export-sector is adequate water, energy and wastewater management.

6.5. Regional trade

For some environmental goods and services exporters, regional markets may present more viable business opportunities. Partly, this is due to geographical proximity and related lower trade costs, but can also be due to lower tariffs within regional economic communities. Exporters of environmental goods may face high applied MFN tariffs in certain countries (see table 5).Thus, these countries may find a competitive advantage in exporting to neighbouring countries or regional communities as tariffs will probably be lower.

Despite being less restricted by geographical challenges, the environmental services trade is nonetheless often geographically defined. For example, Hufbauer et al (2009) found that since the conclusion of the United States/Morocco Free Trade Agreement (FTA), the two-way services trade (unlike the trade in goods) has hardly grown. One reason attributed is a lack of cultural understanding between the two partners. European services firms, however, are very active in the Moroccan market, despite the lack of a similarly comprehensive FTA. Cultural and linguistic proximity may have a bigger role to play in determining services trade potential than simply a measure of openness.[49]

Environmental services can also harbour south-south trade potential for developing countries with bordering countries that share a similar culture and/or language. There are several examples of firms in developing countries that provide environmental services to their 'neighbours'. For example, EnviroServ, a South African firm, provides waste collection services to Angola, Mozambique, Namibia, etc. TEAM Maroc has provided environmental services to francophone African countries such as Cote d'Ivoire (see table 8). Judging by many such cases, the environmental services trade appears to have a strong regional market orientation.

6.6. Employment and enterprises

The potential impact of a competitive environmental goods and services sector on employment creation can be seen from the available data. Although industry-level statistics for the sector are difficult to calculate, estimates have been made by the UK Department for Business Innovation & Skills for 2009-2010.[50]

Given the rapid pace of growth of the market and the recovery after the economic crisis of 2008-2009, general optimism prevails among industry experts concerning green-job-creation and longer-term profitability for firms.[51] For developed countries such as the United States of America, Japan, Germany and emerging economies such as China, this sector already makes up a significant share of the number of companies and employment-creation.

The significant role of the informal sector in providing jobs in environmental services is frequently overlooked. In countries where a lack of regulation has dampened demand for the formal provision of services, the informal sector often helps bridge a gap in service delivery. This is particularly notable in recycling services and waste collection. For example, it is estimated that in Morocco, 90 % of scrap metal collection activities is performed by the informal sector.[52] Major concerns exist regarding these forms of employment with often hazardous working conditions and a potential for exploitation as well as an absence of recognition of the workers at institutional and regulatory levels. Furthermore, the large and growing

[49] Hufbauer and DrRosa (2009).

[50] UK Department for Business Innovation & Skills.

[51] Kaminski (2014).

[52] Laissaoui and Rochat (2008).

number of enterprises in the informal sector represents foregone tax revenue for local and national governments.

Table 9: Selected countries' low carbon and environmental goods and services market size, number of companies and number of employees 2009-2010

Country	Market size £ Million	Number of companies	Number of employees
US	629,303	368,951	7,397,978
China	426,610	251,949	4,973,732
India	199,115	118,953	2,247,487
Japan	197,816	112,101	2,207,012
Germany	135,677	78,421	1,601,112
Brazil	92,513	48,391	974,111
Indonesia	48,360	26,992	551,465
Thailand	29,711	16,769	349,296
Philippines	24,262	13,593	272,772
Pakistan	19,356	11,495	225,560
Colombia	17,542	9,743	200,013
Bangladesh	16,285	9,413	188,834
Viet Nam	16,186	9,378	189,816
Rwanda	546	12,793	25,144
Trinidad and Tobago	527	13,277	27,282
Kyrgyzstan	433	10,120	21,229
Malawi	388	9,278	18,266

Source: Estimates by UK Department for Business Innovation & Skills. Note: Colour indicating level of development (low, middle, high income country).

However, there are also numerous examples of initiatives related to the upgrading and formalisation of the informal sector in environmental services, to ensure quality jobs. For instance, the e-Waste Association of South Africa (eWASA) has proposed an e-waste management system to support small business start-ups and informal recyclers. eWASA also encourages investments in new recycling technologies.[53] Such initiatives provide some examples of how the informal sector can be integrated into the formal economy and how enterprises in niche markets (such as e-waste) can be supported.

7. Challenges for developing countries

7.1. Regulation

Environmental regulation is frequently lacking in developing countries. Where it does exist, it is infrequently fully enforced. Herein lies another challenge for the development of the environmental industry in developing countries. Regulation is a key factor in driving demand for environmental goods and services (see pp.15 -16) and encourages the early development of the industry.

Enforced environmental regulation- and standard-setting create markets that can have both environmental benefits and create business opportunities. In South Africa, for example, there are residue stockpiles and deposits from mining waste. There is an opportunity for its re-use, but this requires the development of standards for the adequate storage, disposal and re-use of the mining waste. It is necessary, for example, for standards of ash toxicity to be developed to ensure that the re-use of waste materials in brick-making or

[53] Finlay (2008).

as a cement-extender does not negatively impact health.[54] Until such regulations are in place, the incentives for economic activity in these particular areas will be limited.

Another challenge is the lack of internationally recognized or harmonized environmental standards. In Rwanda, the ban on polythene materials[55] has been viewed as negatively-affecting private sector competitiveness because regional competitors are not subject to the same regulation and are able to use cheaper (albeit environmentally-unfriendly) packaging materials. Thus greater co-ordination with neighbouring countries may be required to ensure common standards in the regulation of pollutants. This may also be necessary to avoid regulatory arbitrage, where dirty industries move to regions with lower environmental standards, thus undercutting the competitiveness of green industries.

7.2. Need for transparency and competition policy

While regulation is one of the main drivers enabling greater private sector participation, transparency and predictability of the regulatory requirements are also needed to ensure growth in the sector. Private sector operators need to be aware of the licenses, procedures (such as environmental impact assessment) and other standards with which they must conform. In developing countries, these are often still in progress or undergoing changes. This then increases the risk for private sector actors, both domestically and internationally as the latter have less knowledge of the local business environment.

In Rwanda for example, the Environment Management Authority (REMA) argues that non-compliance is more frequently the result of a lack of awareness by the business community and consumers rather than a deliberate contravention of the law. Raising awareness of environmental regulation is the first element of enforcement.[56]

Another feature of the environmental industry is the prevalence of monopolies or oligopolies, particularly in infrastructure environmental services. Morocco provides an example where 80 % of the waste management market is held by only four subsidiaries of international groups.[57] This may be operationally more efficient, given that the nature of the service requires large-scale investment and a measure of economies of scale. However, it also highlights the importance of a strong regulatory environment to be in place. For particular environmental goods and services, subsectors with a pre-disposition to highly concentrated markets (a precondition to liberalization) would therefore be a functioning competition policy and related regulatory environment.

7.3. Trade barriers

A further challenge for developing countries in this sector is the existence of pockets of steep trade barriers, whether tariff or non-tariff varieties. These may just affect a few products or services but given the strong synergies between environmental goods and services, a barrier in one may impede the trade and hike up costs in another.

An OECD study surveying business perceptions of non-tariff measures on environmental goods and services provided an example of a wastewater management provider was detailed. Difficulties were encountered in providing after-sales services on the installation of pumps, due to visa-issuing difficulties for staff.[58] Such measures affecting movement of persons are likely to provide a considerable challenge for developing country environmental service-providers.

7.4. Sector associations and institutional support services

Sector associations and trade support institutions in developing countries rarely focus on the environmental goods and services sector. This partly reflects the still nascent stage, though it may also be

[54] Department of Environmental Affairs, Republic of South Africa (2010).

[55] Agutamba (2013).

[56] Kanamugire (2011).

[57] Bouchareb, op cit.

[58] Fliess and Kim, op cit.

a reflection of the heterogeneity of the sector. Frequently, there is a dual-usage nature of many environmental goods, and many environmental services can be subsumed into engineering, chemical engineering, consultancy or other services. Thus, many firms do not classify themselves as environmental goods and services providers, or if they do so, only as a secondary role.

Even in some developed countries, environmental goods and services sector associations and trade promotion organizations refer to the difficulty of adequately delineating the sector and the need to raise the awareness of other companies in related sectors: specifically, they feel obliged to explain how their goods and services can have environmental applications and the growing market for these internationally.

The lack of sector representation poses a problem, as business interests are poorly represented in policy-making; in preparations for trade negotiations; in economic strategy formulation such as industrial policies or export strategies. This is a current challenge, as international discussions on the classification of environmental goods and services and related trade negotiations are gaining momentum.[59] Governments need to understand their own interests before engaging in trade negotiations, which is more challenging where there is a lack of relevant business voices and representation.

8. Summary of findings

This section highlights some conclusions and policy recommendations for developing countries. An important conclusion is the growing potential of the environmental goods and services sector for firms in developing countries. Demand for environmental goods and services is growing fastest in developing countries, particularly in Asia, Africa and Latin America. With increasing environmental regulation and an international recognition of the need to switch to a green economy, this trend is likely to continue.

Rapidly growing demand for environmental goods and services, coupled with prospective market openings as a result of ongoing international trade negotiations, is creating new export opportunities for firms in developing countries. This brief provides an overview of some of these opportunities, such as niche environmental consulting services, learning through joint ventures with established foreign environmental goods and services suppliers and linking into green regional and global value chains.

The brief also highlights challenges for developing countries in taking advantage of these opportunities, including prevailing barriers to trade, the absence or inadequate enforcement of environmental regulatory regimes and underdeveloped institutional support services for environmental goods and services firms. The report emphasises the need for industry to organize better into sectoral associations and for governments to better incorporate consideration of this emerging growth sector in economic policy and trade strategy formulation.

The report underscores the need for ongoing work to better understand this dynamic rapidly evolving set of industries and their potential to open up new export business opportunities for developing country SMEs.

Developing countries have the potential to benefit from trade in environmental goods and services. In some developing countries, notably middle-income countries, burgeoning environmental industries are already providing competitive goods and services domestically and increasingly to neighbouring countries.

Developing countries can take greater advantage of environmental goods and services trade by:

- Developing their export capacity; this can start with ‘low hanging fruit’ such as non-infrastructure environmental goods and services such as environmental consulting services.[60]
- Identifying and supporting competitive domestic environmental goods and services industries with sufficient supply capacity to research markets abroad.

[59] See for example: USTR Announcement of Intent to Launch WTO Negotiations on Environmental Goods. Press Release from March 2014.

[60] Geloso-Grosso (2007), op cit.

- Identifying diversification potential, based on existing competitive advantages in similar sectors or products and services requiring a similar skills base as for environmental goods and services.
- Taking advantage of lower tariff barriers by exporting to partner countries and regions through bilateral trade agreements, or to countries with a similar language and cultural heritage.
- Integrating into regional or global value chains, by attracting investment from companies looking to outsource parts of their production processes and by identifying options to link as suppliers to MNCs in environmental goods and services.
- Identifying possibilities for joint ventures and joining large environmental projects together with other enterprises.
- Facilitating imports of environmental goods and services needed as inputs into domestic industries, to enhance competitiveness.

In order to take advantage of this potential, developing countries will also need to address particular challenges. These include:

- Strengthening environmental regulation, competition policy and the enforcement of regulations.
- Ensuring transparency and predictability of the regulatory framework.
- Ensuring consistency in environmental standards across regions and enhancing the mutual recognition of standards.
- Strengthening sector associations and trade support institutions in representing environmental companies and promoting these abroad.
- Incorporating environmental goods and services in economic and industrial policies as well as trade strategies.

Appendix I: Tariffs applied on environmental goods

Central Asia & Eastern Europe

HS Code	Environmental Goods with highest average applied tariffs for Central Asia and Eastern Europe	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	20%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	22%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	138%
320910	Paints&varnishes basd on acrylic/vinyl poly,dspr in an aqueous medium	14%
320990	Paints&varnishes based on polymers,dispersed in an aqueous medium,nes	16%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	20%
392690	Articles of plastics or of other materials of Nos 39.01 to 39.14 nes	14%
580190	Woven pile fabrics and chenille fabrics (excl. those of man-made fibres, wool or fine animal hair, terry towelling and similar woven terry fabrics, tufted textile fabrics and narrow woven fabrics of heading 5806)	13%
681099	Articles of cement, of concrete or of artificial stone nes	15%
700800	Multiple-walled insulating units of glass	14%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	15%

Sub-Saharan Africa

HS Code	Environmental Goods with highest average applied tariffs for Sub-Saharan African countries	Average
220110	Mineral&aerated waters not cntg sugar or sweetening matter nor flavoured	22%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	22%
320910	Paints&varnishes basd on acrylic/vinyl poly,dspr in an aqueous medium	19%
320990	Paints&varnishes based on polymers,dispersed in an aqueous medium,nes	19%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	22%
580190	Woven pile fabrics and chenille fabrics (excl. those of man-made fibres, wool or fine animal hair, terry towelling and similar woven terry fabrics, tufted textile fabrics and narrow woven fabrics of heading 5806)	23%
850819	Vacuum cleaners, incl. dry cleaners and wet vacuum cleaners, with self-contained electric motor (excl. of a power <= 1 500 W and having a dust bag or other receptacle capacity <= 20 liter) (Note: Corresponds to 847989 under HS 2002 Rev.: Other machines, nes., having individual functions)	21%
850860	Vacuum cleaners, incl. dry cleaners and wet vacuum cleaners (excl. with self-contained electric motor) (Note Corresponds to 847989 under HS 2002 Rev.: Other machines, nes., having individual functions)	19%
851629	Electric space-heating and soil-heating apparatus (excl. storage heating radiators)	24%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	20%
960350	Brushes nes, constituting parts of machines, appliances or vehicles	18%

North Africa and Middle East

HS Code	Environmental Goods with highest average applied tariffs for North Africa and Middle East	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	27%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	26%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	19%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	20%
841911	Instantaneous gas water heaters (excl. boilers or water heaters for central heating)	20%
841919	Instantaneous or storage water heaters, non-electric, nes	17%
842381	Weighing machinery having a maximum weighing capacity <= 30 kg (excl. balances of a sensitivity of 5 cg or better, personal weighing machines, household scales, scales for continuous weighing of goods on conveyors, constant weight scales and scales for discharging a pre-determined weight of material into a bag or container, incl. hopper scales)	15%
850860	Vacuum cleaners, incl. dry cleaners and wet vacuum cleaners (excl. with self-contained electric motor) (Note: Corresponds to 847989 under HS 2002 Rev.: Other machines, nes., having individual functions)	15%
851629	Electric space-heating and soil-heating apparatus (excl. storage heating radiators)	20%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	18%

South East Asia and the Pacific

HS Code	Environmental Goods with highest average applied tariffs for South East Asia and the Pacific	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	20%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	15%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	182%
320910	Paints&varnishes basd on acrylic/vinyl poly,dspr in an aqueous medium	13%
320990	Paints&varnishes based on polymers,dispersed in an aqueous medium,nes	13%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	12%
851629	Electric space-heating and soil-heating apparatus (excl. storage heating radiators)	12%
853931	Fluorescent lamps, hot cathode	12%
870892	Silencers and exhaust pipes, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the transport of goods and special purpose motor vehicles	14%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	11%

South Asia

HS Code	Environmental Goods with highest average applied tariffs for South Asia	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	29%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	33%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	86%
320910	Paints&varnishes basd on acrylic/vinyl poly,dspr in an aqueous medium	22%
320990	Paints&varnishes based on polymers,dispersed in an aqueous medium,nes	21%
392020	Plates, sheets, film, foil and strip, of non-cellular polymers of ethylene, not reinforced, laminated, supported or similarly combined with other materials, without backing, unworked or merely surface-worked or merely cut into squares or rectangles (excl. self-adhesive products, and floor, wall and ceiling coverings of heading 3918)	20%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	23%
681099	Articles of cement, of concrete or of artificial stone nes	22%
732510	Cast articles of non-malleable cast iron nes	19%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	19%
840991	Parts suitable for use solely or principally with spark-ignition internal combustion piston engines, nes.	19%
870892	Silencers and exhaust pipes, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the transport of goods and special purpose motor vehicles	24%

East Asia

HS Code	Environmental Goods with highest average applied tariffs for East Asia	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	6%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	22%
580190	Woven pile fabrics and chenille fabrics (excl. those of man-made fibres, wool or fine animal hair, terry towelling and similar woven terry fabrics, tufted textile fabrics and narrow woven fabrics of heading 5806)	6%
731021	Cans,iron o steel,cap <50 litres,to be closd by crimpg o soldering,nes	6%
731029	Tanks, casks, drums, cans, boxes and similar containers, of iron or steel, for any material, of a capacity of < 50 l, nes. (excl. containers for compressed or liquefied gas, or containers fitted with mechanical or thermal equipment, and cans which are to be closed by soldering or crimping)	6%
841911	Instantaneous gas water heaters (excl. boilers or water heaters for central heating)	7%
841919	Instantaneous or storage water heaters, non-electric, nes	7%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	7%
870892	Silencers and exhaust pipes, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the transport of goods and special purpose motor vehicles	5%

Caribbean & Central America

HS Code	Environmental Goods with highest average applied tariffs for Caribbean and Central America	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	28%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	27%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	51%
320910	Paints&varnishes basd on acrylic/vinyl poly,dspr in an aqueous medium	20%
320990	Paints&varnishes based on polymers,dispersed in an aqueous medium,nes	21%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	18%
681099	Articles of cement, of concrete or of artificial stone nes	16%
841911	Instantaneous gas water heaters (excl. boilers or water heaters for central heating)	18%
841919	Instantaneous or storage water heaters, non-electric, nes	16%
851629	Electric space-heating and soil-heating apparatus (excl. storage heating radiators)	18%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	19%
850819	Vacuum cleaners, incl. dry cleaners and wet vacuum cleaners, with self-contained electric motor (excl. of a power <= 1 500 W and having a dust bag or other receptacle capacity <= 20 l) (Note: Corresponds to 847989 under HS 2002 Rev.: Other machines, nes., having individual functions)	17%

South America

HS Code	Environmental Goods with highest average applied tariffs for South America	Average
220110	Mineral&aerated waters not cntg sugar or sweeteng matter nor flavoured	16%
220190	Ordinary natural water, not containing added sugar, other sweetening matter or flavoured; ice and snow (excl. mineral waters and aerated waters, sea water, distilled water, conductivity water or water of similar purity)	18%
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	21%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	15%
580190	Woven pile fabrics and chenille fabrics (excl. those of man-made fibres, wool or fine animal hair, terry towelling and similar woven terry fabrics, tufted textile fabrics and narrow woven fabrics of heading 5806)	15%
732510	Cast articles of non-malleable cast iron nes	13%
841911	Instantaneous gas water heaters (excl. boilers or water heaters for central heating)	16%
841919	Instantaneous or storage water heaters, non-electric, nes	14%
850819	Vacuum cleaners, incl. dry cleaners and wet vacuum cleaners, with self-contained electric motor (excl. of a power <= 1 500 W and having a dust bag or other receptacle capacity <= 20 l) (Note: Corresponds to 847989 under HS 2002 Rev.: Other machines, nes., having individual functions)	15%
851629	Electric space-heating and soil-heating apparatus (excl. storage heating radiators)	18%
960310	Brooms/brushes of twigs/oth veg mat bound together,with/w/o handles	18%

Europe and North America

HS Code	Environmental Goods with highest average applied tariffs for Caribbean and Central America	Average
220710	Undenatured ethyl alcohol, of actual alcoholic strength of >= 80%	30%
320910	Paints&varnishes basd on acrylic/vinyl poly,dspr in an aqueous medium	6%
320990	Paints&varnishes based on polymers,dispersed in an aqueous medium,nes	6%
381511	Supported catalysts with nickel or a nickel compound as the active substance, nes.	5%
381512	Supported catalysts with precious metal or a precious-metal compound as the active substance, nes.	5%
381590	Reaction initiators,reaction accelerator&catalytic preparations,nes	5%
391400	Ion-exchangers based on polymers of headings 3901 to 3913, in primary forms	6%
392020	Plates, sheets, film, foil and strip, of non-cellular polymers of ethylene, not reinforced, laminated, supported or similarly combined with other materials, without backing, unworked or merely surface-worked or merely cut into squares or rectangles (excl. self-adhesive products, and floor, wall and ceiling coverings of heading 3918)	6%
392490	Household articles and toilet articles, of plastics (excl. tableware, kitchenware, baths, shower-baths, wash-basins, bidets, lavatory pans, seats and covers, flushing cisterns and similar sanitary ware)	7%
580190	Woven pile fabrics and chenille fabrics (excl. those of man-made fibres, wool or fine animal hair, terry towelling and similar woven terry fabrics, tufted textile fabrics and narrow woven fabrics of heading 5806)	8%
701990	Glass fibres (including glass wool) and articles thereof nes	6%

Source: ITC Market Access Map using OECD Env. Goods list.

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