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ICTSD Environmental Goods and Services Series

Environmental Priorities and Trade Policy for Environmental Goods: A Reality Check

By Veena Jha,
Maguru Consultants and University of Warwick, UK

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For more information about ICTSD's work on Environmental Goods and Services, visit our web site: www.trade-environment.org

ICTSD welcomes feedback and comments on this document. These can be forwarded to Mahesh Sugathan, smahesh@ictsd.ch.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF BOXES

LIST OF FIGURES

ACRONYMS

ACSAD	Arab Center for the Studies of Arid Zones and Dry Lands
APEC	Asia-Pacific Economic Cooperation
BCM	billion cubic metres
CFC	Chlorofluorocarbon
CIESIN	Center for International Earth Science Information Network
DEWA	Division of Early Warning and Assessment
EBI	Environmental Business International
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
EGs	Environmental Goods
EGS	Environmental Goods and Services
EPI	Environmental Performance Index
EPP	Environmentally-preferable Product
ES	Environmental Service
ESCWA	United Nations Economic and Social Commission for West Asia
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GEO	Global Environmental Outlook
HS	Harmonised System
ICTSD	International Centre for Trade and Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organization
ITA	Information Technology Association
LAC	Latin America and the Caribbean
LDC	Least-developed Country
MDG	Millennium Development Goal
MFN	Most-favoured Nation
NAMA	Non-agricultural Market Access
OECD	Organisation for Economic Co-operation and Development
TERI	Tata Energy Research Institute
UNCCD	United Nations Convention to Combat Desertification
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNPD	United Nations Population Division
US	United States of America
WITS	World Integrated Trade Solutions
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WWF	World Wide Fund for Nature

FOREWORD

Environmental goods and services (EGS) as a subset of goods and services was singled out for attention in the negotiating mandate adopted at the Fourth Ministerial Conference of the World Trade Organization (WTO) in November 2001. Increasing access to and use of EGS can yield a number of benefits including reducing air and water-pollution, improving energy and resource-efficiency and facilitating solid waste disposal to name a few of the benefits. Gradual trade liberalisation and carefully managed market opening in these sectors can also be a powerful tool for economic development by generating economic growth and employment and enabling the transfer of valuable skills, technology and knowhow embedded in such goods and services. In short, well-managed trade liberalisation in EGS can facilitate the achievement of sustainable development goals laid out in global mandates such as the Johannesburg Plan of Implementation, the UN Millennium Development Goals and various multilateral environmental agreements (MEAs).

While Paragraph 31 (iii) of the Doha mandate calls for a reduction, or as appropriate, elimination of tariffs and non-tariff barriers (NTBs) on EGS, the lack of a universally accepted definition on EGS has meant that trade delegates have struggled over the scope of goods and services that would be taken up for liberalisation. Further, while the aim of the EGS mandate is to liberalise, it provides no indication of the pace, depth or sequencing of liberalisation vis-à-vis 'other' goods and services. A major fault line in the negotiations on environmental goods is the dispute over whether only goods intended solely for environmental protection purposes should be included as opposed to goods that may have both environmental and non-environmental uses. A number of developing countries are concerned about the inclusion of goods which they perceive as only vaguely linked to environmental protection. They are also worried about the import-led impacts of including a broad range of industrial goods on their domestic industries, employment and tariff revenues. In a broader context, a lack of movement on issues of interest to developing countries, particularly agriculture, also inhibits proactive developing country engagement on EGS negotiations.

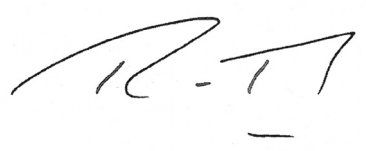
Beyond the possible socio-economic impacts of EGS negotiations, it is essential to ensure that liberalisation of environmental goods, most of which are used for both environmental and non-environmental purposes, ultimately produce the environmental benefits intended by such disciplines. It is useful in this regard to examine and analyse relevant environmental indicators and the extent to which these are correlated with economic data and trade indicators on environmental goods. It is also important to understand the key drivers of trade in environmental goods so that the relative importance of tariff-liberalisation vis a vis other drivers can be weighed in relation to each other in various categories of environmental goods.

This paper by Dr. Veena Jha provides a reality check on these issues through rigorous empirical analysis and econometric modeling. The paper is also unique in that it tries to bring together environmental knowledge generated through the UNEP Global Environmental Outlook and relevant environmental performance indices with trade data on a set of 153 environmental that have informally been proposed for liberalisation by a group of WTO Members which may or may not be relevant in addressing these problems.

The paper assesses the extent to which countries and regions which suffer from various environmental problems trade in the set of these 153 environmental goods and the main factors driving such trade. In addition, it analyses the trends in dynamic comparative advantage enjoyed by the main exporters and importers of these goods-both developed as well as developing countries. Finally the paper also examines the implications of these findings in informing a meaningful negotiating strategy on environmental goods at the WTO.

Dr. Veena Jha is a Visiting Professorial Fellow at the Institute of Advanced studies, University of Warwick, UK, and a research fellow at the International Development Research Centre, Canada. In addition, she is the executive director of Maguru Consultants Limited, London, UK. She has worked with the United Nations in various capacities for over twenty years. She was the Coordinator of an important UNCTAD/ DFID/Government of India initiative on 'Strategies and Preparedness for trade and Globalisation in India'. She has published twelve books on trade and development issues, articles in journals, and was a member of some consensus building initiatives on trade and environment issues in the last decade. She has been a member of several national and international Advisory Boards, notably the United Nations Secretary General's Task Force on Millennium Development goals. She has served as an expert on technical committees of the Government of India, industry associations, and non-governmental organisations on trade and development issues.

The paper is part of a series of issue papers commissioned in the context of ICTSD's Environmental Goods and Services Project, which address a range of cross-cutting, country specific and regional issues of relevance to the current EGS negotiations. The project aims to enhance developing countries' capacity to understand trade and sustainable development issue linkages with respect to EGS and reflect regional perspectives and priorities in regional and multilateral trade negotiations. We hope you will find this paper to be stimulating and informative reading and useful for your work.



Ricardo Meléndez-Ortiz
Chief Executive, ICTSD

EXECUTIVE SUMMARY

The growing importance of environmental issues has generated a parallel interest in evaluating the opportunity for trade in environmental goods and services (EGS). Sustainable development strategies worldwide further contribute to the overall growth of the global environment industry which is currently estimated at over USD 650 billion. Trade in EGS is estimated to amount to a tenth of that amount.

Liberalising trade in EGS may in theory, assist developing economies to build their economies along more environmentally sustainable lines. Continued growth in the EGS sectors in a way that provides economic benefits to the trading partners, both developed and developing countries, depends on the existence not only of policy conditions that allow freer trade in these goods and services, but also on a viable domestic consumer market for such goods and services. This paper shows that while environmental problems arise in almost all developing countries, trade in EGS is restricted to only a handful of countries. Thus not all environmental hotspots are serviced by trade in environmental goods (EGs). The main reason for lack of trade is the absence of a viable market.

The paper analyses trade flows in the list of EGs provided by the WTO JOB(07) 54 (WTO 2007a). Only two categories in the WTO '153' list have been excluded from the analysis. These are the categories of 'Cleaner or More Resource-Efficient Technologies and Products' and Environmental Monitoring, Analysis and Assessment Equipment.' This is because there is very little trade in these items and WITS does not report trade for 15 countries which is the basis of analysis. The sample of traders in these items is too small to do any meaningful regression analysis. The paper shows that imports by developing countries of these 153 products do not necessarily end up in areas that require them most. For example, environmental problems in Africa have reached critical points, yet the import of EGs by African countries is minimal. This could be explained by the fact that effective markets backed by paying capacity exist only in middle income countries which have seen a dramatic rise in imports of EG. In addition, technical assistance or tied aid projects also appear to be directed to those countries which have the relevant purchasing power. This gap in EG imports in a large number of developing countries also points to the need for technical assistance projects in developing countries, especially in Africa. Bilateral and multilateral donor assistance in this regard has focused especially on the relatively high income developing countries, notably China, the Republic of Korea, Brazil or Mexico.

It must also be recognised that environmental problems cannot be solved simply by changing for instance the scope of EG to be liberalised, nor can the link between environmental problems and the list be direct. The link between environmental problems of developing countries and the EGS list is further complicated by the dual and often multiple uses of any particular product defined by its HS (harmonised system) category. For example, while the EBI (Environmental Business International) places a market value of over USD 650 billion on EGS, it states that only about 15 percent of that value may be traded. The value of EG alone traded in the WTO '153' list is of about USD 430 billion. This implies that there are several multiple use products in the '153' list. This high value of traded goods therefore highlights the need to further restrict the scope of EGS.

One way of restricting the scope of EGs would be to initially liberalise only those products that have some environmental end use. The paper shows that if environmental performance indicators were taken as an indicator of environmental end use, EGs would be restricted to only a few categories of products from the WTO '153' list of products. These categories include environmentally-preferable products (EPPs), natural risk products, renewable energy, waste management, clean up, and waste and portable water products. This list would also cover the category of products which have shown particular tariff sensitivity.

Tariffs were found to be important in explaining trade in EGs into developing countries in only one category of products, i.e heat and energy management products. Trade in renewable energy products is also sensitive to reductions in tariffs of 5 percent. It is possible that products in these two categories are high technology products which are mostly imported into developing countries. Thus the initial list of EGs could be further narrowed to include only these sub-items for the initial round of liberalisation. It should however be noted that even in the categories where tariffs matter, the elasticity with respect to tariffs is low: a one percent reduction in tariff in these categories leads to only a 0.15 percent increase in trade.

For two other categories, environmentally-friendly products and natural resource-based products, the tariff response of trade in EGs is inversed: the higher the tariffs the higher the trade. This could be attributed to the fact, that trade in these products may be linked more directly to incomes rather than tariffs. Thus, as incomes rise irrespective of higher tariffs, trade in these categories increases.

Trade in almost all categories of EGs is found to be highly sensitive to gross domestic product (GDP). Trade in air pollution equipment, environmentally-preferable products and products aimed at addressing natural risks, all increase as GDP increases. With an increase in GDP, environmental performance index (EPI) surveys show that air pollution rises. Legislation to combat air pollution has been implemented in most countries as GDP rises, which could account for the increase in trade in this category of products. Natural disaster mitigation also becomes a high priority when GDP rises, hence an increase in trade in EGs in this category. As was explained above, even amongst developing countries the preference for environmentally-preferable products rises as incomes rise.

Trade in management of solid and hazardous wastes, clean up and remediation, renewable energy products and natural resource-based products show a significant negative correlation with GDP. While the generation of waste increases significantly with GDP, middle-income countries have been proactive in developing their own waste management systems. Import of equipment for these categories has been generally low, except in a few South and East Asian countries. India for example has relied mostly on indigenous solar and wind turbines, as have a number of other developing countries. The increase in GDP provides them with resources to generate their own plants, often with high levels of foreign direct investment (FDI).

The most important justification for liberalising trade in EGs is an improvement in the environmental performance of developing countries. The correlation between the relevant EPI and trade is significant, at the one percent level, for three categories of EGs: products related to (i) clean-up and remediation of soil and water (ii) renewable energy and (iii) heat and energy management. These products account for about 40 tariff lines out of the '153' list. This high correlation could therefore be interpreted to imply that goods in these categories are probably being put to some environmental end use.

A robust correlation is shown with respect to FDI. As FDI increases, trade in air pollution control, management of solid and hazardous waste and recycling systems, clean up or remediation of soil and water, renewable energy plants, natural risk management, and noise and vibration abatement equipment covered by the WTO list, increases. The high correlation can be explained by the fact that most of these products have dual uses. Another explanation could be that higher levels of FDI are associated with better environmental practices which necessitate the import of a wide range of environmental goods. A further reason could be that the delivery of environmental services, especially in these categories of services, necessitates the import of these EGs. However, as the variable used is overall FDI, rather than FDI in specific categories of EGs, the most likely explanation is the first one. A counter intuitive result is seen in the category of EPPs, where the lower the FDI,

the higher the trade in EPPs. This result can be explained by the fact that the top EPP exporters are low income Asian and African countries which have not attracted significant levels of FDI.

The most direct, significant and positive correlation is to be found with respect to technical assistance projects. This correlation is found to be robust and positive for eight of the ten categories of EGs namely (i) management of solid and hazardous waste and recycling systems (ii) heat and energy management (iii) waste-water management and potable water treatment (iv) natural risk management (v) natural resources protection (vi) noise and vibration abatement (vii) air pollution control and (viii) renewable energy plants. Elasticities in most cases are also very high (significantly over one) indicating the crucial role of technical assistance projects in explaining trade in EGs. The profile of these projects indicates that tied aid may be important in explaining trade in EGs to developing countries. The lack of trade with low income African countries is also explained by the fact that there are very few projects between developed countries and African countries. Increasing EG trade with Africa would therefore require the development of such projects.

An analysis of factors influencing the import of EGs shows that while lowering tariffs may increase imports, several other factors may play a more decisive role. In the trade context, supporting policies which improve the general competitiveness of exports are also likely to improve trade in EGs. It is however not clear whether developing countries would necessarily benefit, either in environmental or in trade terms, if environmental goods were to be put on a faster track for liberalisation.

However, dynamic comparative advantage appears to be shifting in favour of developing countries for a number of categories of goods identified in the '153' list. With a shifting dynamic comparative advantage, at least in the medium to long term, developing countries are likely to benefit from tariff liberalisation. Nevertheless, as developed countries already have low tariffs, developing countries may find it more beneficial to focus on non-tariff barriers. With a growing comparative advantage it will be in developing countries' interests to examine the role that non-tariff barriers are likely to play in their export markets.

The fact that only a handful of developing countries feature in the top ten importers and exporters of EGs also suggests that these players could usefully engage in a 'request –offer' approach to ensure trade wins. In this way, while the benefits may be multilateralised, the cost of liberalisation will have to be borne only by a few players. These would be the very players who have a lot more to gain through liberalisation.

The link between trade in EG and environmental services (ES) has been widely acclaimed. However, whether this link is important or not, for negotiation purposes, it is important to pursue liberalisation in EGs and ESs separately. The presence or absence of the link should not be used to slow down liberalisation in either of the sectors.

Liberalisation of ES, particularly in public utilities, needs to be further evaluated. Experience with privatisation has been mixed. In many cases the delivery of public services has not improved with privatisation and has exacerbated social exclusion. The role of the state as regulator has changed in recent decades. There is still extensive work to be done on how to develop regulatory functions that are effective and deciding what is the most appropriate level of delivery.

These caveats do not imply that trade liberalisation in ES should be restricted, but rather that liberalisation will not deliver the expected benefit unless the supportive infrastructure in terms of regulation and community participatory structures, among others, are in place. The supportive

infrastructure would be equally important for absorbing and disseminating environmentally-sound technologies.

Another area of ES which has been little explored is that of outsourcing environmental consultancy services. The comparative advantage of developing countries in this area needs to be carefully examined. Such an examination was however outside the scope of this paper.

INTRODUCTION

The growing importance of environmental issues has generated a parallel interest in evaluating the opportunity for trade in environmental goods and services (EGS). Policymakers, business analysts and corporate planners are interested in the opportunities and constraints introduced by environmental regulations and conventions on trade opportunities. For example, the Montreal Protocol for controlling ozone-depletion opened a market for ozone-friendly products, while at the same time it closed markets for products containing or using chlorofluorocarbons (CFCs).

A more recent example of market drivers is the Kyoto Protocol. The Kyoto Protocol aims to reduce greenhouse gas emissions that contribute to climate change. Potential government legislation, economic policy instruments (such as taxes and tradable permits) and other market drivers will have a significant impact on the production and sale of environmental technologies, especially climate-related technologies. At the same time high growth countries which depend on inexpensive carbon-emitting sources of energy may have to resort to more expensive forms of energy. Another important part of the Kyoto Protocol is the use of technology transfer to other countries as a tool to reduce greenhouse gas emissions. The corresponding measures that increase market access opportunities will also stimulate technology transfer between countries.

Sustainable development strategies worldwide further contribute to the overall growth of the global environment industry which is currently estimated at over USD 650 billion (EBI 2005). However, trade in EGS is estimated to be only a tenth of that amount (EBI 2005). A growing number of businesses around the world are incorporating environmental considerations into their corporate planning and decision-making processes. For example, 64 percent of companies in Canada in the primary, manufacturing and utility sectors are using the ISO 14000 series to bring environmental and economic benefits (waste minimisation, energy savings, etc.) and at the same time to offset the costs of reducing environmental impacts (Statistics Canada 2006). Together, such environmental initiatives and corporate environmental strategies serve as market signals that affect the demand and supply of EGS, both domestically and internationally.

The Millennium Development Goals (MDGs) have outlined the importance of environmental considerations in several aspects of development, such as water, sanitation, urbanisation and its associated waste disposal. Rural urban migration also puts a strain on infrastructure which often leads to environmental degradation. While key industries in developed economies are moving towards lessening their environmental footprint by becoming more input efficient (i.e. reducing their resource consumption), many industries in developing economies need to reduce their dependence on exports of primary products and turn to more input-efficient and environmentally-sustainable products. Liberalising trade in EGS may therefore, in theory, assist developing economies to build their economies along more environmentally-sustainable lines. Continued growth in the EGS sectors that provides economic benefits to the trading partners, both for developed and developing countries, depends on the existence not only of policy conditions that allow freer trade in these goods and services, but also on a viable domestic consumer market for such goods and services.

While the justification for developing an EGS industry to cater to domestic environmental needs is straightforward, this justification does not translate as easily to trade in EGS. This is especially true for trade between countries with different environmental problems and those that are at different stages of development, as in the case of developing countries. As most of the EGS industry is located in developed countries, it would be reasonable to assume that exports of EGS would flow from developed to developing countries. Trade analysis would help understand how much is being imported by developing countries, where these imports are coming from and whether imports bridge a gap in

domestic production. To the extent that imports continue to grow, they could be said to meet a domestic production gap. Another important question that needs to be answered is whether international trade mirrors the changing profile of EGS in domestic markets, or does it follow a completely divergent trend in developing countries from that in developed countries?

The opportunities arising from the growing market for EGS will obviously not be spread evenly across countries. It is by no means clear whether developing countries will gain or will have to bear the pain of the negotiations on EGS. The products listed in the WTO JOB(07) 54 (WTO 2007a) can be a useful starting point. Two important issues arise in this context: (i) whether the import of goods to be covered by this list which may be the basis for negotiations, will help alleviate some of the pressing environmental problems of developing countries (ii) whether developing countries can compete successfully in these markets, at least in the medium term. An added issue is whether the losses (in terms of trade or government revenues from import tariffs), if any, from negotiations on EGS in developing countries can be offset by market opportunities gathered elsewhere in the Doha Round of negotiations.

To address these questions the paper has been divided into six analytical chapters. Before examining the main propositions of the paper, i.e environmental priorities and political economy of EGS trade, Chapter I lists the main definitions of EGS. Chapter II tries to link the major environmental problems of developing countries with the list of EGs and ES being discussed in the WTO. This chapter also correlates UNEP's Fourth Global Environmental Outlook (GEO 4) analysis with the pilot project on Environmental Performance Index (EPI) developed by the Center for Environmental Law and Policy at Yale University and the Center for International Earth Science Information Network (CIESIN) at Columbia University (see Box 2). Chapter III examines the trends in trade of EGs especially in developing countries. Chapter IV analyses the factors which drive imports of EGs into developing countries, particularly focusing on whether tariffs are an important factor behind this trade. Finally, Chapter V draws some conclusions from the analysis of the preceding chapters for the negotiations on EGs.

I. WHAT CONSTITUTES AN ENVIRONMENTAL GOOD OR SERVICE?

There is no agreed definition for EGS. This is complicated by the fact that many environmental problems around the world are local, which affects the views in different parts of the world on the coverage of EGS. A key problem in defining EGS arises from the fact that HS (harmonisation system) codes used to classify traded products do not capture the multiple uses, including environmental usage, of particular products. Similarly, classification of services has proved difficult as each service that is traded may have a number of environmental and non-environmental usages. Environmental services may be considered too broad by some and too restrictive by others. Environmental goods and services have thus developed by trial and error, more for utilitarian trade reasons rather than associated environmental benefits. Thus definitions of EGS have evolved on a first come first serve basis with the earlier definitions propounded by the OECD (Organisation for Economic Co-operation and Development) gaining larger acceptance.

One of the earliest definitions of EGS was developed by a joint group of OECD and Eurostat experts in the 1990s:

"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."

When the OECD drew up a list of environmental goods for the purposes of studying trade and trade barriers, it classified them into four categories: pollution management, cleaner technologies and products, resource management and environmentally-preferable products. Environmental services do not constitute a distinct set of similar business activities. They can range from those involving sophisticated knowledge and technology to relatively simple solutions. Compare oil-spill remediation to air pollution measurement and control, or treatment and collection of hazardous waste with that of household refuse.

Box 1. OECD Classification of Environmental Goods and Services

The **pollution management** group includes goods that help control air pollution; manage wastewater and solid waste; clean up soil, surface water and groundwater; reduce noise and vibrations; and facilitate environmental monitoring, analysis and assessment.

Cleaner technologies and products are goods that are intrinsically cleaner or more resource-efficient than available alternatives. For example, a wind mill is fundamentally cleaner than a coal-fired one.

Goods under the category of resource management are used to control indoor pollution, supply water, or to help manage farms, forests or fisheries sustainably. This group also includes goods used to conserve energy (such as rechargeable batteries), and goods that help prevent or reduce the environmental impacts of natural disasters, such as seismic shields.

The United Nations Conference on Trade and Development (UNCTAD) defines **environmentally preferable products** as "products that cause significantly less environmental harm at some stage of their life cycle than alternative products that serve the same purpose". Examples include jute rather than plastic or paper bags.

Source: OECD (1998) and UNCTAD (2003a)

Discussions on definitions of environmental goods and services have been carried out separately, although in the real world goods and services are often inseparable. Quantifying the various components of the environmental industry as a whole, it has been estimated that environmental services constitute two thirds of the industry, whereas environmental goods only amount to one third (OECD 1998).

Around 40 percent of the whole market is related to water management (26 percent of the environmental services market is related to water distribution and purification, while 14 percent is for sewage water treatment), 22.6 percent is related to waste management, 6 percent to consulting services and environmental engineering, 3.5 percent to remediation, and the remaining 28 percent to various activities, including air pollution (Majluf 2006). Developed countries account for 85 percent of the environmental services market, with the United States of America (US) representing half. Within developed countries, the market has declined and is saturated.

1.1 Definition of Environmental Goods

While a general definition of environmental goods for analytical or statistical purposes would involve several conceptual issues and ambiguities, the definition of environmental goods by any individual country for the purpose of trade is more closely linked with its specific environmental problems and policies. Many environmental goods are intermediate products – such as chemicals, filters, pumps, valves, turbines, chemicals, metres, lasers, spectrometers, etc. – that have multiple end-uses.

A detailed analysis, based on work undertaken by the Tata Energy Research Institute (TERI), and recently published by the Government of India (GoI 2003, quoted in UNCTAD 2003a), emphasises that there are multiple end-uses for most EGS. For example, the GoI report finds that conveyers (HS 842833) are not used exclusively for solid waste management, but rather, more generally, they have end uses in a wide range of industrial applications. On the other hand, the environmental benefits of some goods are not affected by multiple uses, for example, silencers and exhaust pipes for motor vehicles (HS 870892) and fluorescent lamps (HS 853931) provide the respective benefits of noise reduction and reduced energy consumption whenever they are used (UNCTAD 2003a, Para 14).

Key conceptual issues in the context of EGS include:

- Whether products with dual and multiple end-uses should be classified as "environmental goods";
- How goods should be captured by the harmonised system; and
- How goods and services which respond to local concerns could be classified as EGS in the international trade context (Stillwell 2007).

Three approaches have been proposed to classify EGs in the WTO negotiations. The first is called the list approach which lists EGs identified by WTO Members. This approach basically consists in designating a defined number of products with their HS codes as EGs. The justification for including them for environmental reasons has been debated at the WTO.

Early proposals based on the list approach include the establishment of a "core" and a "complementary" list of EGs (WTO 2003). The core list would include products for which there was consensus on their designation as environmental goods. The complementary list would include products for which a definitive consensus could not be reached, but for which there was a high degree of acknowledgment that they were significant for environmental protection, pollution prevention or remediation and sustainability.

Another proposal includes the creation of two environmental goods lists, a "common" and a "development" list. The common list would include products for which there was a consensus that they constitute environmental goods, with

priority given to products of export interest to developing and least-developed countries (LDCs). The development list would include products selected from the core list by developing countries for special and differential treatment (WTO 2004a).

An alternative "environmental project approach" has been suggested to take the negotiations forward (WTO 2005b). Under this approach, Members would identify the environmental goods and services they want to liberalise for direct inclusion in environmental projects identified by a "designated national authority". The projects could be aimed at meeting national environmental objectives as well as objectives of any bilateral or multilateral environmental agreement. The criteria for "environmental projects" would be agreed upon by the WTO Members with due consideration to the policy space of national governments.

Another suggestion is that of a revised "integrated approach" under which WTO Members would identify and agree on environmental activities (e.g. air pollution control, water and waste water management, and so on) and then identify a list of public and private entities that carry out these activities (WTO 2007b). These lists would be negotiated and notified to the WTO, and all goods imported by the notified entities for use in the agreed activities would be granted preferential tariff treatment, as agreed by WTO Members.

Yet another approach suggested by Brazil is a "request-offer" process that would reflect the procedure followed in previous GATT/WTO negotiations, under which countries would request specific liberalisation commitments from each other, and then extend tariff cuts they deemed appropriate to all WTO Members.

Other developing country Members have suggested that only single end-use products should be classified as EGs, as multiple end-use products raise a range of questions relating to customs identification and non-environmental uses. It seems clear that single end-use products offer potential for a high degree of convergence among Members as candidates for inclusion in the negotiation's product coverage.

Although it might be possible to proceed with negotiations without a formally agreed definition of "environmental goods", it would be difficult to decide which products will be on the list and which will be excluded. How will Members be able to credibly include specific products on the list in the face of questions by other Members who may doubt the environmental credentials of the product? (WTO 2005a).

Conceptually it has proved difficult to tackle this point and thus suggestions for using reference points, e.g. those proposed by OECD, APEC (Asia-Pacific Economic Cooperation) or bilateral agreements, have been proposed. This may be a useful starting point, but is not persuasive in terms of environmental justification, nor is the rationale clear for classifying such goods as environmental goods for the purposes of more broad-based WTO negotiations (WTO 2005a).

1.2 Definition of Environmental Services

There is no universally-adopted, technical or legal definition or classification for environmental services. The current classification within international organisations, such as the WTO and the OECD, is regarded as outdated by many Members and experts (UNCTAD 2003a).

At the WTO, environmental services were initially grouped into only four categories: sewage services, refuse disposal, sanitation and similar services, and "others". Over the last 15 years, many WTO Members have emphasised that the classification of environmental services should better reflect how the industry operates. Growing public sensitivity to environmental problems, more stringent regulations, and trends towards privatising and liberalising services markets have stimulated a wide range of specialised environmental services. Accordingly, more and more OECD countries are including additional categories in negotiations under the General Agreement on Trade in Services

(GATS) at the WTO. These include nature and landscape protection, air pollution control, and remediation and clean-up of soil, surface water and groundwater.

It has been suggested that the environmental services classification may be divided into "core" (basic) and "related" services for the purposes of the negotiations pursuant to the Doha mandate. The environmental services (pollution control and waste management) contained in W/120 would be the "core" environmental services (they are a sub-set of the first category in the OECD/Eurostat classification: pollution management group). At the same time, the cleaner technologies and resource management group activities under the OECD/Eurostat classification may fall into the "other" category in W/120, which is yet to be precisely defined (see Majluf 2006). Some of the OECD/Eurostat categories could also fall within other GATS sectors such as business, construction and engineering services, or education services. These constitute the "related" services that some WTO Members have advocated (UNEP-UNCTAD CBTF 2005, Para 18).

The wider OECD/Eurostat classification of environmental services has received support mainly from the US, the European Union (EU), Canada and Japan. Both the EU and the US are of the view that the GATS W/120 classification is too narrow and does not reflect the current structure and state of the industry as they see it. Given their competitive advantage in the area of environmental services, they have a particular interest in a broader classification. Developing countries have not been so forthcoming about their views on the definition of environmental services.

Drawing on the OECD classification, the US includes in the class of environmental services: "*pollution control, reduction, clean-up and waste handling services, and a growing range of other environmental services.*" Without the specific link to genuine environmental outcomes, the danger arises that market access is provided for goods or services characterised as environmental when they have no clear environmental benefit. An example may be where both environmental goods and environmental services are delivered as an integrated package. For example, a firm may provide and install waste management and recycling systems, and provide the waste management services used in waste handling and facility operations. Contained within the package could be products either with dual or multiple uses – both environmental and non-environmental – or alternatively with no clear environmental benefit. Definitions and classifications would need to cover the eventuality that such products on their own may not necessarily have environmental uses, although they may be camouflaged as environmental if they are included in a package of environmental services.

As a classification of sectors, "environmental services" is already in use within the GATS framework. However, the current classification seems to be based more on sectors that are related in some way to the environment rather than sectors where liberalisation will result in environmental improvement. For example, opening up water distribution services by privatising water utilities and allowing foreign direct investment in this sector may not necessarily result in the achievement of economic, environmental or public consumer benefits (Sawhney 2006, pp. 32-33). Public water utilities and small to medium-sized domestic private water utilities may often seem and prove to be the only viable providers of potable water services to the poorer populations of Asia (Sawhney 2006, pp. 38-39). If the negotiations are to deliver on the environment "win", the definition of "environmental services" needs revisiting to ensure that these negotiations do not include service sectors where liberalisation has the potential to encourage environmental damage. There is huge potential for controversy if sectors such as water and energy provision are labelled as being inherently environmentally sound.

Then there is the complex issue of ecosystem services which is of great interest to developing countries. While most ecosystem services are not traded in markets, there are three important exceptions: the organic food industry (annual exports of USD 100 billion), the eco-tourism industry (USD 25 billion in 2003) and the growing market in carbon emission reductions and sequestration

services (USD 6 billion in 2005) (Mainka *et al* 2005). Physical accounting studies suggest that developed countries are a substantial and (at least for some material groups) increasing net importer of natural resources from developing countries, although such trade might account for only a small fraction of world trade from a monetary perspective (Giljum and Eisenmenger 2004). These services have not been classified in the WTO.

Notwithstanding these controversies on the definitions of EGS, the aim of this paper is not to debate these definitions, something which has been done exhaustively elsewhere, but rather to take as given the list being exchanged in WTO on EGs. Thus the starting point for this paper is the list of 153 products identified for trade and negotiation in the WTO (see WTO 2007a for the list of products). The purpose of this paper is to identify whether this list can deliver both environmental and trade wins to developing countries.

Similarly the analysis on environmental services will be based on what is currently traded in the existing classification, its links with goods and how they would link with environmental priorities of developing countries.

II. ENVIRONMENTAL PROBLEMS IN DEVELOPING COUNTRIES

The objective of this section is to discuss key environmental problems faced by developing countries. This section will identify and use major countries in Africa, Asia and Latin America as examples wherever possible. The main source of information is the recent UNEP Fourth Global Environmental Outlook (GEO-4, UNEP 2007). Finally this section will assess whether trade flows in the list of environmental products proposed by JOB(07) 54 (WTO 2007a) originates or terminates in countries in the regions identified below, including in "environmental hotspots". This will help illustrate whether current trade in EGS is suitable to address the environmental problems in developing countries, as identified by GEO-4.

2.1 State of the Environment in Developing Countries: An Assessment of Major Problems

The GEO-4 has identified major environmental problems and the contributing driving forces at the source of these problems. These priority environmental issues range from land degradation with associated soil erosion, acidification and desertification, to deforestation, atmospheric and water-pollution, and loss of habitat and biodiversity. The potential impact of climate change has also been underscored for all countries, including developed countries.

Environmental problems are linked to driving forces such as population growth (including recent upward trends in urban and suburban populations), the rise in average per capita consumption, and economic growth and progress.

A world population estimated at 6.5 billion with a 2 billion overall increase since 1980 (GeoHive 2006) combined with rising incomes, has led to significant increases in food production in order to keep up with rising demand. As noted by the 1987 Brundtland Commission, the relationship between population growth and environmental degradation is not linear; other elements such as unequal access to resources and unsustainable use of these resources by more developed countries have had a negative trickle down effect on developing countries and regions of the world. A case in point is North America consuming 25 percent of global primary energy while only representing 5.2 percent of the world's population (UNEP 2002b).

A serious attempt to quantify the environmental performance of countries has been made by a consortium including, notably, Yale University, Columbia University, the World Economic Forum and the Joint Research Centre of the European Union. The ranking of countries with the lowest environmental performance indices (EPI) and the reasons advanced are more or less in agreement with those of the GEO 4. For the most part, the countries with the lowest EPI are either densely-populated industrialising countries with stressed ecosystems (Bangladesh, India and Pakistan), arid states with limited natural resources (Mauritania, Mali and Yemen), or LDCs (Ethiopia, Chad and Niger). In every case, the countries with low EPI scores have under-invested in environmental infrastructure (drinking water and sanitation systems) and lack the capacity for aggressive pollution control or systematic natural resource management. The methodology used to construct this index is shown in Box 2 below.

Box 2. Pilot 2006 Environmental Performance Index

The quantitative metrics of the EPI encompass 16 indicators or datasets. For each indicator, a relevant long-term public health or ecosystem sustainability goal is identified on the basis of international agreements, standards set by international organisations, national authorities or prevailing consensus among environmental scientists. The targets do not vary by country. Rather, they serve as absolute benchmarks for long-term environmental sustainability.

For each country and each indicator, a proximity-to-target value is calculated. Using the 16 indicators, the environmental health and ecosystem vitality performance is evaluated at three levels of aggregation.

First, scores are given to countries building on two to five underlying indicators, within six core policy categories – environmental health, air quality, water resources, biodiversity and habitat, productive natural resources and sustainable energy. This level of aggregation permits countries to track their relative performance within these well-established policy lines.

Second, scores are given within the two broad objectives: environmental health and ecosystem vitality. The five policy category scores are linked to this second objective.

Finally, an overall Environmental Performance Index, which is the average of the two broad objective scores, is calculated.

(Developed by the Yale Center for Environmental Law and Policy, Yale University; Center for International Earth Science Information Network (CIESIN), Columbia University; in collaboration with the World Economic Forum, Geneva, Switzerland and the Joint Research Centre of the European Commission, Ispra, Italy.)

2.2 Africa

Land degradation is a major issue in Africa. In 1993, sixty-three percent of agricultural land was degraded, which included 320 million hectares of Africa's drylands (UNEP 2002a). Land degradation has negative impacts on people's livelihoods and well-being as well as on a country's economy. A case in point is Ethiopia where USD 130 million is estimated to have been lost because of reduced agricultural productivity (TerrAfrica 2004). Land degradation includes soil erosion, salinisation and contamination of soil, and soil nutrient depletion. It is to be noted that the EPI for Ethiopia is one of the lowest in the list.

Soil erosion is a widespread phenomenon and is associated with reduction of soil productivity. Per capita land productivity in East and Central Africa ranges from 0.69 hectares in the Democratic Republic of the Congo to 2.06 hectares in Gabon (UNEP 2006a). Overall, these are low productivity numbers which negatively impact both people and the environment.

Salinisation also represents an important environmental problem in the region which can be traced back to the inefficient application of irrigation. According to a 2002 FAO estimate, around 14.8 million hectares of Africa's total land area is affected by salinisation. For example, in Egypt alone one million hectares of arable land are affected by salinisation (Goossens *et al* 1993).

Desertification is perhaps the single most important environmental threat to the region's land productivity. Desertification touches 46 percent of the region (UNEP 2002a). The Sahel is a region particularly at risk with a band of around 350 million hectares of semi-arid land. Countries such as Eritrea and Botswana consist entirely of drylands (Gonzales 2002). The problem extends from Mediterranean Africa to the Sahel (FAO 2002).

In constituting the EPI for this group, desert countries are grouped together (called "peer

grouping") keeping in mind the unique ecological challenges these countries face. In the overall ranking of countries among the ten poorest performers, three, i.e Mauritania, Niger and Angola are from this region.

Looking at the list of environmental goods in the WTO (WTO 2007a), it is clear that Africa is not a major importer of products from the list which could help reduce desertification or prevent soil erosion. In fact none of the services covered include prevention of erosion or combating desertification. Large projects particularly on integrated crop and land management are required. Products from such initiatives, for example organic food, could qualify as environmentally-preferable products (EPPs) and could be traded. However, these African countries do not figure prominently in the list of either exporters (for some countries, such as Uganda, organic products are important and represent a significant share of their total exports from some categories of food products, such as coffee) or importers of EPPs. Trading in EPPs would require some form of certification which can be expensive and difficult. There are some EPPs which are inherently environment-friendly, such as jute, and other natural products, which may not require certification. From the above analysis it appears that the environmental hotspots or the poor EPI performers are not significant, or in some cases represent only small traders in the EGs identified in the WTO list.

2.3 Asia and the Pacific

The Asia and Pacific region comprises 43 countries and has a total population of 3,925 million people, which represents 60 percent of the world population (Geohive 2006). These 43 countries are all at various stages of political and economic development.

Urban Air Pollution

Overall, the Asia and Pacific region is facing an ever-growing need for energy. Indeed, the region is responsible for 34 percent of total energy consumption. It has seen an increase in energy use of more than 190 percent over the period 1987-2002 compared to a global average of 130 percent. This number is set to increase in the coming years (Geohive 2006). The growing demand for energy and the use of different fuel types have caused serious air pollution. Associated with this increase in energy consumption is the rise in carbon emissions. According to UNFCCC sources (2005), the Asia and Pacific region has seen an increase in its CO_2 emissions from 32 percent of global CO_2 in 1992 to 36 percent in 2002; North and East Asia contribute 63 percent of the region's emissions. On the other hand, Central Asia has recorded a substantial decrease (24 percent) in its global CO_2 emissions, from 426 million metric tonnes in 1992 to 312.2 metric tonnes in 2002.

Air pollutants, notably in urban areas, are a serious problem in the region; South Asian cities for instance, have the highest levels of air pollution worldwide, with very high levels of particulate matters PM_{10} (World Bank 2003). Air pollution has negative impacts on health and human well-being, including premature death which is estimated to affect 500,000 people every year in the region (Ezzati *et al* 2004a; Ezzati *et al* 2004b; Cohen *et al* 2005).

Climate Change

The small island states of the South Pacific are extremely vulnerable to sea- level rise and global climate change. In addition, countries such as Thailand, India, Myanmar and China are exposed to coastal flooding and erosion due to sea-level rise and meteorological changes.

Access to Adequate Water Quality and Supply

Adequate water supply is one of the most serious problems in the region. For instance, the South Pacific sub-region, together with Central Africa, has the lowest per capita fresh water availability in the world. The Asia and Pacific region contains 32 percent of the world's freshwater resources but has to deal with 58 percent of the world's population (Shiklomanov 2004).

Water quality is another problem affecting the region, an increase in discharge of chemicals in coastal waters and rivers has contributed to a decline in human health. For instance, high concentrations of arsenic and fluoride have been found in more than 7000 wells in West Bengal (CBCP 1996; Kumar 2000). Water-borne diseases, including diarrhoea, kill 500,000 children each year (Kennett and Steenblick 2006; OECD 2006).

Threatened Ecosystems

Fifty percent of mangrove forests are still housed in Asia and the Pacific. However, the mangroves have been extensively destroyed in the past years with the most significant destruction taking place in Southeast Asia (FAO 2003; FAOSTAT 2005; UNESCAP 2005a).

Many coral reefs are either threatened or totally destroyed, including severe bleaching due to higher sea-surface temperature. Around 60 percent of Asia and the Pacific's coral reefs are said to be at risk (UNESCAP 2005a).

Central Asia has seen a serious degradation of its natural habitat with biodiversity and inland ecosystems increasingly threatened (Wilkinson 2004).

Land Degradation

In almost all of the Asia and Pacific sub-regions, land is degrading (IFAD and GEF 2002; ADB and GEF 2005; UNCCD 2001; Scherr and Yadav 2001). Land degradation has negative and severe implications on people's livelihood and on their well-being more generally.

A Growing Problem: Electronic Waste (e-waste)

As countries in the Asia and Pacific regions are rapidly developing, a wide range of advanced and cheaper technological goods has been made available, creating an incentive for people to buy new products rather than upgrade old ones. This in turn has resulted in a 3–5 percent increase in e-waste in the region. Countries such as India, China and Bangladesh, are the disposal markets for more than 90 percent of the 50 million tonnes of e-waste generated every year worldwide (Brigden *et al* 2005; UNEP 2005.).

Air quality scores for several Asian countries are among the lowest in the world, with large economies such as China having the lowest scores. Water quality is relatively better with middling level scores for Asian countries. Biodiversity and habitat scores are also average, except for a few countries, such as Pakistan and Bangladesh which have low scores. Overall environmental scores are also average for most Asian countries.

Unlike Africa, at least some of the products being traded or in the negotiating list concerning air pollution and solid waste management, are directly linked to the environmental problems of this region. In addition, middle income Asian countries are emerging as large traders in air pollution equipment and in water and waste management products. Water cleaning and waste management services may also be of use. However, the basic issues surrounding population pressures and excessive urbanisation cannot be addressed through trade in EGS. Better land and water management requires essentially indigenous solutions which are aligned with the topology, resources and climate of the region. This region has also been a user of environmental consultancy services, particularly of impact assessment studies. Several environmental technical assistance projects have also increased trade in EGS.

2.4 Latin America and the Caribbean

What are the main Environmental problems?

The Latin America and Caribbean (LAC) region comprises 32 countries and is home to 561.4 million people, representing 8.8 percent of the world's population. Some of the main environmental challenges faced by the region are unplanned urbanisation, coastal degradation and marine

pollution, deforestation and loss of biodiversity, and vulnerability to climate change.

The Threat of High and Growing Urbanisation on the Environment

The LAC region is the most urbanised in the developing world. Indeed, 77.4 percent of the total population in the region is urban (UNPD 2003). For instance, in countries such as Argentina, Uruguay and Puerto Rico, 90 percent of the total population is urban.

Population concentration (notably of the poor) in mega-cities, such as Mexico, Sao Paolo and Buenos Aires, has contributed to increased and centralised consumption and production that have impacted negatively on forests, biodiversity, soil, air and water.

Water contamination and access to fresh drinking water is a problem for more than 80 million LAC inhabitants (FAO-AQUASTAT 2006; ECLAC 2005). Although provision of water sanitation services went up from 69 percent in 1990 to 75 percent in 2002, over 100 million people in LAC still do not have access to water sanitation and only 14 percent of sewage is adequately and effectively treated (FAO-AQUASTAT 2006; ECLAC 2005).

In the past 30 years, solid waste has more than doubled and was at 0.92 kg per person per day in 1997. Composition of solid waste changed from organic to non-biodegradable (Acurio *et al* 1997). More than 40 percent of total waste in the region is not disposed of and contributes to land and water pollution.

Urban air pollution although better controlled, is still a problem in mega-cities such as Sao Paolo and Mexico City (Molina and Molina 2002), notably with regard to ozone, particulates and sulphur. The health of poor people in the region is greatly affected by indoor air pollution caused mainly by the use of biomass for cooking and heating.

Impact on Biodiversity and Ecosystems

The LAC region is known for its high biological diversity. A case in point is the Amazon which contains around 50 percent of the world's biodiversity (ECLAC 2002). Of 178 ecoregions classified by the World Wide Fund for Nature (WWF) in Latin America (Dinerstein *et al* 1995; Olson *et al* 2001), it is estimated that only eight of those ecoregions remain intact, with 31, 51, and 55 ecoregions considered to be greatly endangered, endangered and vulnerable, respectively.

Habitat loss threatens both plants and vertebrates in hotspots located in the tropical Andes and Meso-America, including countries such as Panama and Colombia (UNEP 2004a).

Loss of forest cover (the LAC region houses 23.4 percent of the world's forest cover) is becoming a serious problem in the region. It is estimated that out of the total forest loss that occurred worldwide between the years 2000-2005, over 66 percent happened in the LAC region, particularly in South America which suffered a net loss of 4.3 million hectares of forest per year (UNEP 2004a).

Forests have been converted and replaced by land pastures for livestock exports, intensive monocultures such as corn, wheat, rice and soya, roads, large dam projects, wood harvesting and timber production (UNEP 2004a). Deforestation often reduces water quality and quantity, and results in soil erosion and sedimentation (McNeill 2000). Land-use change linked to deforestation is responsible for approximately 48.3 percent of total carbon emissions in the region (UNEP 2007, Chapter 2).

Around 15.7 percent of the land in the region is degraded, with Meso-America being most affected. Erosion is the main cause of land degradation, which, combined with agricultural production, causes nutrient depletion (UNEP 2004a). Nutrient loss affects an estimated 68.2 million hectares in the whole of South America (ECLAC 2002). Salinisation of agricultural soil is significant in countries such as Argentina, Mexico, Peru and Cuba (UNEP 2004a).

Coastal Degradation and Marine Pollution

According to a 1996 estimate, 50 percent of the coastline in South America and 29 percent

in Central and North America are under threat. There is significant loss of mangroves ranging from 67.5 percent in Mexico to 24.5 percent in Peru (Burke *et al* 2001).

Seventy percent of Caribbean beaches are eroded and 61 percent of coral reefs are under medium to high threat from sediment, marine and land-based pollution. Coastal groundwater contamination and depletion is occurring throughout the region and is causing economic losses (UNEP 2004a). Eighty-six percent of untreated sewage goes into the oceans and rivers.

Vulnerability to Climate Change

Findings from the Intergovernmental Panel on Climate Change (IPCC) show that warming could affect the LAC region in the form of sea rise, increased risk of droughts and more likely occurrence of natural disasters such as hurricanes and floods (IPCC 2001).

Poor people living in vulnerable sites are exposed to flooding and landslides. Glacier loss from the Andes region and intrusion of salt water from sea rise will affect the availability of freshwater for consumption, agriculture and tourism.

Latin American countries with relatively intact natural resource systems according to the EPI are facing growing resource pressures. These countries have poor air quality and mid-range scores on other measures.

Like Asia, this region is a significant user of air pollution, water management and solid waste cleaning technologies and services. However a number of serious environmental problems such as biodiversity loss and unplanned urbanisation are not addressed by the current trade in environmental goods and services. In fact, initiatives related to ecosystem services would be of particular use to this region.

2.5 West Asia

What are the Main Environmental Problems?

The region covers thirteen countries (according to the UN Economic and Social Commission for West Asia – ESCWA) stretching from Egypt to Iraq. Each of these countries is at a different stage in its socioeconomic development.

The main environmental problems faced by the region are: water scarcity and quality, land degradation, degradation of marine and coastal ecosystems, and urban management.

Water Scarcity and Quality

Overall per capita freshwater availability in the region fell from 1700 m^3 per year to 903 m^3 per year between the years 1985 and 2005. The decline is projected to reach a low of 420 m^3/ year by 2050 (ESCWA 2003b; UNDP 2006).

Domestic water consumption has increased from 7.8 bcm (billion cubic metres) in 1990 to around 11 bcm in 2000 (a 40 percent increase). Access to clean drinking water and sanitation remains a problem, particularly for the poor. Cities such as Damascus, Sana'a and Amman are examples of places with water shortages for domestic use (Elhadj 2004; ESCWA 2003b).

Land Degradation

Out of a total land area of 4 million km^2, 64 percent are drylands (Al-Kassas 1999). There has been widespread land-use change, land degradation and desertification in the region. At the beginning of the 21st century, 79 percent of the land was degraded (ACSAD/CAMRE/UNEP 2004). Wind and water erosion as well as salinisation are a major threat and have contributed significantly to the degradation of lands in the region.

Twenty-two percent of the region's arable land is affected by increased salinity and alkalinity (ACSAD/CAMRE/UNEP 2004). There has been an upsurge in soil erosion and sand dune encroachment on agricultural land (Al-Dhabi *et al* 1997).

Over the past 20 years the forest area has decreased by 17 percent in places such as Yemen and by as much as 50 percent in the Occupied Palestinian Territory.

There has been a decline in biodiversity due to pressure on forests, woodlands and rangelands.

Degradation of Coastal and Marine Ecosystems

Coastal and marine areas are under serious threat in the region. Oil spills and chemical contamination have put pressure on the marine environment, notably the Mediterranean countries of the region. For instance there are 15 petrochemical complexes and eight refineries that are located along the coast. Contamination of coastal water has also negatively impacted marine species.

Urban Management

Intense urbanisation in West Asia has had negative impacts on the natural environment. There has been a higher demand for water and energy, increased waste and a deterioration in air quality.

The region holds about 52 percent of the world's oil and average per capita CO_2 emissions have increased from 5.84 to 7.38 tonnes between 1987 and 2000, which is above the world average of 3.9 tonnes (UNFCCC 2004).

Despite the phasing out of lead from gasoline and overall lead decrease in most countries in the region, lead concentration, notably in countries such as Lebanon, are considered high by world standards (World Bank 2004).

The EPI for West Asia also shows considerable stress on water-related pollution and air pollution. It also shows poor ratings for the sustainable energy, biodiversity and habitat protection indicators. Thus the EPI correlates with the findings of GEO 4.

Most of the problems in this region cannot be addressed through trade in the current category of goods included in the EGs list. This region requires a series of dedicated projects on issues which are of specific concern in order to address water quality, soil degradation, war-induced soil contamination, soil erosion etc.

This chapter has shown that developing countries face serious environmental challenges, some harder to manage than others. The complexity of environmental problems and various point sources and drivers of these problems have made the enforcement of some environmental regulations difficult. In fact not only are the environmental problems complex, but the achievement of environmental targets as shown by the EPI has also proved difficult for a number of developing countries.

The role of trade in EGS in addressing the environmental problems of developing countries will not be uniform. Countries which are growing more rapidly and generating the same kind of environmental problems that developed countries encountered just a decade or two ago are likely to be active users of EGS. This is because by and large, trade in EGS is in one direction, i.e. developed to developing countries. The current trade in EGS does not address some of the major environmental problems of West Asia and Africa. The fact that Africa which has a number of solid waste and water-related problems is not importing EGS indicates that either: (a) the specified EGS are not related to Africa's problems, (b) they are related but expensive or (c) Africa has not generated technical assistance programmes to obtain them. In the case of Asia and Latin America, current trade in EGS also does not include products and services that could address environmental problems related to excessive urbanisation, population-induced land degradation and waste management.

As recognised at the WSSD (World Summit on Sustainable Development), liberalising trade in EGS can contribute to addressing some environmental problems, but making certain environmental technologies and relevant services available in the market is not sufficient to solve environmental problems. Certain environmental problems, such as air pollution,

can be addressed at least in part, with the help of readily available technologies/services, but this is not necessarily the case for all environmental problems. Trade liberalisation of EGs (whatever the scope of the list of products) should be seen as complementary to existing efforts to address various environmental problems. In other words, changing for instance the scope of EGs to be liberalised can only provide part of the solution to environmental problems. Additionally, the link between environmental problems and the list of EGs to be liberalised cannot be direct.

III. ENVIRONMENTAL GOODS AND SERVICES MARKETS IN DEVELOPED AND DEVELOPING COUNTRIES

Measures of the size of the market depend on who is doing the measurement, and especially what is being counted as an environmental good or service. The various measures put the market between USD 200 billion and over USD 650 billion (EBI 1995; EU 1995; OECD 1998; Statistics Canada 2006). The industry is composed of a few large firms and a number of small firms with, for instance, 117,000 US companies engaged in the business of environmental technologies (US Department of Commerce 1995). The structure of US firms contrasts with that of European and Japanese firms, which are conglomerates that operate in other major markets, including the United States. During the early 1990s only a few US firms were engaged in exporting internationally (Menes 1993).

According to an OECD study, competitive advantage in the EGS industry is based on four factors: technological innovation, quality and service performance, marketing and export strategies, and flexibility in production (OECD 1998). However, scale economies, size and breadth of a firm's abilities, and cost were considered less important (OECD 1996). In the developing world, firm size, breadth of capability (either individually or through joint ventures), experience in negotiating standards on a facility-by-facility basis and cost may be more important (US International Trade Commission 1995).

The EGS industries in the United States, Germany, Japan, and elsewhere compete aggressively in third markets, particularly developing countries. The three largest market players are the United States (with 37 percent of the market), Western Europe (with 30 percent) and Japan (with 18 percent). No other country or region holds more than five percent of the global market. The competition in the EGS market is in effect a three-way race between the three largest market share holders. Some of the countries in Asia have been able to find niche markets and are performing well by way of exports (UK Environmental Intelligence Report 2007).

In 1995, developing and emerging economies represented less than 10 percent of the overall environment market. The UK Joint Environmental Markets Unit has estimated that by 2010, developing countries will see an annual growth rate of their environment sector of 10 percent, translating into an overall figure of USD 178 billion. On the other hand, it is predicted that developed countries will only increase their respective market potential rates by 3–5 percent but their market potential will continue to be much higher, valued at USD 773 billion. The market share of developing countries in EGS is therefore likely to be 20 percent by the year 2010.

3.1 Growth Factors

Bilateral and regional free trade agreements have increased demand for environmental services between all parties concerned and are rated as an essential market-shaping force. The pressure for changes in environmental legislation and regulations brought about by consumers on a global basis (ISO 14000 standards for instance), is another factor driving the environmental services' industry.

In the context of the EU, new entrants have had to adopt suitable measures aimed at aligning their respective national legislation to EU standards. This requirement has been turned into an essential and non-negotiable clause to ensure the implementation of the EU free trade agreements with third countries. This clause has generated a large environmental market in the Eastern and Southern European countries, and in other EU trading partners.

Likewise, in Asia during the past 10 years, the private sector has introduced remarkable improvements such as environmental management

systems. This trend is likely to remain in place now that companies have realised that such ecological "credentials" help their export strategies.

Developing countries may be under growing pressure to follow developed countries' lead in environmental regulation. The dynamics of standard-setting activity is aimed at the promotion of the homogenisation of products, processes and environmental management practices between developed and developing countries, particularly in their export sector. Developing countries' markets may also be affected by environmental regulations adopted as a result of technical assistance which favours the donor country's suppliers and their standards. The role of export credit agencies of developed countries in developing a market for EGS in developing countries may also prove important. For example, Ex-Im Bank's environmental exports programme offers up to 15-year repayment terms for US exports of goods and services in most renewable energy sectors and projects related to the supply of water for human use, wastewater treatment and hydroelectric power projects. Other environmentally-beneficial projects and exports are eligible for repayment terms of up to 10 years. Ex-Im Bank also offers local cost coverage and covers interest during construction. These extended terms can significantly improve the economics of environmental export transactions and facilitate more export sales, which in turn benefits US manufacturers and service providers in these industries (Ex-Im Bank 2004).

3.2 Market Potential of Environmental Services

Environmental services, if considered separately from equipment and resources, account for about 50 percent of the total market potential of EGS. The two or three largest segments in environmental services are water and wastewater treatment services and solid waste management services (non-hazardous wastes) which constitute 30 percent and 22 percent of the total global environmental market respectively (Sawhney 2006, pp. 3-4). The growing demand for an overall improvement in environmental management practices may lead to a global annual growth in ES markets of 7–10 percent.

Since the United States generates almost 80 percent of total world volume of hazardous waste and has stringent regulations, it has become the largest market for suitable equipment and systems for treating such waste (Sawhney 2006). The treatment, incineration and processing of chemicals are among the sectors where the highest demand can be expected.

During the past ten years, the annual growth in the recycling market has fluctuated between 7 and 13 percent and there are no indications of a decline or change (Sawhney 2006). There is a growing demand for technologies which involve ultra filtration which allows for a reduction in the use of oil and paint solvents, the cleansing process applied by the microelectronics industry for reducing sediments using vibration equipment, as well as the neutralisation, detoxification and evaporation processes. Among the most important elements for securing a change in environmental quality are the enforcement of environmental preservation legislation and exacting recycling regulations currently enforced in many parts of Europe, the United States and Japan.

In the water and waste water management areas – which represent over 30 percent of the overall environmental market – it is predicted that there will be an increase in demand for automated systems suitable for use at secondary and tertiary treatment utilities and for waste water treatment technologies. Further, the demand for computer-controlled management systems, aerobic kits suitable for the elimination of pollutants and air injection equipment for use with underground water cleaning systems, is also likely to grow.

The sector responsible for controlling air pollution has experienced the most rapid growth in the past 20–30 years. However the total number of international transactions in this segment, which is dominated by a handful of companies, is scant and infrequent. Growth rates expected for the next ten years are likely to be registered in the areas of microbial cleansing, electro membranes,

catalytic converters and in the development of technologies suitable for exhaust gas cleansing (through the removal of combustion sulphurs) as well as wet gas and chimney purifying kits. It is thought that demand will be generated and boosted by the petrochemical, steel-making, power generation and automotive industries (US Department of Commerce 1995).

3.3 Emerging Markets

In China, environmental authorities are experiencing difficulties both in recruiting qualified staff and in the enforcement of environmental standards on manufacturing industry concerns, almost all of which are state-owned. However, with a growing industrialisation drive and a stiffening of environmental protection standards, it is estimated that this market will experience a 10 percent growth. This would imply that the market for EGS would rise from USD 5 billion in 2000 to USD 15 billion by 2010 (UK Environmental Intelligence Report 2007).

In India, despite the early introduction of environmental legislation (early 1990s) the regulatory framework is still weak. As a result, it is thought that the main driving forces in the environmental market should be renewable energy and distribution infrastructure, as well as municipal management. Estimates suggest that environmental services could reach a peak of USD 7 billion by 2010 (UK Environmental Intelligence Report 2007).

3.4 Competitiveness of Environmental Goods and Services

Background data by the OECD suggests that the competitiveness factors for this sector are:

- **Technology Innovation:** it is estimated that 50 percent of total EGS to be used within the next 15 years are yet to be created.
- **Services' Quality and Performance:** this entails the capacity to adapt to the customer's needs and also to produce efficient and user-friendly devices.
- **Marketing and Export Strategies:** such strategies must be adapted to cater for growing globalization and to the surge of new market opportunities.
- **Production Flexibility**: this concept entails a close watch on the changes that are introduced to standards, in order to ensure swift and low-cost changes on products.

In most countries there is a growing trend to adopt environmental standards that are enforced worldwide. In addition, the opening up of most economies to the rest of the world and the privatisation of public services such as water and power utilities, increase the prospects for foreign companies to participate in tenders. A sector consolidation and an expansion in company size will also influence the growth prospects for environmental service suppliers in foreign markets.

3.5 Latin America

Mexico is the single largest market in Latin America, currently at about USD 3 billion and projected to reach USD 3.8 billion in 2008 (US Department of Commerce 1995). The two principal environmental problems in Mexico are air and water pollution. Consequently, the major environmental goods in demand in Mexico include air pollution monitoring equipment, technologies for converting fuels, and air pollution control and abatement systems for stationary pollution sources (scrubbers, bag filtering systems, and nitrous oxide control systems), and modernisation of water treatment plants (TPCC 1994a). Brazil, Venezuela, Chile, Argentina and Colombia together represent a USD 4 billion market in air and water pollution control and abatement systems, technologies and services (TPCC 1994b). The major "demand

drivers" of EGS in Latin America include a commitment to the production of clean fuels, installation of catalytic converters, improved automobile efficiencies, privatisation of regional water companies, municipal and industrial water pollution control equipment and services (US Department of Commerce 1995). These changes were brought about by FDI.

3.6 The European Union Market

The European Union market was estimated at over USD 150 billion in 2005 (US Department of Commerce 1995). The primary demand drivers are the directives issued by the EU with the key sectors being water, air pollution, solid waste and hazardous waste recycling.

3.7 Central and Eastern Europe

The market for Central and Eastern Europe was over USD 18 billion in 2005 (US Department of Commerce 1995). History and economics are the principal factors driving the demand for EGS in this region. Historically, over 45 years of relative neglect of the environment has created a need for an accelerated cleanup programme. On the other hand, these countries face major budget constraints that may shift priorities away from environmental cleanup. The process of democratisation should strengthen the voice of environmental groups and increase the demand for EGS. The critical demand sectors include water pollution control, waste recycling and instruments.

3.8 Middle East and North Africa

Environmental Business International estimated the market size for EGS in the Middle East and North Africa at USD 5 billion, with a 3.8 percent annual growth rate in the year 2000. Political instability, combined with a general lack of environmental awareness, is a major impediment to developing markets in this region. The Commerce Department/ITA (Information Technology Association) cites rising air pollution levels in major Israeli cities as an impetus for greater environmental awareness in that country. Israel is seen as a strong future best prospect, although currently its air pollution control market is worth only USD 20 million. The Turkish market presents good opportunities not only for pollution control equipment sales, but also for design, engineering and contracting services. Major customers are state organisations and infrastructure projects in the tourist zones. The newness of the market masks the potential for its ultimate size. The annual Turkish water and air pollution control market is estimated at USD 225 million, with Germany holding a 50 percent share.

3.9 Asia and the Pacific

Estimates of the size of the EGS market in the Asia and Pacific region reached over USD 32 billion by 2004 (US Department of Commerce 1995). Taiwan Province of China, Hong Kong Special Administrative Region of China and the Republic of Korea are the major markets. There is a strong commitment to improve the environment in these countries as reflected in the open market and procurement policies, a strong regulatory regime, strict enforcement practices and the significant public investment in environmental cleanup (Delphos 1994). Countries within the Association of Southeast Asian Nations, especially Thailand, Indonesia, Malaysia and the Philippines, are also major consumers of EGS. Major EGS demand is centred on solid-waste handling and disposal services sector, and filtration and purification equipment for water and wastewater.

3.10 Sub-Saharan Africa

The EGS market in the African region is projected to experience reasonable growth, albeit starting from a small base. The 1996 market was estimated at USD 2.2 billion with a 10 percent growth rate (EBI 1995) amounting to a USD 5 billion market by 2006. The major EGS sectors are water and wastewater. Almost all the countries in Africa face major budgetary, debt service and foreign exchange constraints. The economic conditions in these countries make the roles of the World Bank, the African Development Bank, and other donor and bilateral agencies important in their EGS markets.

The EGS markets in all regions are set to grow rapidly with the highest rates of growth to be found in developing countries. The Asia and Pacific region, along with Africa and Latin America are likely to show increases of 10 percent or more per annum. Several Asian economies such as China, Taiwan Province of China, the Republic of Korea and India are now also exporting to Asian and other emerging economies (Alavi 2006, p. 10). For this reason the focus in the negotiations is towards opening developing country markets which are growing at much higher rates than those in developed countries.

IV. TRENDS IN TRADE IN ENVIRONMENTAL GOODS IN THE LIST OF WTO PRODUCTS IN DEVELOPED AND DEVELOPING COUNTRIES

While markets in EGS are set to grow, it follows that trade in EGS is also likely to grow rapidly. Trade accounts for less than one fifteenth of the global EGS market (EBI 2005, see Table 1). This is in sharp contrast to other estimates according to which trade flows between developed and developing countries for the set of goods on either the OECD or APEC lists (herein referred to as the O+A list) from 1996 to 2001 were about USD 290 billion (UNCTAD 2003a). From both sources, data in these goods show an overall negative balance of trade between developing countries and the rest of the world. However, underlying this situation are increases in developing country exports of environmental goods. The ratio of developing country exports to imports rose from 0.36 in 1996 to 0.52 in 2001, with a corresponding decline in the same figure for developed countries from 1.39 in 1996 to 1.25 in 2001 (UNCTAD 2003a).

Actually, whereas the O+A list covered only a very small share of developing countries' imports of non-agricultural goods (which are covered by the NAMA – non-agricultural market access – negotiations), the early "consolidated lists of EG" prepared by the WTO Secretariat (2005c) covered a much more significant share of developing country imports, heightening concerns about multiple use products, "ex-items", and poorly defined environmental goods. Subsequently the lists have been reduced, but they still cover a significant share of developing country imports without having necessarily clear environmental benefits.

Table 1. Global Environmental Market and Trade Flows (in USD Billion)

THE GLOBAL ENVIRONMENTAL MARKET (USD BILLION)			GLOBAL EXPORTS AND IMPORTS OF ENVIRONMENTAL GOODS AND SERVICES (USD BILLION)				
BY REGION	2002	2003	EXPORTS (2003)	IMPORTS (2003)	BALANCE (2003)	EXPORT GROWTH (2002-2003)	IMPORT GROWTH (2002-2003)
USA	224.6	232.4	26.0	20.9	5.1	11%	9%
Western Europe*	166.9	172.4	37.5	30.2	7.3	21%	18%
Japan	93.9	96.1	16.9	5.8	11.1	16%	6%
Rest of Asia	30.1	33.6	1.5	10.4	-8.9	6%	31%
Mexico	3.8	4.1	0.05	1.64	-1.6	2%	40%
Rest of Latin America	10.3	11.0	0.2	4.8	-4.6	3%	44%
Canada	15.8	16.1	1.65	2.14	-0.5	11%	13%
Australia/ New Zealand	9.1	9.6	1.8	1.2	0.6	18%	13%
Central & Eastern Europe	10.9	11.8	0.5	4.3	-3.8	6%	36%
Middle East	7.5	8.3	0.2	2.9	-2.7	4%	35%
Africa	3.8	4.6	0.0	2.1	-2.0	1%	45%
Total	**577**	**600**	86.3	86.3	0.08		

SOURCE: Environmental Business International, Inc., San Diego, CA.
**Note: each country within the region, not as a block: i.e. German sale to Italy is an export and an import*

4.1 Recent Trends in Trade in EGs

A comparison of different estimates is difficult as definitions may not always be clear and may differ. This paper marks a departure from previous analysis. Using the WTO '153' list (WTO 2007a) as a starting point, the top ten exporters and importers of EGs from both developed and developing countries are shown in Table 2 and Table 3 and the Tables in Annex 2 onwards. The data for trade has been taken from World Integrated Trading Solution (WITS) and refers to the reported data. Tariff data has also been obtained from WITS. This shows that among the top ten exporters of the WTO '153' list of EGs, two or three developing countries feature prominently in 2006. These are China, Mexico and the Republic of Korea (see Table 2). China has already emerged as one of the leading exporters in almost all categories of EGs in the '153' list. The situation has changed since early this century where developing countries did not feature as significant exporters of EGs. Further, comparing the share of the top ten exporters of EGs between developed and developing countries (see Annex 4) for the years 2004-2006, it can be observed again that developing countries are rapidly catching up. The top ten exporters from developing countries account for over 25 percent of global exports in most categories of EGs, with a much higher share of over 60 percent in environmentally-preferable products and natural resource protection products. Predictably, China, the East Asian countries, Mexico and Brazil are the largest exporters of EGs in almost all categories.

Table 2. Top Ten EG Exporters in 2006 (in USD Billions)

COUNTRY	EXPORTS
USA	108
Germany	108
China	65
Canada	25
Mexico	24
Korea, Rep. of	20
Hong Kong	15.6
Belgium	13.2
Austria	12.4
Sweden	10.46

Source: WITS

Table 3. Top Ten EG Importers in 2006

COUNTRY	IMPORTS (USD BILLION)	MOST-FAVOURED NATION (MFN) TARIFFS	BOUND TARIFFS
United States	107	1.4	4.5
Germany	89	1.7	1.8
China	77	7.6	8.0
Mexico	26	11.7	35
Canada	25	4.4	7.9
Korea, Rep. of	23	6.0	8.7
Hong Kong	16	0.0	0
Denmark	7.7	2.32	2.5
Malaysia	6.6	4.7	10
Russian Fed.	6.2	8.4	Not bound

Source: WITS

As far as imports of EGs are concerned, China, Mexico and the Republic of Korea are again amongst the top ten importers in almost all categories of EGs in the WTO '153' list (see Table 3). China is the top importer in two to three categories of products. The position of developing countries as importers of EGs has changed since 2004 when they did not figure as major players in the list of top ten importers of EGs. The top ten developing country importers account for over 30 percent of the total global imports of EGs in the WTO '153' list of products. Again China, the East Asian countries, Mexico, Brazil and a handful of other countries are major importers of almost all categories of EGs.

While the European Union as a group (other than large exporters such as Germany) and Japan figured prominently in the lists in the past, by 2006 they were no longer in the top ten. This does not imply that other members of the European Union are not significant importers and exporters of EGs but rather that the rise of China, Mexico and the Republic of Korea has dwarfed the growth in EG trade from other countries. Another factor that may explain the disappearance of the EU and Japan from the list is that after 2003, very few environmental projects originated in these areas (see Annex 1). As explained below, exports of EGs crucially depend on technical assistance projects initiated by governments of developed countries.

By contrast, according to EBI, developing countries had a very small share in trade of EGs for the years 2003 and 2004. This difference could be attributable to the different category of goods and services used by EBI in comparison to those being discussed in the WTO. The difference between EBI figures and trade for categories of goods identified in the WTO '153' list also points to the significant comparative advantage that developed countries enjoy in the global EGS industry in general. However, for the purposes of negotiation, it is the lists tabled in the WTO which are relevant. The rest of this paper has confined itself to an analysis of the products in the WTO '153' list of EGs submitted by the "Friends of EGs" group of countries (WTO 2007a). At the time of writing, this is the most recent list of goods that has been tabled and the only one under consideration.

Trade in EGs appears to be no different from trade in other manufacturing products. The countries, both developed and developing, which dominate trade in manufacturing products, also dominate trade in EGs. China, as should be expected has featured prominently as a major exporter and importer of EGs as per the WTO classification of EGs in recent years. Other major players from developing countries are Mexico and Brazil. East Asian countries are also emerging as major players, which is again in keeping with their dominant position in manufacturing trade in general.

V. DRIVERS OF TRADE IN ENVIRONMENTAL GOODS

This chapter will examine the factors which could explain the flow of EGs into developing countries. The purpose is to estimate the elasticity of trade in EGs and identify the various macroeconomic factors which determine the flow of trade. This will help to identify policy initiatives which could augment trade in EGs. It could also provide useful insights for the ongoing negotiation in EGs. The factors that are examined below in the regression model are the economic size or GDP of the country, FDI, either sector-specific or national environmental performance indicators, as well as specific technical assistance projects of a country. Tariffs may also play a role though it is by no means clear that this role is significant.

5.1 Model Specification

Economic size (GDP): The economic size of a nation has been suggested as an important factor influencing its trade (Douglas, Craig and Keegan 1982). "GDP growth creates the conditions for environmental improvement by raising the demand for improved environmental quality and makes the resources available for supplying it" (Yandle, Vijayaraghavan and Bhattarai 2002). This would imply that as GDP increases the value of trade in EGs is likely to rise. This relationship is however critically dependent on such supportive measures as government policies, markets and social structures. Data on economic size was obtained from the CIA World Factbook (obtained at: https://www.cia.gov/library/publications/the-world-factbook/print/ch.html).

The ***link between FDI and trade in environmental goods*** is twofold. In the first place FDI is an indicator of openness in an economy. Secondly surveys have shown that FDI is more likely to be more environment friendly than domestic investment (OECD 1996; UNCTAD 2003a). Since data on environmental services is not available on a systematic basis, FDI has also been used as a proxy for environmental services. Thus, where FDI is seen to be correlated to imports of EGs, it shows that Mode 3 trade in environmental services may also generate trade in goods. Foreign direct investment data was obtained from **UNCTAD's World Investment Report (2006).**

In addition, it is likely that ***technical assistance projects between governments of developed countries*** and those of developing countries may increase trade in EGs. As not all countries get technical assistance projects, the impact of such projects which in several cases is tantamount to tied aid, is captured through the use of dummy variables. A list of illustrative technical assistance projects obtained through a web search is attached in Annex 1.

Another important issue which may have an effect on trade in EGs is the ***environmental performance index of a country***. As explained above the EPI is a composite index which traces how close a country is to universal environmental goals. Where possible the specific EPI has been used in the regression model, i.e for trade in air pollution equipment the EPI which captures air pollution has been used. However, where a specific index is not applicable, the general EPI ranking of a country was used. The source for this data is the ***pilot project for 2006 of the environmental performance index*** (see Box 2 above).

The ***degree of industrialisation***, i.e the share of industrial output in GDP, may also be important in determining trade in EGs. This is based on the assumption that the higher the level of industrialisation the higher the level of pollution, the more stringent the environmental regulations and hence the higher the likelihood of imports of EGs. The data for this has been obtained from the CIA World Factbook (obtained from: https://www.cia.gov/library/publications/the-world-factbook/print/ch.html)

A pooled cross-section estimation technique suggested by Kmenta (1982) was used to determine the factors influencing EGS import demand for nearly 32 developing countries, three

of which are transition economies. The data has been corrected for both autocorrelation and heteroscedasticity in the error terms for the model used in the study. This approach is reasonable because in pooling together countries, large and small, it is conceivable that variances of variables may be large across countries. The data has been transformed twice, once to remove autocorrelation and again to remove heteroscedasticity.

The regression is based upon using duplicate observations (similar observation) so that the proportion of projects and non-projects can be similar or equalised. Data on both imports and exports have been used. The total number of observations as well as the proportion of projects is specified below. As the log transformations have been used, the coefficients themselves are the elasticities. The analysis pertains to those products in the '153 list where trade was sufficiently high to carry out the analysis.

5.2 Regression with Robust Standard Errors

Table 4. Variable Notations

AIR POLLUTION CONTROL	ap
MANAGEMENT OF SOLID AND HAZARDOUS WASTE AND RECYCLING SYSTEM	mn
CLEAN UP OR REMEDIATION OF SOIL AND WATER	csw
RENEWABLE ENERGY PLANT	rep
HEAT AND ENERGY MANAGEMENT	hem
WASTE/POTABLE WATER MANAGEMENT	pw
ENVIRONMENTALLY-PREFERABLE PRODUCTS	pp
NATURAL RISK MANAGEMENT	nr
NATURAL RESOURCES PROTECTION	nrp
NOISE AND VIBRATION ABATEMENT	nv
DUMMY VARIABLE =1 WHEN PROJECT IS THERE, OTHERWISE =0	Dimm_ variable name
GROSS DOMESTIC PRODUCT	GDP
FOREIGN DIRECT INVESTMENT	FDI
ENVIRONMENT INDEX	EI
TARIFF	Tariff

Table 5. Proportion of Projects in Sample

	ap	mn	csw	rep	hem
Proportion of projects	40%	6%	3%	8%	10%
	pw	pp	nr	nrp	nv
proportion of projects	3%	5%	5%	5%	5%

Table 6 (a). Regression using Duplicate Observations

DEPENDENT VARIABLES ▶	ap	mn	csw	rep	hem
explanatory variable					
Log_Tariff	0.03 (0.02)	-0.04 (0.06)	0.10 (0.06)	-0.13** (0.06)	-0.15*** (0.04)
Log_GDP	0.70*** (0.14)	-1.41*** (0.37)	-3.16*** (0.38)	-1.13*** (0.34)	0.35 (0.24)
Log_EI	-0.91 (1.16)	-1.62 (2.73)	9.10*** (2.57)	10.18*** (2.01)	9.63*** (1.58)
Log_FDI	0.54*** (0.07)	1.49*** (0.17)	2.06*** (0.15)	1.82*** (0.16)	0.46*** (0.10)
Dum_ap	-0.72** (0.37)	-	-	-	-
Dum_mn	-	3.31*** (0.90)	-	-	-
Dum_csw	-	-	3.60 (2.88)	-	-
Dum_rep	-	-	-	1.96** (0.89)	-
Dum_hem	-	-	-	-	4.92*** (0.55)
R-sq	0.08	0.24	0.41	0.30	0.20
Root-Mse	7.55	7.48	5.70	8.15	6.70
F (5, 1670)	32.58***	-	-	-	-
F (5, 434)	-	28.10***	-	-	-
F (5, 332)	-	-	47.39***	-	-
F (5, 534)	-	-	-	47.68***	-
F (5, 630)	-	-	-		32.74***
No. Obs	1676	440	338	540	636

Table 6 (b) (contd). Regression using Duplicate Observations

DEPENDENT VARIABLES ▶	Pw	Pp	nr	nrp	nv
explanatory variable					
Log_Tariff	-0.002 (0.08)	0.15*** (0.04)	-0.06 (0.04)	0.49*** (0.03)	-0.02 (0.05)
Log_GDP	0.44 (0.40)	1.03*** (0.24)	1.41*** (0.28)	-1.43*** (0.26)	-0.00 (0.38)
Log_EI	6.28** (3.35)	-6.09*** (1.64)	-8.18*** (1.87)	0.26 (2.35)	2.25 (3.38)
Log_FDI	-0.08 (0.21)	-0.30*** (0.12)	0.29** (0.14)	-0.22 (0.14)	1.30*** (0.21)
Dum_pw	9.10*** (1.09)	-	-	-	-
Dum_pp	-	8.83*** (0.66)	-	-	-
Dum_nr	-	-	9.17*** (0.75)	-	-
Dum_nrp	-	-	-	4.53*** (0.63)	-
Dum_nv	-	-	-	-	1.78** (0.90)
R-sq	0.35	0.58	0.55	0.47	0.20
Root-Mse	6.18	4.05		4.93	7.10
F (5, 222)	24.05***				
F (5, 330)		91.63***			
F (5, 330)			83.74***		
F (5, 330)				60.78***	
F (5, 330)					17.12***
No Obs	228	336	336	336	336

** Significant at 10% level*
*** Significant at 5% level*
**** Significant at 1% level*
Note: Figures in parentheses show standard error.

5.3 Interpretation of Model Results

Tariffs were found to be important in explaining trade in EGs entering developing countries in only one category of products, i.e heat and energy management products. Trade in renewable energy products is also sensitive to reductions in tariffs at the 5 percent level of significance. It is possible that products in these two categories are high technology products which are mostly imported into developing countries. This result is in keeping with other studies conducted by the US which showed that reductions in tariff and non-tariff barriers to trade would lead to significant increases in EG trade in this category of products. The policy implications of this finding are that the initial list could be further narrowed to include only these sub-items for the initial round of liberalisation. It should however be noted that the elasticity with respect to tariffs is low, showing that a one percent reduction in tariff leads to 0.15 percent increase in trade in these two categories.

For two other categories, the tariff response of trade in EGs is in the opposite direction: for both environmentally-friendly products and natural resource-based products, the higher the tariffs the higher the trade. This could be attributed to the fact that trade in these products may be linked more directly to incomes rather than tariffs. Thus, as incomes rise irrespective of higher tariffs, trade in these categories increases.

Trade in almost all categories of EGs is found to be highly sensitive to GDP. Trade in air pollution equipment, environmentally-preferable products and products aimed at addressing natural risks, increases as GDP increases. With an increase in GDP, the EPI surveys show that air pollution rises. Legislation to combat air pollution has been implemented in most countries as GDP rises, which could account for the increase in trade in this category of products. Natural disaster mitigation also becomes a high priority when GDP rises, hence an increase in trade in EGs in this category. As was explained above, even amongst developing countries the preference for environmentally-preferable products rises as incomes rise.

Trade in management of solid and hazardous wastes, clean up and remediation, renewable energy products and natural resource-based products show a significant negative correlation with GDP. While the generation of waste increases significantly with GDP, middle income countries have been proactive in developing their own waste management systems. Imports of equipment for these categories have been generally low, except in a few Southeast Asian countries. Similarly in the case of renewable energy, India for example has relied mostly on indigenous solar and wind turbines as have a number of other developing countries. The increase in GDP provides them with resources to generate their own plants, often with high levels of FDI.

The most important justification for liberalising trade in EGs is an improvement in the environmental performance of developing countries. It is here that the correlation between environmental performance indicators and trade in EGs becomes important. For three categories of EGs, the correlation between the relevant EPI and trade is significant at the one percent level. These are the products covered under the categories of clean up or remediation of soil and water, renewable energy plants, heat and energy management, and account for about 40 tariff lines. For all these products a specific EPI was not available, therefore the general EPI was used. This correlation implies that the higher the EPI ranking of the developing country, the higher the trade in these products. In general, a high EPI ranking implies a better framework of implementation for environmental regulations, as well as better chances of attainment of environmental targets. This high correlation could therefore be interpreted to imply that trade in goods in these categories is probably being put to some environmental end use. It is to be noted that 26 of these tariff lines overlap with the lines identified by the World Bank study on climate change (World Bank 2007).

In two categories of products, i.e. environmentally-preferable products and natural risk products, trade increases even with a low EPI. This implies that countries with low EPIs probably export EPPs and import natural risk mitigation products.

A robust correlation is shown with respect to FDI. As FDI increases trade in seven categories of products increases. These are products in the category of air pollution control, management of solid and hazardous waste and recycling system, clean up or remediation of soil and water, renewable energy plants, natural risk management, and noise and vibration abatement. This large correlation could arise on account of two factors. The first is that most of these products are dual-use products which come into general industrial uses. The second could be that higher levels of FDI are associated with better environmental practices which necessitate the import of a wide range of environmental goods. Another reason could be that the delivery of environmental services, especially in these categories of services, necessitates the import of these EGs. However, as the variable used is overall FDI, rather than FDI in specific categories of EGS, the most likely

explanation is the first one. A counter intuitive result is seen in the category of EPPs, where the lower the FDI, the higher the trade in EPPs. This result can be explained by the fact that the top EPP exporters are low income Asian and African countries which have not attracted significant levels of FDI.

The most direct, significant and positive correlation is to be found with respect to technical assistance projects. The countries which have technical assistance projects are most likely to trade in EGs. This correlation is found to be robust and positive for eight of the ten categories of EGs. Elasticities in most cases are also very high, significantly over one, indicating the crucial role of technical assistance projects in explaining trade in EGS. Only in the case of air pollution is the correlation negative and the elasticity low. This could be accounted for the fact that air pollution projects have been implemented in middle income countries where most of the equipment required is not high technology and is probably procured locally. This high correlation, and indeed the details of these projects, indicates that tied aid has a crucial role to play in explaining trade in EGs to developing countries. The lack of trade with low income African countries is also explained by the fact that developed countries have very few projects with African countries. Increasing EG trade with Africa would therefore require the development of such projects.

5.4 Tariff Profiles of Countries Trading in Environmental Goods

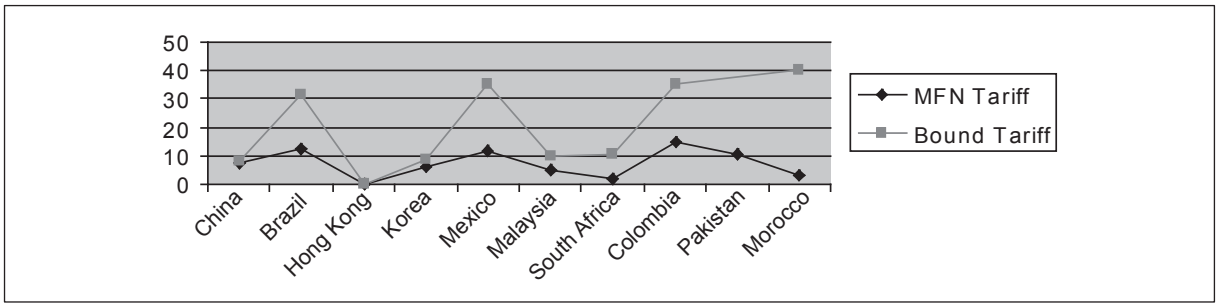
It is important to examine the profile of tariffs among major importers given the much higher than expected increase in the share of developing countries in trade of EGs. Tariffs for the top ten importers in each of the HS categories (WTO '153' list) vary on an average between 0-14 percent in developing countries and between 0-8 percent in developed countries. The interesting issue is that the top developing country importers, i.e Brazil and Mexico, have the highest applied tariffs in almost all categories of EGs, reaching some 35 percent at the bound level in some cases. Tariff water is also the highest in the significant importing countries of EGs. Only the East Asian countries which are significant importers, apply zero tariffs on most categories of EGs. They also have much lower levels of tariff water. Thus tariffs in most of the top ten developing country importers tend to be high, suggesting that tariffs may not be a significant factor influencing imports of EGs (see Table 7).

Table 7. Top Ten Developing Country Importers of EGs.

COUNTRY	VALUE OF IMPORTS (BILLIONS OF USD)	MFN TARIFF RATES	BOUND TARIFFS
China	77	7.6	8.0
Brazil	6.5	11.6	30.0
Hong Kong	16	0.0	0
Republic of Korea	26	11.7	35
Mexico	26	11.7	35
Malaysia	6.6	4.7	10
South Africa	3.9	2.3	10
Colombia	0.8	15.0	38
Pakistan	1.0	10.0	Unbound
Morocco	0.4	2.0	40

Source: WITS

Fig. 1. Simple Average Bound and MFN tariffs of the Top Ten Importers of EGs from Developing Countries



Note: (i) Pakistan has several unbound tariff lines for EGs, hence it is not possible to derive average bound tariffs, (ii) Korea refers to the Republic of Korea.

However, in other categories of EGs which account in value terms for the larger proportion of imports in EGs, the effects of tariffs are somewhat ambiguous. These effects are also vindicated by case studies conducted in Latin America (for example, small and medium-sized enterprise studies in Chile).To the extent that the case studies mention tariff rates, the information is patchy. Some companies reported "no particular problems", others that tariffs on equipment were as high as 60 percent.

5.5 Dynamic Comparative Advantage

Competitiveness of different countries in the EGs market is changing rapidly. The notion of dynamic comparative advantage based on revealed comparative advantage would be useful in understanding the future trends in this market (for a complete detail on methodology used for calculating dynamic comparative advantage see Gwo-Jiun 1998). Essentially dynamic comparative advantage is a weighted average of the revealed comparative advantage of all the tariff lines for a particular country in a particular sector. Again, the dynamic comparative advantage projections on the basis of the past years appear to suggest that for some categories of EGs developing countries have a decreasing dynamic comparative advantage (see Table 8). These EGs are wastewater treatment and clean up equipment. This is probably because of the high technology content of these industries as mentioned earlier.

Table 8. Dynamic Comparative Advantage of Top Ten Exporters from Developed and Developing Countries in various categories of EGs

CATEGORY OF EGs	AVERAGE FORECASTED DYNAMIC COMPARATIVE ADVANTAGE OF TOP TEN DEVELOPING COUNTRY EXPORTERS IN 2015 USING 2006 AS BASE	AVERAGE FORECASTED DYNAMIC COMPARATIVE ADVANTAGE OF TOP TEN DEVELOPED COUNTRY EXPORTERS IN 2015 USING 2006 AS BASE
Air pollution control	1.6	0.9
Solid and hazardous waste	1.9	0.9
Clean up and remediation of soil and water	0.6	1.2
Renewable energy plant	1.12	1.0
Heat and energy management	1.1	1.9
Waste/potable water management	0.4	1.06
Environmentally-preferable products	3.2	0.056
Natural risk management	14.8	16
Natural resource management	1.06	1.23
Noise and vibration	0.9	0.41

Some categories of EGs have a relatively static state of dynamic comparative advantage, such as natural resource-based products and natural risk mitigation products. This can be explained by the high population base which is putting pressure on natural resource-based products and making them net importers. Risk mitigation products are very capital and technology intensive accounting for the static nature of the dynamic comparative advantage of these developing countries. Products from renewable resources also show a relatively static growth in comparative advantage.

Developing countries show a growing dynamic comparative advantage in air pollution, solid waste management, heat equipment and noise vibration equipment. Together these account for more than 60 percent of value of trade in EGs. Therefore, in the entire category of EGs it is possible that developing countries have a dynamic comparative advantage.

By contrast, for most categories of EGs, developed countries show a static or declining dynamic comparative advantage. This shows that trade in EGs exhibits the same characteristics as any other product, with dynamic comparative advantage shifting in favour of developing countries.

Moreover, the forecasted dynamic comparative advantage of the top ten exporters from both developed and developing countries taken as two groups shows that for most categories of EGs, developing countries are likely to be doing better than developed countries in the year 2015. In five of the ten categories, developed countries are likely to be doing better. Thus in narrowing the list of EGs for the negotiations, both dynamic comparative advantage and market drivers could provide useful pointers.

Trade in EGs appears to be no different from trade in other manufacturing products. The group of countries, both developed and developing, which dominates trade in manufacturing products also dominates trade in EGs. China, as should be expected, has featured prominently as a major exporter and importer of EGs as per the WTO classification of EGs in recent years. Other major players from developing countries are Mexico and Brazil. East Asian countries are also emerging as major players, which is again in keeping with their dominant position in manufacturing trade in general. This pattern also reflects the dual use nature of these products where some environmental end uses have been identified only for a subset of products in the WTO '153' list.

The results also suggest a need for examining the overall trade policies, especially export subsidies through export credit and tied aid programmes of developed countries. Project assistance is shown to have a crucial role in determining trade in EGs in developing countries. Reducing tariffs may lead to an increase in imports in only one category of EGs, though other factors may be more significant. Tariff response in general is quite weak in the EGs sector. The level of openness indicated by the level of FDI and the level of GDP is however significant in explaining trade in EGs. The correlation with EPI may be an indicator of environmental end use which was found to be significant only in some categories of products. These were high technology products in the waste management, water management and clean up and remediation products. However, the EGs sector is quite complex and several variables had to be used to get a "best fit" function.

Trends in dynamic comparative advantage of developing countries indicate that reducing barriers to trade would help open up markets for exports of environmental goods produced in developing countries. However, given the lower levels of tariffs in developed countries, focus should be on non-tariff barriers, particularly standards. In political economy terms, standards are very difficult to address because several factors determine the development of standards.

VI. ENVIRONMENTAL SERVICES AS A DRIVER FOR TRADE IN ENVIRONMENTAL GOODS IN DEVELOPING COUNTRIES

Trade in environmental services appears to be relatively free of restrictions in comparison with other service sectors. The concern of exporters of such services is to achieve greater market access in terms of commercial presence. Export of environmental services involves considerable investment in the importing country and thus ownership and control become a significant consideration for the firms providing such services. It is contended that EGs follow ESs. If ESs are indeed important drivers of EGs, it would be necessary to understand the drivers of ES first.

6.1 Factors Underlying Imports of Environmental Services in Developing Countries

The most important driver of this industry in the so-called core sectors is the increased move towards privatisation of infrastructure. Privatisation and deregulation of markets in the environment industry have contributed to a larger role for the private sector in the delivery of goods and services in sectors such as water, energy and waste management. The public sector has thereby become an important purchaser of such goods and services. In the OECD, environmental expenditure is divided equally between the public and private sectors, while in developing countries, the public sector accounts for about 70 percent of overall environment expenditure (Vikhlyaev 2003).

The expansion of demand from the public sector in developing countries is hindered by budgetary constraints; insufficient public funds are available to meet the needs for building/ upgrading environmental infrastructure and cleanup. Another driver of demand in the public sector has traditionally been the implementation of large construction projects, such as roads, bridges or hydroelectric power stations. These projects are now increasingly outsourced to the private sector. The lack of awareness by public authorities, especially in developing countries, of the risks and costs related to environmental problems may lead to relatively slow growth in the market for ES in these sectors.

The impact of the trend towards privatisation, which may be largely responsible for the generation of ES markets in developing countries, is however being re-visited. Empirical evidence from various surveys suggests that there is no systematic difference in efficiency between public and private operators. In 2002 Willner and Parker surveyed a large number of studies on the question of private versus public efficiency, in both developed, developing and transition countries, and observed that there is no consistent conclusion: some show greater private sector efficiency, some show greater public sector efficiency or no difference, and so they conclude that "it appears from the empirical evidence that a change of ownership from public to private is not necessarily a cure for an under-performing organisation" (Willner and Parker 2002).

The desire to have a green image for export-oriented firms and transnational corporations in particular, is a driver for demanding ES. Global companies often feel that they have to address global environmental problems as a sign of their economic and moral leadership. However, public pressure is not always strong and coherent enough to represent a sustainable driver for demanding environmental goods and services. Taxation and the need to save costs may be other important drivers, but these may lead to the simplest improvements instead of the more complex ones (UNCTAD 2003b).

It is contended by several authors that the drivers for environmental services and goods may be interlinked (Steenblik *et al* 2006; Vikhlyaev 2003). Several of the case studies (Chaytor 2004) provide evidence that there is often a progression in the way that service providers procure the goods they need. In almost all cases, any materials associated with "plumbing" (piping, valves and so forth) are purchased locally from the beginning,

as are gravel, sand and similar bulk materials. As the service provider becomes more familiar with local suppliers, they will generally turn to them more for equipment and intermediate inputs, as long as the quality of those goods is sufficient for their needs. All else being equal, there are advantages to procuring goods locally: delivery times may be shorter, transport costs lower and after-sales service more reliable.

Consequently, as the market for equipment and inputs associated with environmental services expands, so usually does the number of local suppliers and the range and sophistication of the products they can offer – not just to service providers operating in their own countries, but also to buyers in other countries. Often, these local suppliers are the results of joint ventures between foreign companies with specialised knowledge of the EGS industry, and local companies with complementary strengths. For example, in a joint venture with Dongguan Hu Men Harbour Water Supply Company, Sino French Water Development (a 50-50 subsidiary of Ondeo and the Hong Kong-based New World Group) established an equipment manufacturer which produced membrane-technology equipment for water treatment (including microfiltration units capable of treating 100 to 50,000 m^3/day) and, using ultrafiltration techniques introduced from France and reverse osmosis techniques from the USA, also produced additional equipment in a capacity range of up to 45,000 m^3/day. This equipment has been used in other water plants in China and for exports outside of China (Chaytor 2004).

The ability of local suppliers of environmental goods to meet the needs of environmental-service providers will vary, of course, according to the level of development of the local economy and the kinds of manufacturing in which it specialises. Most of the products necessary for treating and managing urban water and wastewater can already be purchased locally in rapidly industrialising countries such as Brazil, the Republic of Korea and China. Similarly, above-ground diaphragm pumps, which are used for soil and water remediation in areas with shallow groundwater tables are widely available in many developing countries.

However, some segments of the environmental service industry require equipment that is often difficult to find locally. Here, environmental goods may follow environmental services. The treatment of end-of-pipe industrial wastewater flows, for example, typically involves processes that are highly specialised (the market segments are narrow), and are catered to by a limited number of global suppliers. Tube-well diaphragm pumps (required for remediation of soil and water in areas with groundwater) are another example of devices that are often not available locally, and therefore have to be imported. Similarly, the blowers for soil-vapour extraction systems, because they need to be intrinsically safe, are usually imported, at least initially (EU 1995).

The size of the potential gains from environmental services liberalisation for developing countries will depend to a significant extent on the success of their privatisation programme for core infrastructural services. Liberalisation by itself cannot mitigate some of the risks of investment in developing countries. This will require high rates of growth, macroeconomic reforms and most importantly appropriate regulation to ensure that potential gains from services liberalisation are maximised. Appropriate institutional and policy frameworks that take into account potential economic, environmental and social impacts of liberalisation are necessary precursors to good policies, but capacity building is often needed to support the establishment of such institutions. In the case of infrastructure environmental services, such as water and wastewater management, the public sector will retain responsibility for ensuring that public interests are met, irrespective of whether supply is by public or private sector enterprises. This public interest may cover universal service provision, pricing and subsidies for consumers. With increased private sector involvement, responsibility for ensuring that public interest obligations are met moves to the regulatory authorities. Experience in both developed and developing countries demonstrates the risk of regulatory failure, resulting from regulatory

capture or lack of regulatory capacity. Where regulatory frameworks and other mitigation measures are absent or ineffective, the gains from liberalisation of environmental services are less likely to be achieved, and the outcomes for sustainable development more uncertain.

The extent to which services will be a driver of trade in EGs will depend crucially on successful privatisation of a number of infrastructural sectors in developing countries. However, this process itself is being questioned. Regulatory risks and capacities will play an important role in the privatisation process. Privatisation is a complex process involving several stakeholders, whereas trade in EGs is a relatively simple process responding to different market stimuli. Further analysis and data collection, especially related to environmental services FDI, will be necessary to establish the extent to which trade in environmental services is a driver of environmental goods imports.

VII. CONCLUSIONS

The preceding analysis has shown that imports of products on the list of 153 EGs do not necessarily end up in areas that require them most. For example, environmental problems in Africa have reached critical points, yet the import of EGs by African countries is minimal. This could be explained by the fact that effective markets backed by paying capacity, exist only in middle income countries which have seen a dramatic rise in imports of EGs. In addition, technical assistance or tied aid projects also appear to be directed to those countries which have the relevant purchasing power. This gap in EGS imports in a large number of developing countries also points to the need for technical assistance projects in those countries, especially in Africa. Bilateral and multilateral donor assistance in this regard has focused especially on relatively high income developing countries, notably China. It must also be recognised that there is a limit to addressing environmental problems by changing for instance the scope of EGS to be liberalised, nor can the link between environmental problems and the list of EGS be direct. The link between environmental problems of developing countries and the EGS list is further complicated by the dual and often multiple uses of any particular product defined by its HS category.

The same conclusion holds for EPI indicators. Very few countries with low EPI participate in EGs trade. Trade is dominated by middle income countries with high or medium EPI scores.

To the limited extent that the list being discussed in the WTO is aligned to the environmental problems of developing countries, it may be crucial for WTO Members to first adopt clear definitions of environmental goods and environmental services. However, given the lack of consensus around a definition, a good starting point could be the list which is currently under discussion at the WTO. Trends in trade in products on the WTO '153' list and surveys by the EBI of the EGS market in general show divergent patterns. While the share in trade of developing countries in the '153' EGs list is over 30 percent, that in the EGS list of EBI is less than 10 percent. Hence it would be in the interest of developing countries to use the WTO '153' list as a starting point of the negotiations on EGs, particularly as the wider markets are not likely to deliver environmental benefits. Interestingly, while the EBI places a market value of over USD 650 billion on EGS, the value of only EGs traded in the WTO '153' list points to a figure of about USD 430 billion. This implies that there are several multiple use products in the '153' list as EBI has pointed out that only about 15 percent of the USD 650 billion are traded. This high value of traded goods therefore suggests the need to further restrict the scope of EGS.

One way of restricting the scope of the EGs would be to initially liberalise only those products that have some environmental end use. The preceding regression analysis with respect to environmental performance indicators would mean restricting trade to about six categories of EGs from the WTO '153' list of products. These categories include EPPs, natural risk management, renewable energy, heat and energy management, wastewater management and potable water treatment and clean up or remediation of soil and water. This list would also cover the category of products which have shown particular tariff sensitivity namely renewable energy and heat and energy management products.

An analysis of factors influencing the import of EGs shows that while lowering tariffs may increase imports, several other factors may play a more decisive role. In the trade context, supporting policies which improve the general competitiveness of exports are also likely to improve trade in EGs. It is however not clear whether, if environmental goods were to be put on a faster track for liberalisation, developing countries would necessarily benefit both in either environmental or trade terms. However, dynamic comparative advantage appears to be shifting in favour of developing countries for a number of categories of goods identified in the '153' list. This highlights benefits that tariff liberalisation, but more importantly the removal of non-tariff barriers, would be able to bring to developing countries. With a growing comparative advantage

it will be in developing countries' interests to examine the role that non-tariff barriers are likely to play in their export markets.

The fact that only a handful of developing countries feature in the list of top ten importers and exporters of EGs also suggests that these players could usefully engage in a request offer approach to ensure trade wins. In this way, while the benefits may be multilateralised, the cost of liberalisation would be borne by only a few players: the very players who have a lot more to gain through liberalisation.

There are several factors that may present challenges for WTO Members seeking to negotiate in EG sectors. A great deal revolves around the nature of the industry itself (e.g. the more mature sectors are those in the public infrastructure/ utility arena). While tariff protection is being dismantled in developing countries in general, the export of EGs from developed countries is crucially dependent on tied aid projects and technical assistance. Thus, along with tariffs, other factors such as FDI openness and technical assistance projects need to be encouraged to promote trade in EGs. This is particularly true for countries in Africa which may not be able to participate effectively in the market for EGs.

The link between trade in EG and ES has been widely acclaimed. However, whether this link is important or not, for negotiation purposes it is necessary to pursue liberalisation in EGs and ESs separately. The presence or absence of the link should not be used to slow down liberalisation in either of the sectors.

Liberalisation of ES, particularly in public utilities, needs further evaluation. Experience with privatisation has however been mixed. In many cases the delivery of public services has not improved with privatisation and has exacerbated social exclusion. The successful integration of environmental health, sustainable development and social inclusion policies depends on several factors. First of all investment in public services by public or private authorities is of prime importance. Secondly, socially-excluded groups should be able to obtain advice and information, backed by legislation, in order to ensure appropriate access to public utilities, whether publicly- or privately-owned.

The role of the state as regulator has changed in recent decades. Technically, the state is supposed to provide more of an enabling and regulating role rather than being a direct provider. However, there is still extensive work to be done on developing regulatory functions that are effective and deciding what is the most appropriate level of delivery.

Coalitions, which bring together different interests, especially local communities, need to be supported by public policies and public authorities, especially when they relate to the delivery of ES. How these interests are mediated will ultimately influence the extent to which environmental health, sustainable development and social inclusion policies are implemented successfully.

These caveats do not imply that trade liberalisation in ES should be restricted, but rather that liberalisation will not deliver the expected benefit unless the supportive infrastructure in terms of regulation, community participation etc. is in place. The supportive infrastructure would be equally important for absorbing and disseminating environmentally-sound technologies.

Another area of ES which has been little explored is that of outsourcing environmental consultancy services. The comparative advantage of developing countries in this area needs to be carefully examined. Such an examination was however outside the scope of this paper.

ANNEX 1: ILLUSTRATIVE LIST OF PROJECTS IN 2003 AND 2004 IN THE CATEGORIES OF PRODUCTS IN THE 153 ENVIRONMENTAL GOODS LIST

Projects between Developing Countries and the US

1. Heat and energy management project between US and Bolivia in 2003.
2. Air pollution project between US and Brazil in 2003.
3. Renewable energy plant project between US and Brazil in 2003.
4. Environmental-preferable production project between US and Brazil in 2003.
5. Air pollution project between China and US, 2004.
6. Clean up or remediation of soil and water project between China and US in 2003 or 2004
7. Renewable energy plant project between China and US, 2003.
8. Environmentally-preferable production project between US and China, 2005.
9. Natural resources protection project between US and Columbia, 2004.
10. Heat and energy management project between Estonia and US, 2003.
11. Management of solid and hazardous waste and recycling system between Kazakhstan and US, 2004.
12. Environmentally-preferable production project between US and Mexico, 2003.
13. Natural resources protection project between US and Mexico, 2003.
14. Natural resources protection project between US and Morocco, 2001.
15. Renewable energy plant project between US and Nepal in 2003.
16. Renewable energy plant project between US and Pakistan in 2004.
17. Management of solid and hazardous waste and recycling system project between US and Romania, 2003: Removal of Fresh Highly Enriched Uranium (HEU) Research Reactor Fuel.
18. Management of solid and hazardous waste and recycling system project between US and Russia, 2003.
19. Natural resources protection project between US and Russia, 2003.
20. Renewable energy plant project between Sri Lanka and US in 2003.
21. Air pollution project between US and Thailand, 2003.
22. Air pollution project between US and Venezuela, 2003.

Projects between Developed Countries and OECD Countries

1. Heat and energy management project between Austria and OECD countries, 2003.
2. Clean up or remediation of soil and water projects between Belgium and Japan/ US or OECD countries.
3. Remediation and clean up of waste water treatment, solid waste treatment; US, Japan and Belgium, 2003-2004.
4. Natural risk management project between US and Japan and other OECD countries, 2003.
5. Air pollution project between Canada and Japan/ US or OECD countries, 2003.
6. Renewable energy plant project between Belgium and Japan/ US or OECD countries, 2004.
7. Renewable energy plant project between Finland and US or Japan or OECD countries, 2004.
8. Heat and energy management project between France and US or Japan or OECD countries, 2005.
9. Environmentally-preferable production project between France and US or Japan or OECD countries, 2004.
10. Clean up or remediation of soil and water project between Germany and US or Japan or OECD countries, 2004.
11. Renewable energy plant project between Canada and US and other OECD countries, 2003.

Source: "Web searches"

ANNEX 2: AGGREGATE EXPORTS OF ENVIRONMENTAL GOODS *
(TOP TEN EXPORTERS)

AGGREGATED DATA FOR THE YEAR 2004			AGGREGATED DATA FOR THE YEAR 2005			AGGREGATED DATA FOR THE YEAR 2006		
Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)
1. AIR POLLUTION CONTROL								
EUN	European Union	10,961,901.202	EUN	European Union	11,220,470.239	DEU	Germany	10,285,892.000
DEU	Germany	8,278,608.000	DEU	Germany	8,986,242.000	USA	United States	7,600,530.036
USA	United States	6,195,782.085	USA	United States	6,885,747.912	CHN	China	2,678,371.386
JPN	Japan	6,139,345.197	JPN	Japan	5,959,525.872	ZAF	South Africa	2,424,870.188
ITA	Italy	3,848,358.642	ITA	Italy	3,459,360.958	MEX	Mexico	2,059,280.817
FRA	France	3,137,460.110	FRA	France	3,088,131.709	BEL	Belgium	1,678,787.144
GBR	United Kingdom	2,427,162.481	GBR	United Kingdom	2,482,970.046	KOR	Korea, Rep.	1,479,005.740
BEL	Belgium	2,165,295.006	CHN	China	2,053,864.441	CAN	Canada	1,339,898.708
MEX	Mexico	1,451,629.931	BEL	Belgium	1,778,316.778	BRA	Brazil	973,377.822
CHN	China	1,415,541.365	MEX	Mexico	1,733,512.459	AUT	Austria	825,842.791
2. MANAGEMENT OF SOLID AND HAZARDOUS WASTE AND RECYCLING SYSTEMS								
EUN	European Union	16,340,391.977	EUN	European Union	17,753,439.971	DEU	Germany	14,094,060.000
JPN	Japan	15,132,207.134	JPN	Japan	14,195,020.364	USA	United States	11,850,264.685
DEU	Germany	10,691,835.000	DEU	Germany	12,474,572.000	KOR	Korea, Rep.	3,409,767.279
USA	United States	10,237,158.771	USA	United States	10,199,396.075	SWE	Sweden	1,887,838.202
ITA	Italy	6,919,031.752	ITA	Italy	7,236,225.397	AUT	Austria	1,833,797.161
KOR	Korea, Rep.	2,534,848.839	KOR	Korea, Rep.	2,880,392.510	CAN	Canada	1,824,768.579
CHE	Switzerland	2,412,614.169	GBR	United Kingdom	2,777,591.364	CHN	China	1,767,208.605
GBR	United Kingdom	2,342,810.645	FRA	France	2,351,145.455	HKG	Hong Kong, China	1,250,003.863
FRA	France	2,242,166.479	CHE	Switzerland	2,165,825.432	BEL	Belgium	1,111,231.614
NLD	Netherlands	1,705,362.428	NLD	Netherlands	1,746,879.111	FIN	Finland	1,004,033.926
3. CLEAN UP OR REMEDIATION OF SOIL AND WATER								
EUN	European Union	1,015,819.194	EUN	European Union	1,228,873.855	CHN	China	1,023,740.128
DEU	Germany	779,234.000	DEU	Germany	815,928.000	DEU	Germany	915,262.000
CHN	China	537,853.923	CHN	China	695,353.488	USA	United States	368,898.197
USA	United States	277,674.198	USA	United States	326,949.534	SWE	Sweden	238,250.402
ITA	Italy	244,022.179	ITA	Italy	242,477.853	LTU	Lithuania	110,215.303
FRA	France	169,701.840	FRA	France	191,352.032	CAN	Canada	95,727.082
GBR	United Kingdom	155,847.066	GBR	United Kingdom	174,287.748	DNK	Denmark	78,278.821
JPN	Japan	108,041.762	FIN	Finland	151,545.721	MYS	Malaysia	72,497.076
SWE	Sweden	103,539.706	SWE	Sweden	116,924.772	HKG	Hong Kong, China	60,195.709
CAN	Canada	98,441.197	JPN	Japan	107,617.247	IRL	Ireland	60,087.808
4. RENEWABLE ENERGY PLANT								
EUN	European Union	20,119,897.644	EUN	European Union	22,042,040.994	DEU	Germany	22,594,974.000
JPN	Japan	16,759,024.899	DEU	Germany	19,018,522.000	USA	United States	19,663,995.416
DEU	Germany	13,490,718.000	JPN	Japan	17,758,413.177	CHN	China	16,052,634.496
USA	United States	13,156,282.618	USA	United States	17,588,195.784	HKG	Hong Kong, China	6,276,803.364
CHN	China	8,329,787.071	CHN	China	11,312,270.535	MEX	Mexico	5,785,621.925
FRA	France	5,525,364.829	FRA	France	5,712,493.744	DNK	Denmark	3,843,323.989
HKG	Hong Kong, China	4,743,492.162	HKG	Hong Kong, China	5,508,833.638	MYS	Malaysia	2,955,610.132
ITA	Italy	4,647,988.576	GBR	United Kingdom	4,786,494.066	BEL	Belgium	2,800,543.955
GBR	United Kingdom	4,646,239.859	MEX	Mexico	4,783,109.848	CAN	Canada	2,569,055.792
MEX	Mexico	4,261,936.756	ITA	Italy	4,757,566.000	KOR	Korea, Rep.	2,292,157.565

** The analysis in this table pertains to those products and categories among the 153 where trade was sufficiently high to carry out the analysis.*

AGGREGATED DATA FOR THE YEAR 2004			AGGREGATED DATA FOR THE YEAR 2005			AGGREGATED DATA FOR THE YEAR 2006		
Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)
5. HEAT AND ENERGY MANAGEMENT								
EUN	European Union	1,872,565.922	EUN	European Union	2,138,570.347	DEU	Germany	1,657,256.000
DEU	Germany	1,358,305.000	DEU	Germany	1,428,293.000	USA	United States	1,083,346.306
ITA	Italy	796,459.433	ITA	Italy	832,379.078	CHN	China	523,970.840
USA	United States	712,184.648	USA	United States	811,425.480	SWE	Sweden	514,449.189
FRA	France	483,368.958	FRA	France	567,281.339	KOR	Korea, Rep.	418,446.300
SWE	Sweden	342,450.681	CHN	China	452,099.268	MEX	Mexico	339,833.881
GBR	United Kingdom	314,590.028	SWE	Sweden	380,654.278	BEL	Belgium	225,315.344
CHN	China	283,334.244	MEX	Mexico	345,991.219	DNK	Denmark	210,153.450
CZE	Czech Republic	278,648.587	KOR	Korea, Rep.	302,399.551	CAN	Canada	160,475.742
MEX	Mexico	275,374.072	GBR	United Kingdom	293,095.056	AUT	Austria	146,978.051
6. WASTE WATER MANAGEMENT AND POTABLE WATER MANAGEMENT								
EUN	European Union	24,127,480.644	EUN	European Union	27,920,499.332	DEU	Germany	25,979,566.000
DEU	Germany	19,537,738.000	DEU	Germany	22,797,401.000	USA	United States	16,635,364.411
ITA	Italy	12,511,985.436	USA	United States	14,199,721.882	CHN	China	15,647,321.147
USA	United States	12,293,808.810	ITA	Italy	13,537,801.696	CAN	Canada	4,173,615.863
CHN	China	7,932,894.740	CHN	China	10,697,244.859	KOR	Korea, Rep.	3,354,174.347
JPN	Japan	7,322,140.757	JPN	Japan	8,408,862.110	MEX	Mexico	3,152,831.035
FRA	France	6,645,958.392	FRA	France	7,517,550.751	AUT	Austria	3,026,456.031
GBR	United Kingdom	4,804,411.308	GBR	United Kingdom	5,083,208.303	SWE	Sweden	3,003,290.819
CAN	Canada	3,468,796.937	CAN	Canada	3,814,158.830	BEL	Belgium	2,683,298.506
MEX	Mexico	2,417,018.323	MEX	Mexico	2,801,731.439	DNK	Denmark	2,494,670.439
7. ENVIRONMENTALLY PREFERABLE PRODUCTS, BASED ON END USE AND OR DISPOSAL CHARACTERISTICS								
BGD	Bangladesh	249,216.606	IND	India	121,435.819	BRA	Brazil	31,966.385
IND	India	128,946.519	BRA	Brazil	31,028.444	BEL	Belgium	15,139.627
BRA	Brazil	27,575.863	BEL	Belgium	15,967.524	TZA	Tanzania	7,581.631
KEN	Kenya	15,124.728	EUN	European Union	8,372.317	PAK	Pakistan	4,413.924
BEL	Belgium	14,158.864	TZA	Tanzania	8,101.553	USA	United States	4,245.249
TZA	Tanzania	7,996.713	TUR	Turkey	5,469.762	CHN	China	2,244.291
EUN	European Union	6,265.538	PAK	Pakistan	5,030.733	DEU	Germany	2,157.000
NLD	Netherlands	3,954.102	DEU	Germany	4,363.000	ZAF	South Africa	1,004.112
CHN	China	3,028.303	NLD	Netherlands	3,616.585	CIV	Cote d'Ivoire	954.414
USA	United States	2,830.232	USA	United States	2,714.090	SWE	Sweden	842.379
8. NATURAL RISK MANAGEMENT								
EUN	European Union	1,419,901.340	EUN	European Union	1,574,002.502	USA	United States	1,488,135.306
USA	United States	870,986.080	USA	United States	1,017,074.654	CAN	Canada	446,668.031
GBR	United Kingdom	690,375.838	GBR	United Kingdom	808,397.448	DEU	Germany	390,963.000
FRA	France	526,133.804	FRA	France	619,575.392	CHN	China	243,751.141
CAN	Canada	270,903.840	CAN	Canada	341,559.511	FIN	Finland	143,651.351
DEU	Germany	258,439.000	DEU	Germany	331,045.000	NOR	Norway	141,010.135
NLD	Netherlands	142,386.164	CHN	China	176,113.856	HKG	Hong Kong, China	55,836.228
CHE	Switzerland	120,293.443	NLD	Netherlands	169,046.759	SWE	Sweden	48,498.979
FIN	Finland	105,681.216	CHE	Switzerland	131,711.968	MYS	Malaysia	38,442.344
CHN	China	103,873.505	FIN	Finland	114,877.049	RUS	Russian Federation	32,382.189

AGGREGATED DATA FOR THE YEAR 2004			AGGREGATED DATA FOR THE YEAR 2005			AGGREGATED DATA FOR THE YEAR 2006		
Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)
9. NATURAL RESOURCES PROTECTION								
CHN	China	140,530.188	CHN	China	175,106.604	CHN	China	217,779.569
JPN	Japan	62,312.164	THA	Thailand	78,567.330	KOR	Korea, Rep.	44,704.761
THA	Thailand	61,900.123	JPN	Japan	65,570.819	USA	United States	24,016.873
EUN	European Union	58,283.108	EUN	European Union	65,413.883	NOR	Norway	18,164.463
KOR	Korea, Rep.	39,464.882	KOR	Korea, Rep.	42,568.409	DNK	Denmark	12,996.075
USA	United States	24,988.283	ESP	Spain	23,904.450	MYS	Malaysia	10,033.702
SGP	Singapore	23,775.927	USA	United States	23,652.354	LTU	Lithuania	8,610.753
PRT	Portugal	23,772.227	SGP	Singapore	22,818.553	MEX	Mexico	8,100.009
MEX	Mexico	23,158.316	ITA	Italy	22,699.392	RUS	Russian Federation	7,662.070
ITA	Italy	22,279.310	IND	India	22,118.455	SWE	Sweden	5,827.265
10. NOISE AND VIBRATION ABATEMENT								
JPN	Japan	4,569,897.287	DEU	Germany	5,026,312.000	DEU	Germany	5,608,618.000
DEU	Germany	3,746,762.000	JPN	Japan	4,827,926.206	USA	United States	2,900,488.985
USA	United States	2,749,773.487	USA	United States	3,163,269.048	MEX	Mexico	1,501,958.553
EUN	European Union	1,991,693.546	EUN	European Union	2,102,995.860	CAN	Canada	1,176,085.628
MEX	Mexico	1,234,256.037	MEX	Mexico	1,421,247.831	AUT	Austria	624,801.739
CAN	Canada	1,025,290.657	CAN	Canada	1,151,690.343	CHN	China	552,390.899
ITA	Italy	810,854.953	ITA	Italy	839,396.066	BRA	Brazil	464,175.273
FRA	France	638,064.337	FRA	France	597,997.965	BEL	Belgium	224,325.659
GBR	United Kingdom	601,539.869	GBR	United Kingdom	555,329.866	KOR	Korea, Rep.	135,239.809
AUT	Austria	513,947.680	PRT	Portugal	501,412.088	SWE	Sweden	111,790.601

ANNEX 3: AGGREGATE IMPORTS OF ENVIRONMENTAL GOODS
(TOP TEN IMPORTERS)

AGGREGATED DATA FOR THE YEAR 2004			AGGREGATED DATA FOR THE YEAR 2005			AGGREGATED DATA FOR THE YEAR 2006		
Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)
1. AIR POLLUTION CONTROL								
USA	United States	6,585,946.862	USA	United States	7,398,771.241	USA	United States	8,474,496.537
EUN	European Union	6,213,726.176	EUN	European Union	6,588,955.350	CHN	China	5,035,217.308
CHN	China	4,610,058.552	CHN	China	4,549,588.053	DEU	Germany	5,009,435.000
DEU	Germany	3,888,795.000	DEU	Germany	4,215,448.000	CAN	Canada	2,648,930.373
FRA	France	2,544,487.806	FRA	France	2,573,649.419	MEX	Mexico	2,487,541.329
ITA	Italy	2,000,060.644	TWN	Taiwan, China	2,251,138.425	KOR	Korea, Rep.	1,975,284.828
CAN	Canada	1,981,649.926	MEX	Mexico	2,239,351.370	RUS	Russian Federation	1,466,902.638
TWN	Taiwan, China	1,908,377.641	CAN	Canada	2,229,525.450	BEL	Belgium	1,264,893.697
GBR	United Kingdom	1,861,940.377	ITA	Italy	2,038,777.632	SWE	Sweden	914,210.875
MEX	Mexico	1,715,645.208	GBR	United Kingdom	1,947,288.144	AUT	Austria	872,621.013
2. MANAGEMENT OF SOLID AND HAZARDOUS WASTE AND RECYCLING SYSTEMS								
CHN	China	10,697,794.746	CHN	China	9,879,321.281	CHN	China	11,260,255.086
TWN	Taiwan, China	6,643,295.665	USA	United States	7,416,201.712	USA	United States	8,055,515.881
USA	United States	6,417,161.890	TWN	Taiwan, China	6,233,903.173	KOR	Korea, Rep.	5,944,796.422
EUN	European Union	5,231,784.670	EUN	European Union	5,609,444.807	DEU	Germany	5,181,756.000
KOR	Korea, Rep.	4,942,033.519	KOR	Korea, Rep.	5,180,219.732	MEX	Mexico	2,367,442.274
DEU	Germany	3,743,680.000	DEU	Germany	4,719,408.000	CAN	Canada	2,114,723.259
SGP	Singapore	3,079,588.007	JPN	Japan	3,063,123.269	MYS	Malaysia	1,528,235.846
JPN	Japan	2,755,751.019	FRA	France	2,612,391.504	HKG	Hong Kong, China	1,295,773.122
FRA	France	2,491,972.451	MEX	Mexico	2,269,114.820	BEL	Belgium	1,165,477.506
GBR	United Kingdom	2,150,643.617	GBR	United Kingdom	2,249,302.929	AUT	Austria	1,164,575.263
3. CLEAN UP OR REMEDIATION OF SOIL AND WATER								
USA	United States	777,358.485	USA	United States	632,889.365	USA	United States	830,949.677
EUN	European Union	459,388.912	EUN	European Union	555,318.081	CHN	China	346,989.687
CHN	China	285,968.751	CHN	China	313,360.438	DEU	Germany	325,187.000
DEU	Germany	281,868.000	DEU	Germany	242,203.000	RUS	Russian Federation	280,271.679
JPN	Japan	251,936.337	JPN	Japan	240,652.273	CAN	Canada	182,638.294
GBR	United Kingdom	238,438.270	GBR	United Kingdom	230,640.777	DNK	Denmark	98,581.845
FRA	France	158,832.430	CAN	Canada	179,650.573	MEX	Mexico	86,582.450
ITA	Italy	146,829.266	RUS	Russian Federation	178,399.452	KOR	Korea, Rep.	84,703.537
CAN	Canada	120,725.429	FRA	France	171,290.609	BEL	Belgium	80,153.401
ESP	Spain	112,344.819	ESP	Spain	144,687.406	NOR	Norway	77,536.678
4. RENEWABLE ENERGY PLANT								
USA	United States	17,549,309.392	USA	United States	20,297,935.684	USA	United States	24,193,711.075
EUN	European Union	15,645,483.861	EUN	European Union	16,733,576.755	CHN	China	17,174,902.000
CHN	China	11,846,713.505	CHN	China	14,526,820.475	DEU	Germany	14,605,186.000
DEU	Germany	10,046,950.000	DEU	Germany	12,518,183.000	HKG	Hong Kong, China	6,291,261.069
JPN	Japan	5,642,465.994	JPN	Japan	6,202,437.552	CAN	Canada	5,735,849.160
HKG	Hong Kong, China	4,633,032.605	HKG	Hong Kong, China	5,375,853.634	KOR	Korea, Rep.	5,492,585.431
GBR	United Kingdom	4,579,606.726	GBR	United Kingdom	4,951,365.049	MEX	Mexico	5,048,705.399
MEX	Mexico	3,795,018.539	MEX	Mexico	4,562,035.571	BEL	Belgium	2,358,404.052
ITA	Italy	3,556,816.836	FRA	France	4,258,824.803	MYS	Malaysia	1,789,204.562
FRA	France	3,166,315.245	ITA	Italy	3,728,963.262	DNK	Denmark	1,544,395.760

AGGREGATED DATA FOR THE YEAR 2004			AGGREGATED DATA FOR THE YEAR 2005			AGGREGATED DATA FOR THE YEAR 2006		
Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)
5. HEAT AND ENERGY MANAGEMENT								
DEU	Germany	665,028.000	EUN	European Union	733,164.397	USA	United States	839,081.085
EUN	European Union	595,195.112	DEU	Germany	706,065.000	DEU	Germany	806,210.000
USA	United States	555,420.528	USA	United States	641,366.927	CHN	China	554,340.567
CHN	China	545,501.223	CHN	China	490,678.833	RUS	Russian Federation	469,075.198
ITA	Italy	404,612.460	ITA	Italy	446,335.254	CAN	Canada	439,700.093
FRA	France	306,277.571	CAN	Canada	358,453.054	MEX	Mexico	298,701.673
CAN	Canada	275,761.431	FRA	France	357,488.337	BEL	Belgium	241,179.348
GBR	United Kingdom	262,247.179	RUS	Russian Federation	331,783.279	SWE	Sweden	168,601.224
ESP	Spain	219,733.415	GBR	United Kingdom	306,752.864	AUT	Austria	163,575.198
RUS	Russian Federation	186,956.046	ESP	Spain	209,902.722	KOR	Korea, Rep.	114,270.459
6. WASTE WATER MANAGEMENT AND POTABLE WATER MANAGEMENT								
USA	United States	16,971,916.303	USA	United States	19,275,035.285	USA	United States	22,516,963.903
EUN	European Union	11,170,196.814	EUN	European Union	12,531,415.361	DEU	Germany	12,372,200.000
DEU	Germany	9,529,856.000	DEU	Germany	10,934,749.000	CHN	China	9,197,106.445
FRA	France	6,594,422.087	CHN	China	7,611,574.868	CAN	Canada	6,314,606.033
CHN	China	6,514,279.568	FRA	France	7,047,758.075	MEX	Mexico	5,711,538.905
GBR	United Kingdom	5,130,503.814	CAN	Canada	5,595,437.018	BEL	Belgium	4,469,045.786
CAN	Canada	4,767,369.633	GBR	United Kingdom	5,538,979.995	KOR	Korea, Rep.	3,838,217.051
MEX	Mexico	4,483,641.391	MEX	Mexico	4,979,934.643	AUT	Austria	2,666,643.480
ITA	Italy	4,145,914.512	ITA	Italy	4,509,109.754	SWE	Sweden	2,069,611.059
JPN	Japan	3,470,534.761	JPN	Japan	3,861,369.937	DNK	Denmark	1,808,990.556
7. ENVIRONMENTALLY PREFERABLE PRODUCTS, BASED ON END USE AND OR DISPOSAL CHARACTERISTICS								
EUN	European Union	102,646.445	EUN	European Union	99,497.331	CHN	China	65,422.784
TUR	Turkey	66,698.924	TUR	Turkey	79,465.914	BEL	Belgium	52,348.336
BEL	Belgium	44,196.691	CHN	China	49,948.240	PAK	Pakistan	46,775.933
CHN	China	33,289.516	BEL	Belgium	48,046.989	USA	United States	26,099.029
PAK	Pakistan	30,423.272	IND	India	46,175.496	GHA	Ghana	16,609.626
USA	United States	24,336.273	PAK	Pakistan	39,101.528	RUS	Russian Federation	10,575.324
IRN	Iran, Islamic Rep.	22,487.817	IRN	Iran, Islamic Rep.	32,882.544	DEU	Germany	9,757.000
ESP	Spain	17,161.911	USA	United States	29,203.995	CIV	Cote d'Ivoire	8,624.403
SAU	Saudi Arabia	16,981.933	SYR	Syrian Arab Republic	27,997.376	MEX	Mexico	8,386.405
IND	India	13,241.825	SAU	Saudi Arabia	19,380.960	MAR	Morocco	7,183.823
8. NATURAL RISK MANAGEMENT								
EUN	European Union	891,377.709	EUN	European Union	957,094.455	USA	United States	747,343.845
GBR	United Kingdom	654,233.375	GBR	United Kingdom	772,271.118	CHN	China	341,667.824
USA	United States	482,346.718	USA	United States	537,328.147	CAN	Canada	257,576.861
CHN	China	329,869.494	CHN	China	380,711.906	RUS	Russian Federation	151,401.570
CAN	Canada	185,661.421	CAN	Canada	225,343.727	NOR	Norway	126,066.923
FRA	France	153,811.043	SGP	Singapore	183,191.580	DEU	Germany	119,247.000
SGP	Singapore	152,187.800	FRA	France	147,585.089	MEX	Mexico	81,449.757
JPN	Japan	120,477.087	JPN	Japan	122,186.681	KAZ	Kazakhstan	62,955.277
RUS	Russian Federation	109,303.450	DEU	Germany	117,548.000	HKG	Hong Kong, China	59,074.883

AGGREGATED DATA FOR THE YEAR 2004			AGGREGATED DATA FOR THE YEAR 2005			AGGREGATED DATA FOR THE YEAR 2006		
Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)	Reporter	Reporter Name	Total Trade Value($ '000)
DEU	Germany	96,972.000	NLD	Netherlands	112,657.306	MYS	Malaysia	56,050.296
9. NATURAL RESOURCES PROTECTION								
EUN	European Union	69,627.690	EUN	European Union	75,796.135	USA	United States	44,449.557
USA	United States	44,892.980	USA	United States	40,982.714	KOR	Korea, Rep.	29,133.005
JPN	Japan	29,433.749	JPN	Japan	32,711.895	NOR	Norway	24,449.045
FRA	France	24,795.783	FRA	France	28,743.844	MEX	Mexico	16,795.992
ESP	Spain	23,916.863	KOR	Korea, Rep.	26,500.153	RUS	Russian Federation	15,630.032
KOR	Korea, Rep.	21,547.663	ESP	Spain	24,499.814	DNK	Denmark	14,405.854
NOR	Norway	18,458.204	NOR	Norway	21,039.077	MAR	Morocco	13,605.686
SGP	Singapore	17,432.235	GHA	Ghana	19,467.052	GHA	Ghana	13,278.407
DNK	Denmark	16,037.051	SGP	Singapore	19,381.734	CHN	China	12,095.779
MAR	Morocco	13,306.438	MAR	Morocco	14,859.883	TZA	Tanzania	10,851.627
10. NOISE AND VIBRATION ABATEMENT								
USA	United States	4,535,286.712	USA	United States	5,016,735.633	USA	United States	5,256,511.393
HUN	Hungary	2,135,235.000	HUN	Hungary	2,466,250.815	DEU	Germany	2,435,641.000
CAN	Canada	1,904,696.705	CAN	Canada	2,022,967.113	CAN	Canada	1,798,516.897
DEU	Germany	1,835,911.000	DEU	Germany	1,953,142.000	CHN	China	1,668,484.466
FRA	France	1,660,564.026	FRA	France	1,801,921.890	MEX	Mexico	1,216,729.776
EUN	European Union	1,525,270.349	EUN	European Union	1,592,722.694	AUT	Austria	1,122,891.014
CHN	China	1,411,652.990	GBR	United Kingdom	1,371,641.643	SWE	Sweden	460,307.670
GBR	United Kingdom	1,283,190.838	MEX	Mexico	1,266,720.996	BRA	Brazil	430,246.488
MEX	Mexico	985,081.408	CHN	China	1,218,135.397	KOR	Korea, Rep.	325,846.928
AUT	Austria	941,760.556	AUT	Austria	1,092,262.609	BEL	Belgium	178,288.990

ANNEX 4: TOP TEN EXPORTERS OF ENVIRONMENTAL GOODS FROM DEVELOPED AND DEVELOPING COUNTRIES (2006)*

Reporter	Reporter Name	Total Export Value($ '000)	Reporter	Reporter Name	Total Export Value($ '000)
1. AIR POLLUTION CONTROL					
DEU	Germany	10,285,892.000	CHN	China	2,678,371.386
USA	United States	7,600,530.036	ZAF	South Africa	2,424,870.188
BEL	Belgium	1,678,787.144	MEX	Mexico	2,059,280.817
CAN	Canada	1,339,898.708	KOR	Korea, Rep.	1,479,005.740
AUT	Austria	825,842.791	BRA	Brazil	973,377.822
SWE	Sweden	554,360.589	MYS	Malaysia	653,502.636
DNK	Denmark	527,946.110	HKG	Hong Kong, China	616,120.994
FIN	Finland	310,588.986	HRV	Croatia	27,084.944
NOR	Norway	217,861.473	LVA	Latvia	7,870.725
IRL	Ireland	127,748.964	JOR	Jordan	5,762.801
Percentage of Total EG Exports in 2006: 66%			Percentage of Total EG Exports in 2006: 31%		
2. MANAGEMENT OF SOLID AND HAZARDOUS WASTE AND RECYCLING SYSTEMS					
DEU	Germany	14,094,060.000	KOR	Korea, Rep.	3,409,767.279
USA	United States	11,850,264.685	CHN	China	1,767,208.605
SWE	Sweden	1,887,838.202	HKG	Hong Kong, China	1,250,003.863
AUT	Austria	1,833,797.161	MYS	Malaysia	869,363.247
CAN	Canada	1,824,768.579	MEX	Mexico	658,486.400
BEL	Belgium	1,111,231.614	BRA	Brazil	448,853.951
FIN	Finland	1,004,033.926	ZAF	South Africa	104,017.708
DNK	Denmark	744,230.646	HRV	Croatia	48,133.981
NOR	Norway	690,313.168	COL	Colombia	34,852.315
IRL	Ireland	128,753.295	CRI	Costa Rica	20,102.444
Percentage of Total EG Exports in 2006: 79%			Percentage of Total EG Exports in 2006: 19%		
3. CLEAN UP OR REMEDIATION OF SOIL AND WATER					
DEU	Germany	915,262.000	CHN	China	1,023,740.128
USA	United States	368,898.197	MYS	Malaysia	72,497.076
SWE	Sweden	238,250.402	HKG	Hong Kong, China	60,195.709
CAN	Canada	95,727.082	MAR	Morocco	26,133.521
DNK	Denmark	78,278.821	KOR	Korea, Rep.	24,048.763
IRL	Ireland	60,087.808	MEX	Mexico	10,529.460
NOR	Norway	58,663.806	ZAF	South Africa	10,376.404
BEL	Belgium	48,008.746	BRA	Brazil	7,333.208
FIN	Finland	41,469.157	LVA	Latvia	3,058.662
AUT	Austria	37,062.464	HRV	Croatia	1,774.396
Percentage of Total EG Exports in 2006: 58%			Percentage of Total EG Exports in 2006: 37%		
4. RENEWABLE ENERGY PLANT					
EU	European Union	17,942,832.724	CHN	China	9,104,812.84
DEU	Germany	16,119,314.200	MEX	Mexico	4,800,652.82
JAP	Japan	14,666,219.786	HKG	Hong Kong, China	4,709,494.44
USA	United States	13,128,662.273	TAI	Taiwan, China	3,191,704.655
FR	France	5,145,901.673	MYS	Malaysia	2,452,848.363
UK	United Kingdom	4,232,814.994	THL	Thailand	1,500,032.992
ITL	Italy	4,016,056.210	CZH	Czech Republic	1,068,303.744
DNK	Denmark	2,928,735.781	HUN	Hungary	848,373.61
CAN	Canada	2,192,116.409	BRA	Brazil	528,850.36
BEL	Belgium	1,990,327.989	POL	Poland	523,647.968
Percentage of Total EG Exports in 2006: 58%			Percentage of Total EG Exports in 2006: 38%		
5. HEAT AND ENERGY MANAGEMENT					
DEU	Germany	1,657,256.000	CHN	China	523,970.840
USA	United States	1,083,346.306	KOR	Korea, Rep.	418,446.300
SWE	Sweden	514,449.189	MEX	Mexico	339,833.881
BEL	Belgium	225,315.344	BRA	Brazil	108,562.269
DNK	Denmark	210,153.450	MYS	Malaysia	71,260.602
CAN	Canada	160,475.742	HKG	Hong Kong, China	32,211.766
AUT	Austria	146,978.051	ZAF	South Africa	27,651.176
FIN	Finland	113,059,605	MLT	Malta	13,044.966
NOR	Norway	33,484,426	COL	Colombia	9,604.608
IRL	Ireland	1,252,395	LVA	Latvia	3,942.036
Percentage of Total EG Exports in 2006: 69%			Percentage of Total EG Exports in 2006: 26%		

** The figures for Renewable Energy Plant as well as Wastewater Management and Potable Water Treatment indicate average import values for the period 2004-2006.*

Reporter	Reporter Name	Total Export Value($ '000)	Reporter	Reporter Name	Total Export Value($ '000)
6. WASTE WATER MANAGEMENT AND POTABLE WATER TREATMENT					
EU	European Union	21,766,021.736	CHN	China	7,287,551.616
DEU	Germany	19,409,537.400	TAI	Taiwan, China	2,617,969.222
USA	United States	12,900,561.425	MEX	Mexico	2,521,626.877
ITL	Italy	11,019,142.546	KOR	Korea, Rep.	2,138,664.332
JAP	Japan	6,632,974.055	CZH	Czech Republic	1,662,142.610
FR	France	6,176,062.286	POL	Poland	1,311,476.686
UK	United Kingdom	4,328,066.470	HKG	Hong Kong, China	1,220,851.426
CAN	Canada	3,353,632.208	TUR	Turkey	833,419.036
SP	Spain	2,752,246.810	RUS	Russian Federation	782,134.073
SWE	Sweden	2,377,390.082	THL	Thailand	750,186.886
Percentage of Total EG Exports in 2006: 65%			Percentage of Total EG Exports in 2006: 28%		
7. ENVIRONMENTALLY PREFERABLE PRODUCTS, BASED ON END USE AND OR DISPOSAL CHARACTERISTICS					
BEL	Belgium	15,139.627	BRA	Brazil	31,966.385
USA	United States	4,245.249	TZA	Tanzania	7,581.631
DEU	Germany	2,157.000	PAK	Pakistan	4,413.924
SWE	Sweden	842.379	CHN	China	2,244.291
DNK	Denmark	466.359	ZAF	South Africa	1,004.112
CAN	Canada	383.291	CIV	Cote d'Ivoire	954.414
IRL	Ireland	287.438	HKG	Hong Kong, China	255.699
AUT	Austria	206.817	MYS	Malaysia	127.079
NOR	Norway	105.630	UGA	Uganda	118.819
FIN	Finland	8.573	GHA	Ghana	101.483
Percentage of Total EG Exports in 2006: 32%			Percentage of Total EG Exports in 2006: 66%		
8. NATURAL RISK MANAGEMENT					
USA	United States	1,488,135.306	CHN	China	243,751.141
CAN	Canada	446,668.031	HKG	Hong Kong, China	55,836.228
DEU	Germany	390,963.000	MYS	Malaysia	38,442.344
FIN	Finland	143,651.351	MEX	Mexico	23,792.620
NOR	Norway	141,010.135	ZAF	South Africa	8,051.161
SWE	Sweden	48,498.979	UGA	Uganda	3,412.596
AUT	Austria	21,263.333	KOR	Korea, Rep.	3,166.660
DNK	Denmark	17,276.214	BRA	Brazil	2,838.374
BEL	Belgium	8,964.192	YEM	Yemen	2,341.083
ISL	Iceland	1,745.089	MLT	Malta	1,657.388
Percentage of Total EG Exports in 2006: 86%			Percentage of Total EG Exports in 2006: 12%		
9. NATURAL RESOURCES PROTECTION					
USA	United States	24,016.873	CHN	China	217,779.569
NOR	Norway	18,164.463	KOR	Korea, Rep.	44,704.761
DNK	Denmark	12,996.075	MYS	Malaysia	10,033.702
SWE	Sweden	5,827.265	MEX	Mexico	8,100.009
AUT	Austria	5,692.089	HKG	Hong Kong, China	5,706.274
DEU	Germany	4,308.000	CRI	Costa Rica	4,835.098
ISL	Iceland	3,752.7 44	PER	Peru	4,134.082
BEL	Belgium	2,038.756	FRO	Faeroe Islands	3,865.630
CAN	Canada	966.761	BRA	Brazil	2,834.726
IRL	Ireland	919.918	LVA	Latvia	1,981.839
Percentage of Total EG Exports in 2006: 19%			Percentage of Total EG Exports in 2006: 74%		
10. NOISE AND VIBRATION ABATEMENT					
DEU	Germany	5,608,618.000	MEX	Mexico	1,501,958.553
USA	United States	2,900,488.985	CHN	China	552,390.899
CAN	Canada	1,176,085.628	BRA	Brazil	464,175.273
AUT	Austria	624,801.739	KOR	Korea, Rep.	135,239.809
BEL	Belgium	224,325.659	HKG	Hong Kong, China	73,414.082
SWE	Sweden	111,790.601	ZAF	South Africa	36,336.513
NOR	Norway	40,213.403	MYS	Malaysia	19,251.891
FIN	Finland	19,524.256	MAR	Morocco	5,878.493
DNK	Denmark	12,223.122	COL	Colombia	5,156.584
IRL	Ireland	10,121.781	BHR	Bahrain	1,312.849
Percentage of Total EG Exports in 2006: 78%			Percentage of Total EG Exports in 2006: 20%		

ANNEX 5: TOP TEN IMPORTERS OF ENVIRONMENTAL GOODS FROM DEVELOPED AND DEVELOPING COUNTRIES (2006)*

Reporter	Reporter Name	Total Import Value($ '000)	Reporter	Reporter Name	Total Import Value($ '000)
1. AIR POLLUTION CONTROL					
USA	United States	8,474,496.537	CHN	China	5,035,217.308
DEU	Germany	5,009,435.000	MEX	Mexico	2,487,541.329
CAN	Canada	2,648,930.373	KOR	Korea, Rep.	1,975,284.828
BEL	Belgium	1,264,893.697	HKG	Hong Kong, China	777,957.554
SWE	Sweden	914,210.875	MYS	Malaysia	648,803.428
AUT	Austria	872,621.013	BRA	Brazil	643,445.092
NOR	Norway	373,870.814	ZAF	South Africa	459,275.278
DNK	Denmark	361,745.453	PAK	Pakistan	296,456.031
FIN	Finland	305,434.030	COL	Colombia	184,973.410
IRL	Ireland	191,791.895	PER	Peru	113,698.621
Percentage of Total EG Imports in 2006: 55%			Percentage of Total EG Imports in 2006: 34%		
2. MANAGEMENT OF SOLID AND HAZARDOUS WASTE AND RECYCLING SYSTEMS					
USA	United States	8,055,515.881	CHN	China	11,260,255.086
DEU	Germany	5,181,756.000	KOR	Korea, Rep.	5,944,796.422
CAN	Canada	2,114,723.259	MEX	Mexico	2,367,442.274
BEL	Belgium	1,165,477.506	MYS	Malaysia	1,528,235.846
AUT	Austria	1,164,575.263	HKG	Hong Kong, China	1,295,773.122
NOR	Norway	856,410.589	BRA	Brazil	675,453.811
SWE	Sweden	829,521.294	ZAF	South Africa	533,694.661
DNK	Denmark	588,763.078	PAK	Pakistan	233,628.186
FIN	Finland	398,643.644	MAR	Morocco	196,154.972
IRL	Ireland	337,180.174	HRV	Croatia	161,337.347
Percentage of Total EG Imports in 2006: 43%			Percentage of Total EG Imports in 2006: 50%		
3. CLEAN UP OR REMEDIATION OF SOIL AND WATER					
USA	United States	830,949.677	CHN	China	346,989.687
DEU	Germany	325,187.000	MEX	Mexico	86,582.450
CAN	Canada	182,638.294	KOR	Korea, Rep.	84,703.537
DNK	Denmark	98,581.845	HKG	Hong Kong, China	52,009.245
BEL	Belgium	80,153.401	BRA	Brazil	39,835.238
NOR	Norway	77,536.678	MYS	Malaysia	33,513.657
SWE	Sweden	75,514.787	ZAF	South Africa	22,046.195
FIN	Finland	38,571.179	MAR	Morocco	20,279.297
AUT	Austria	37,058.080	PAK	Pakistan	13,328.994
IRL	Ireland	25,585.742	PER	Peru	11,819.382
Percentage of Total EG Imports in 2006: 60%			Percentage of Total EG Imports in 2006: 24%		
4. RENEWABLE ENERGY PLANT					
USA	United States	18,908,831.826	CHN	China	11,442,706.302
EU	European Union	13,703,394.361	HKG	Hong Kong, China	4,638,663.461
DEU	Germany	10,419,449.600	MEX	Mexico	4,319,835.469
JAP	Japan	5,111,778.531	KOR	Korea, Rep.	3,966,574.427
CAN	Canada	4,613,650.215	TAI	Taiwan, China	2,840,591.165
UK	United Kingdom	4,214,418.192	BRA	Brazil	1,601,104.843
FR	France	3,648,941.766	THL	Thailand	1,528,343.303
ITL	Italy	3,227,341.560	MYS	Malaysia	1,446,166.811
SP	Spain	2,749,674.201	RUS	Russian Federation	1,078,725.789
NEL	Netherlands	2,553,287.263	IND	India	1,065,557.801
Percentage of Total EG Imports in 2006: 67%			Percentage of Total EG Imports in 2006: 22%		
5. HEAT AND ENERGY MANAGEMENT					
USA	United States	839,081.085	CHN	China	554,340.567
DEU	Germany	806,210.000	MEX	Mexico	298,701.673
CAN	Canada	439,700.093	KOR	Korea, Rep.	114,270.459
BEL	Belgium	241,179.348	BRA	Brazil	106,108.343
SWE	Sweden	168,601.224	MYS	Malaysia	73,171.323
AUT	Austria	163,575.198	HKG	Hong Kong, China	48,991.427
DNK	Denmark	100,007.174	ZAF	South Africa	48,283.796
FIN	Finland	83,558.036	COL	Colombia	45,414.936
NOR	Norway	81,449.783	PAK	Pakistan	30,621.595
IRL	Ireland	22,725.218	HRV	Croatia	24,415.132
Percentage of Total EG Imports in 2006: 57%			Percentage of Total EG Imports in 2006: 26%		

** The figures for Renewable Energy Plant as well as Wastewater Management and Potable Water Treatment indicate average import values for the period 2004-2006.*

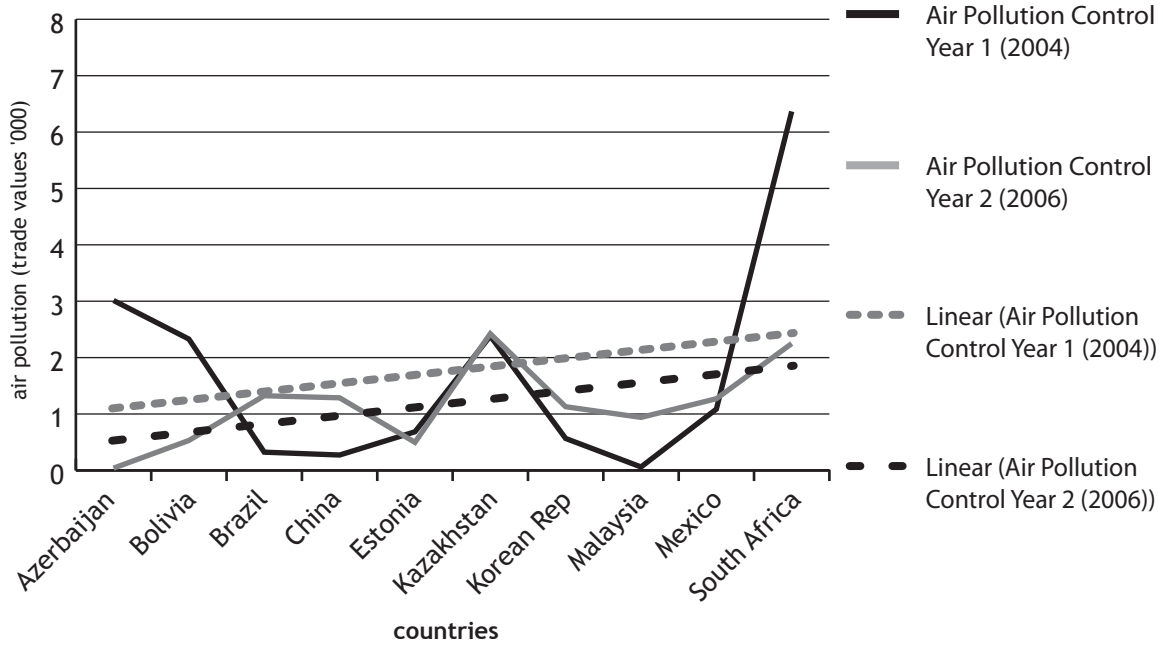
Reporter	Reporter Name	Total Import Value($ '000)	Reporter	Reporter Name	Total Import Value($ '000)
6. WASTE WATER MANAGEMENT AND POTABLE WATER TREATMENT					
USA	United States	16,932,354.642	CHN	China	6,085,210.285
EU	European Union	10,013,865.273	MEX	Mexico	4,583,508.499
DEU	Germany	9,527,430.000	KOR	Korea, Rep.	2,807,960.286
FR	France	5,888,953.760	POL	Poland	2,066,870.690
CAN	Canada	5,060,540.737	TAI	Taiwan, China	1,888,098.657
UK	United Kingdom	4,672,870.936	THL	Thailand	1,831,932.651
ITL	Italy	3,736,665.326	RUS	Russian Federation	1,632,751.839
JAP	Japan	3,146,065.276	CZH	Czech Republic	1,469,058.502
SP	Spain	2,964,183.101	HKG	Hong Kong, China	1,318,745.204
BEL	Belgium	2,715,260.567	MYS	Malaysia	1,018,803.320
Percentage of Total EG Imports in 2006: 65%			Percentage of Total EG Imports in 2006: 28%		
7. ENVIRONMENTALLY PREFERABLE PRODUCTS, BASED ON END USE AND OR DISPOSAL CHARACTERISTICS					
BEL	Belgium	52,348.336	CHN	China	65,422.784
USA	United States	26,099.029	PAK	Pakistan	46,775.933
DEU	Germany	9,757.000	GHA	Ghana	16,609.626
CAN	Canada	2,106.783	CIV	Cote d'Ivoire	8,624.403
AUT	Austria	1,418.396	MEX	Mexico	8,386.405
IRL	Ireland	1,199.557	MAR	Morocco	7,183.823
DNK	Denmark	889.249	BRA	Brazil	4,134.190
SWE	Sweden	671.965	ZAF	South Africa	3,331.609
NOR	Norway	444.660	KOR	Korea, Rep.	3,136.353
ISL	Iceland	306.463	JOR	Jordan	2,720.744
Percentage of Total EG Imports in 2006: 33%			Percentage of Total EG Imports in 2006: 57%		
8. NATURAL RISK MANAGEMENT					
USA	United States	747,343.845	CHN	China	341,667.824
CAN	Canada	257,576.861	MEX	Mexico	81,449.757
NOR	Norway	126,066.923	HKG	Hong Kong, China	59,074.883
DEU	Germany	119,247.000	MYS	Malaysia	56,050.296
DNK	Denmark	28,584.288	ZAF	South Africa	37,810.199
FIN	Finland	23,090.015	KOR	Korea, Rep.	28,660.522
SWE	Sweden	22,193.489	BRA	Brazil	20,514.499
AUT	Austria	19,635.049	PAK	Pakistan	13,807.516
BEL	Belgium	19,107.746	COL	Colombia	13,242.899
IRL	Ireland	12,684.506	BOL	Bolivia	7,369.610
Percentage of Total EG Imports in 2006: 58%			Percentage of Total EG Imports in 2006: 28%		
9. NATURAL RESOURCES PROTECTION					
USA	United States	44,449.557	KOR	Korea, Rep.	29,133.005
NOR	Norway	24,449.045	MEX	Mexico	16,795.992
DNK	Denmark	14,405.854	MAR	Morocco	13,605.686
SWE	Sweden	10,237.359	GHA	Ghana	13,278.407
CAN	Canada	8,770.182	CHN	China	12,095.779
DEU	Germany	6,909.000	TZA	Tanzania	10,851.627
AUT	Austria	4,405.931	MYS	Malaysia	8,514.480
FIN	Finland	4,247.150	HKG	Hong Kong, China	8,300.863
ISL	Iceland	3,398.736	PER	Peru	5,541.294
BEL	Belgium	3,359.951	BRA	Brazil	5,419.172
Percentage of Total EG Imports in 2006: 41%			Percentage of Total EG Imports in 2006: 40%		
10. NOISE AND VIBRATION ABATEMENT					
USA	United States	5,256,511.393	CHN	China	1,668,484.466
DEU	Germany	2,435,641.000	MEX	Mexico	1,216,729.776
CAN	Canada	1,798,516.897	BRA	Brazil	430,246.488
AUT	Austria	1,122,891.014	KOR	Korea, Rep.	325,846.928
SWE	Sweden	460,307.670	MYS	Malaysia	128,028.923
BEL	Belgium	178,288.990	HKG	Hong Kong, China	88,928.383
DNK	Denmark	38,182.691	ZAF	South Africa	82,600.063
NOR	Norway	28,871.923	COL	Colombia	56,943.290
FIN	Finland	26,769.674	PAK	Pakistan	42,880.856
IRL	Ireland	8,669.048	PER	Peru	20,354.943
Percentage of Total EG Imports in 2006: 72%			Percentage of Total EG Imports in 2006: 26%		

ANNEX 6: DYNAMIC COMPARATIVE ADVANTAGE IN ENVIRONMENTAL GOODS

Trend Developing Countries: Air Pollution Control

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	3.013009827	0.039430796
Bolivia	2.328489765	0.530576941
Brazil	0.3228337	1.323640278
China	0.272269122	1.286718213
Estonia	0.684254573	0.49733038
Kazakhstan	2.382307401	2.423417716
Korean Rep	0.565952929	1.128639227
Malaysia	0.060638848	0.93963372
Mexico	1.086000383	1.270911975
South Africa	6.36580993	2.24876966

Forecast Value	Year 2015
Base Year 2004	2.4669
Base Year 2006	1.6909

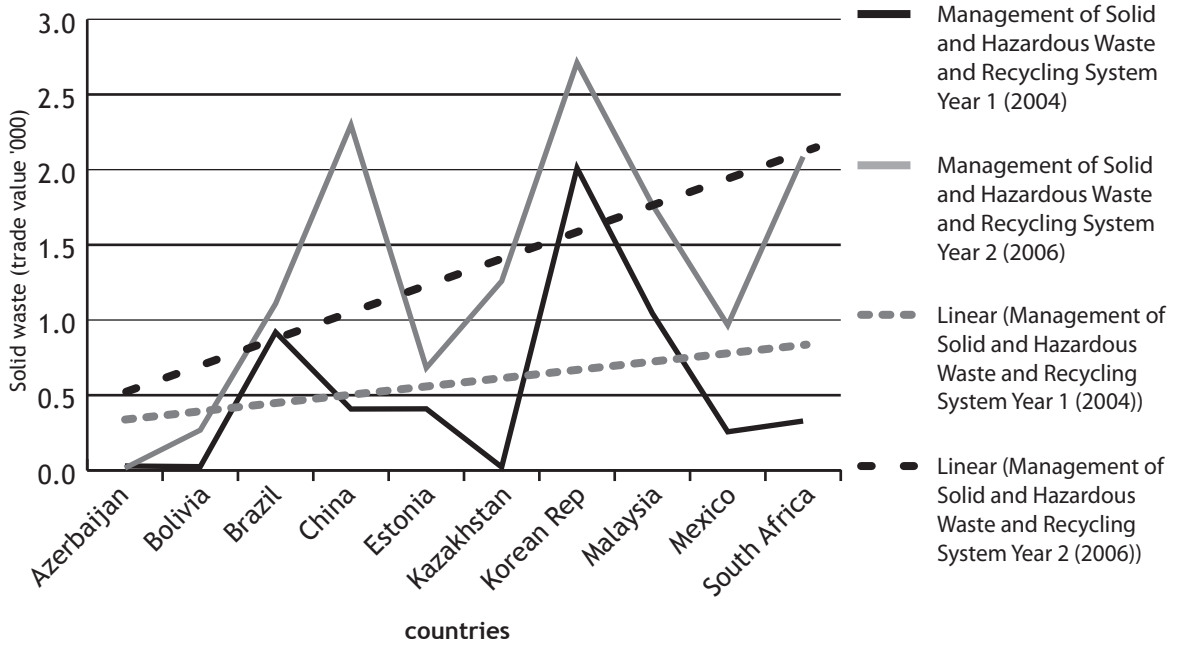


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Management of Solid and Hazardous Waste and Recycling System

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0.029263299	0.015196727
Bolivia	0.024638399	0.267902677
Brazil	0.918639632	1.109192543
China	0.408011293	2.297027858
Estonia	0.409260808	0.681803327
Kazakhstan	0.021891482	1.258761361
Korean Rep	2.010470312	2.711534926
Malaysia	1.044513296	1.766805097
Mexico	0.256531258	0.965555781
South Africa	0.328210812	2.086015668

Forecast Value	Year 2015
Base Year 2004	0.8567
Base Year 2006	1.9232

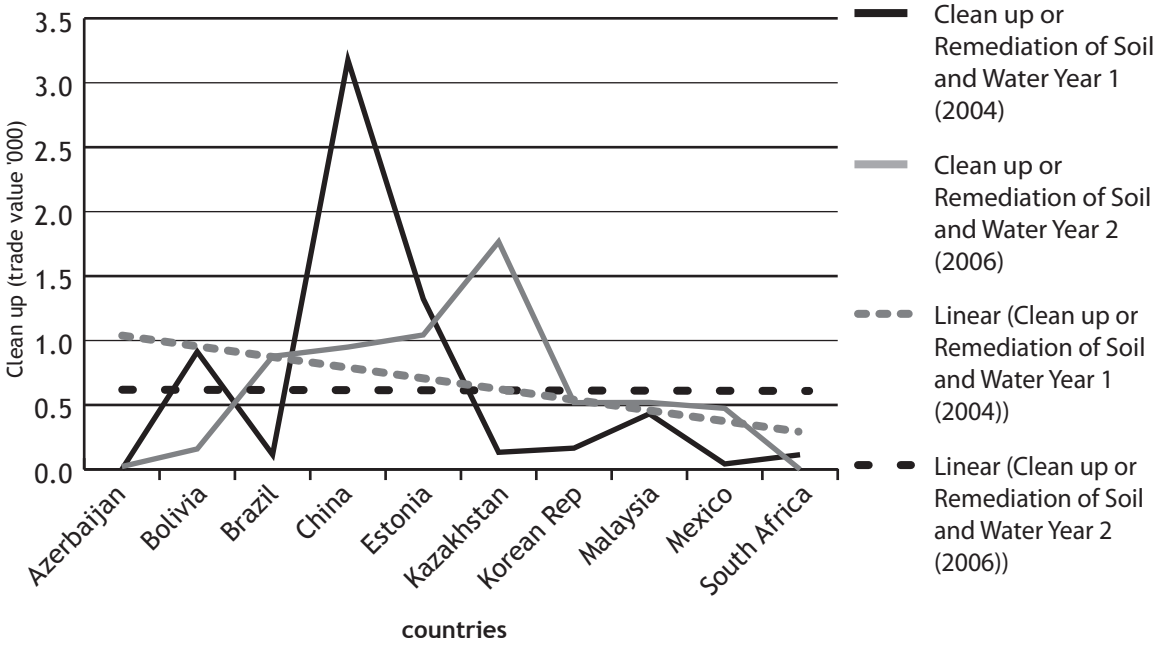


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Clean up or Remediation of Soil and Water

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0.000135243	0.022245718
Bolivia	0.913230645	0.158752684
Brazil	0.114276419	0.877231152
China	3.175861216	0.949226699
Estonia	1.322802523	1.043387944
Kazakhstan	0.132671388	1.766430836
Korean Rep	0.165138349	0.518101806
Malaysia	0.431239221	0.51958359
Mexico	0.042263149	0.473547105
South Africa	0.114000247	0

Forecast Value	Year 2015
Base Year 2004	0.184
Base Year 2006	0.6249

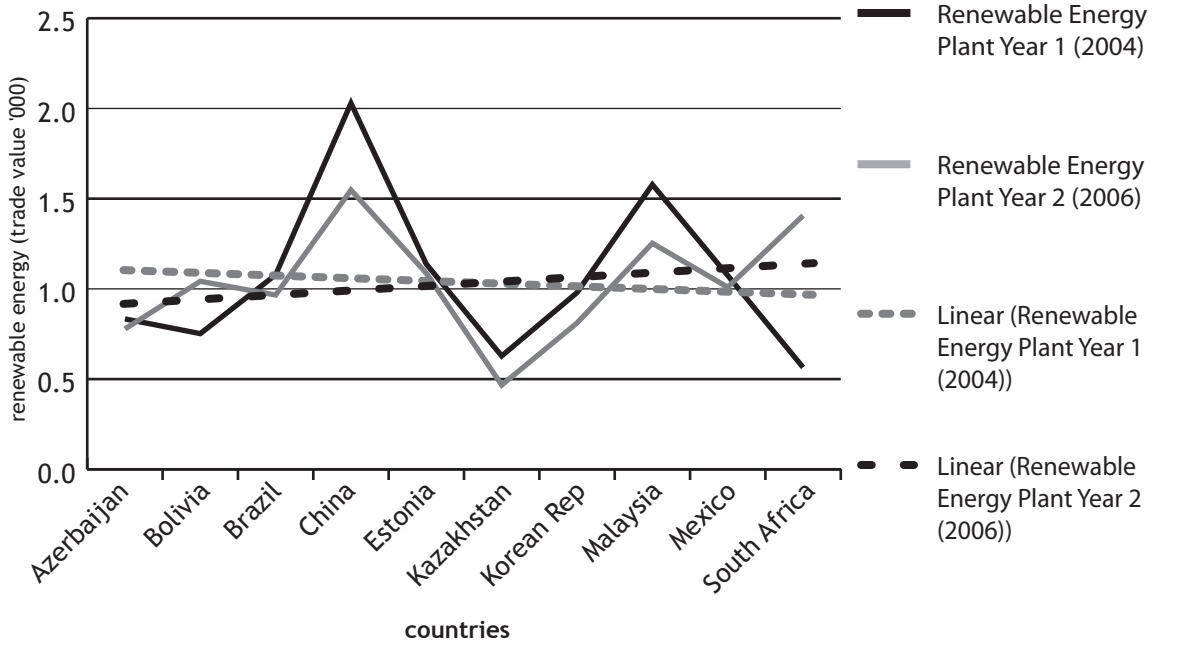


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Renewable Energy Plant

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0.8335921	0.777894876
Bolivia	0.752090065	1.042018182
Brazil	1.078129842	0.966189795
China	2.029134177	1.547948524
Estonia	1.137387455	1.086678764
Kazakhstan	0.628119951	0.467065512
Korean Rep	0.979484177	0.81102594
Malaysia	1.578037722	1.252938536
Mexico	1.074303616	1.009281173
South Africa	0.564764207	1.40642305

Forecast Value	Year 2015
Base Year 2004	1.0216
Base Year 2006	1.122

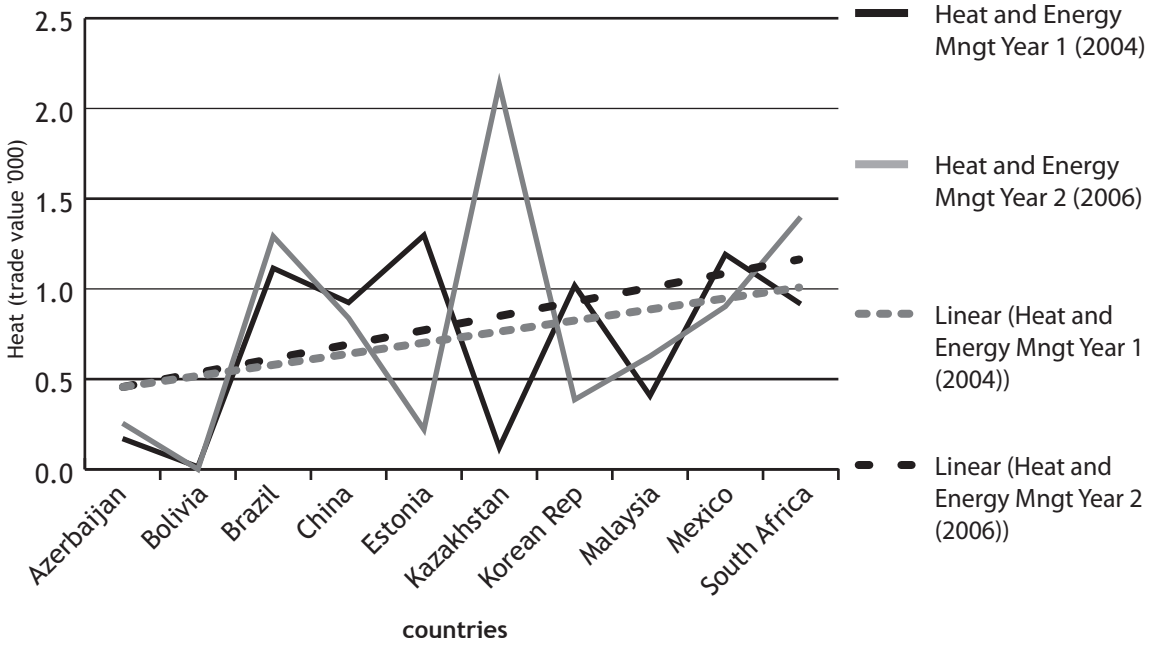


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Heat and Energy Mngt

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0.170276451	0.255266237
Bolivia	0.013500403	0
Brazil	1.114706933	1.291087102
China	0.924390817	0.837894655
Estonia	1.297201321	0.22100788
Kazakhstan	0.120680594	2.13209025
Korean Rep	1.01798175	0.386195237
Malaysia	0.407509221	0.626807081
Mexico	1.1911367	0.902672788
South Africa	0.916040737	1.398365947

Forecast Value	Year 2015
Base Year 2004	1.0684
Base Year 2006	1.0989

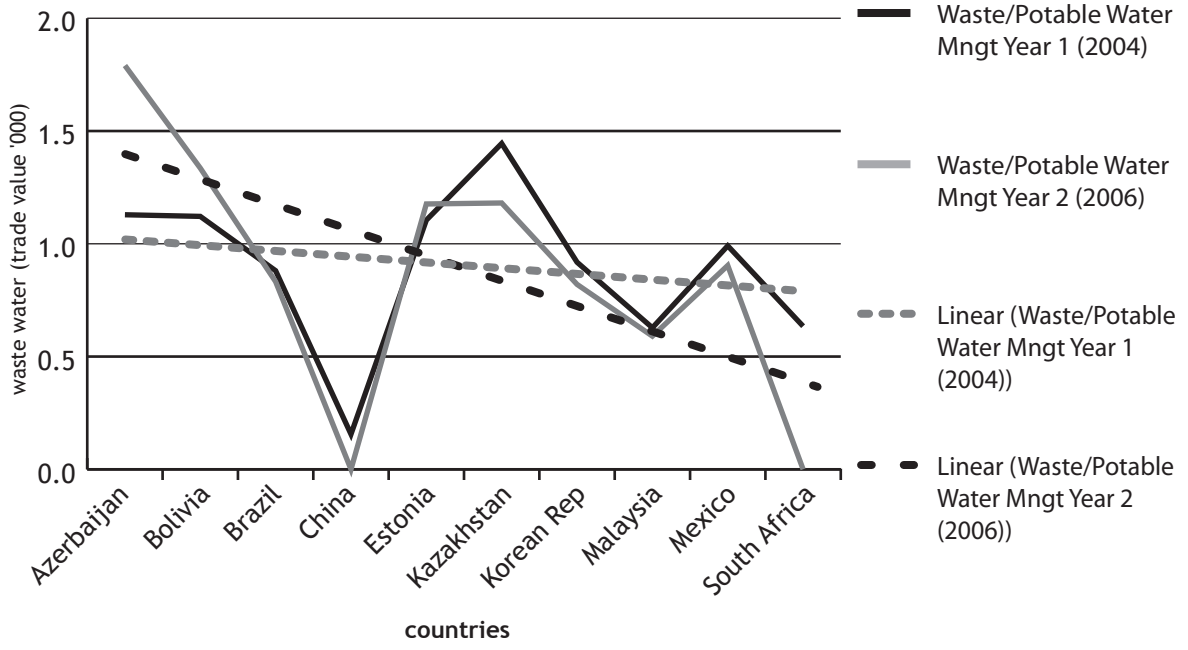


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Waste/Potable Water Mngt

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	1.128694656	1.790427995
Bolivia	1.121482645	1.335616887
Brazil	0.88062402	0.832035034
China	0.155773612	0
Estonia	1.104888202	1.176561702
Kazakhstan	1.444748327	1.180940113
Korean Rep	0.918304057	0.820071152
Malaysia	0.627658826	0.590601105
Mexico	0.991071031	0.903744877
South Africa	0.634552299	0

Forecast Value	Year 2015
Base Year 2004	0.7678
Base Year 2006	0.4834

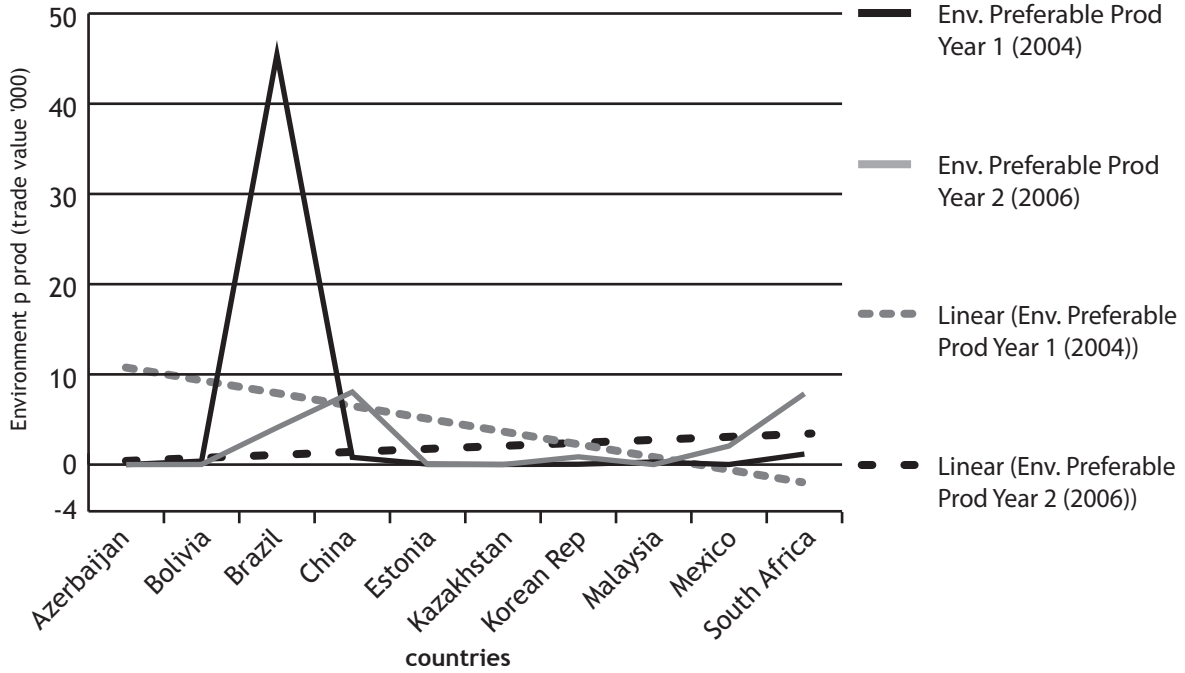


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Env. Preferable Prod

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0	0
Bolivia	0.386570743	0.014428267
Brazil	45.44314228	4.093372868
China	0.803971672	8.046863678
Estonia	0.053999002	0.00033866
Kazakhstan	0.015099217	0
Korean Rep	0.039385968	0.862546947
Malaysia	0.288379096	0
Mexico	0.00862221	2.062307359
South Africa	1.169793157	7.851602851

Forecast Value	Year 2015
Base Year 2004	-2.5197
Base Year 2006	3.205

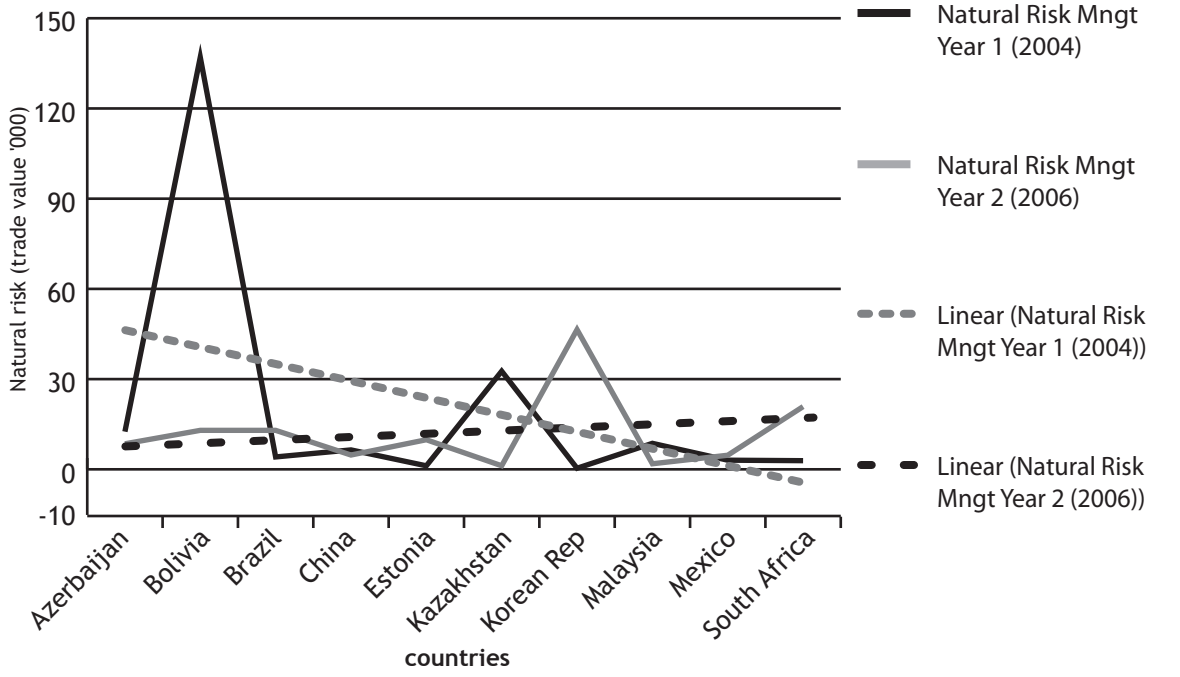


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Natural Risk Mngt

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	12.53270587	8.489932713
Bolivia	137.0247819	12.96195172
Brazil	4.116211732	12.96195172
China	6.454951724	4.754431363
Estonia	1.168904741	9.836678949
Kazakhstan	32.62804658	1.186838615
Korean Rep	0.359320295	46.45754645
Malaysia	8.640851375	1.844967388
Mexico	3.037630242	4.688286519
South Africa	2.874683656	20.85739438

Forecast Value	Year 2015
Base Year 2004	-12.0842
Base Year 2006	14.8276

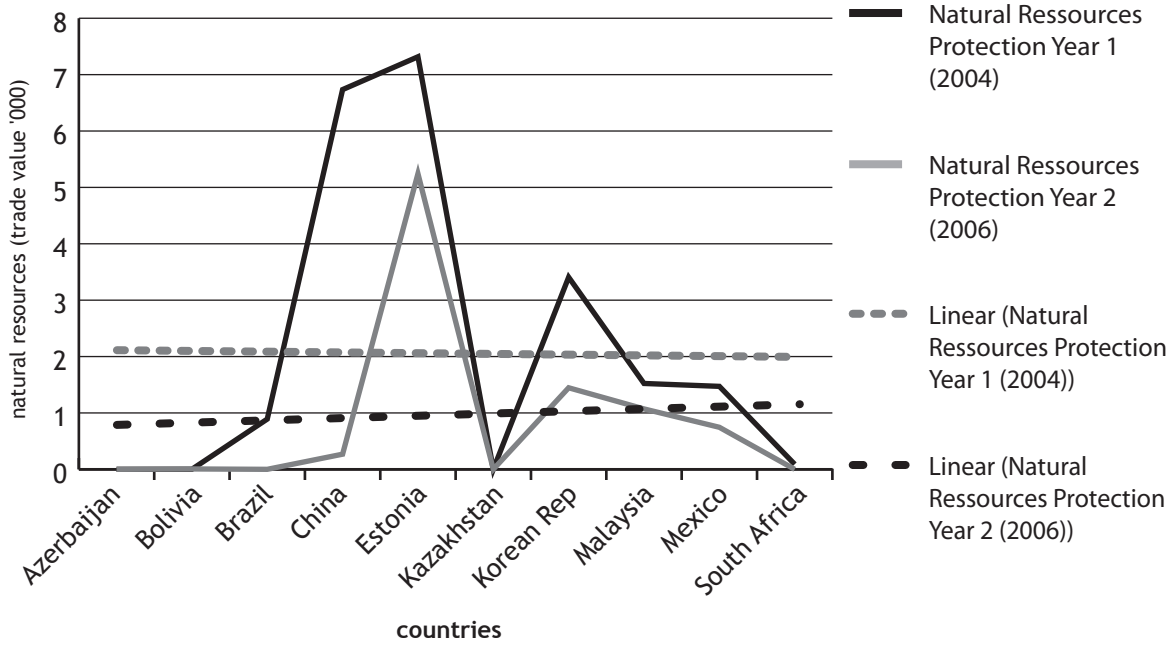


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Natural Resources Protection

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0	1.56879E-05
Bolivia	0.000779126	0.006556946
Brazil	0.891202098	0
China	6.734749054	0.268560315
Estonia	7.316488573	5.243056933
Kazakhstan	0	0
Korean Rep	3.406797872	1.446283594
Malaysia	1.522727967	1.071386948
Mexico	1.471433943	0.745578867
South Africa	0.089448175	0

Forecast Value	Year 2015
Base Year 2004	2.0424
Base Year 2006	1.0656

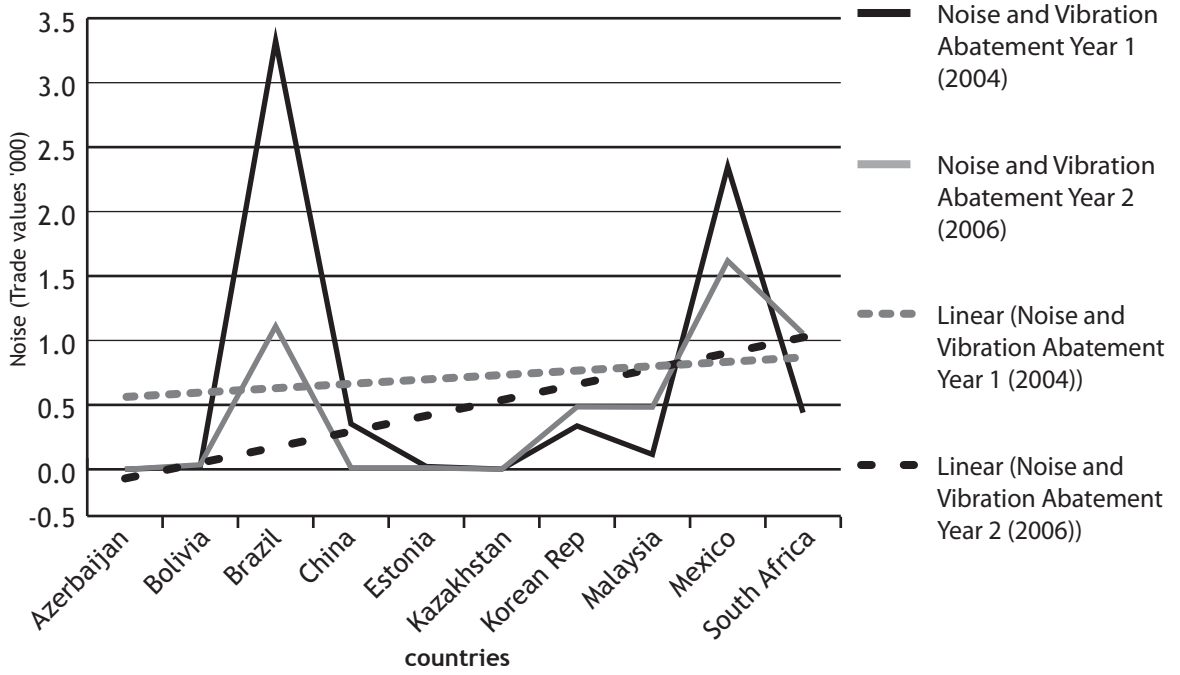


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developing Countries: Noise and Vibration Abatement

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Azerbaijan	0	0
Bolivia	0.023020203	0.035113967
Brazil	3.324593472	1.109385703
China	0.35266147	0.012100388
Estonia	0.02170236	0.012100388
Kazakhstan	0.001615106	0
Korean Rep	0.336711476	0.484433547
Malaysia	0.11588335	0.482446008
Mexico	2.348504831	1.61746343
South Africa	0.439495544	1.052319093

Forecast Value	Year 2015
Base Year 2004	0.834
Base Year 2006	0.8793

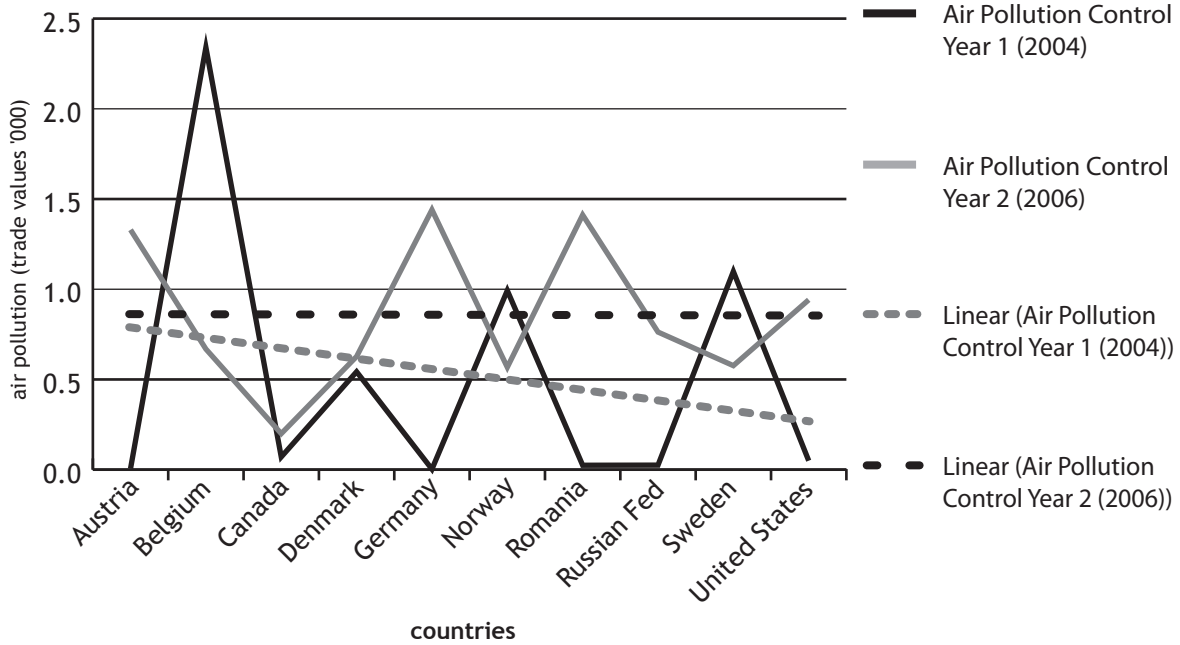


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Air Pollution Control

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	0.006024756	1.329526547
Belgium	2.340339184	0.668454059
Canada	0.070708952	0.199695326
Denmark	0.542650416	0.627170553
Germany	0.00280298	1.440249344
Norway	0.99292087	0.56778317
Romania	0.024518312	1.411684838
Russian Fed	0.025206725	0.762717916
Sweden	1.098402752	0.5765272
United States	0.049644278	0.941423534

Forecast Value	Year 2015
Base Year 2004	0.2123
Base Year 2006	0.8562

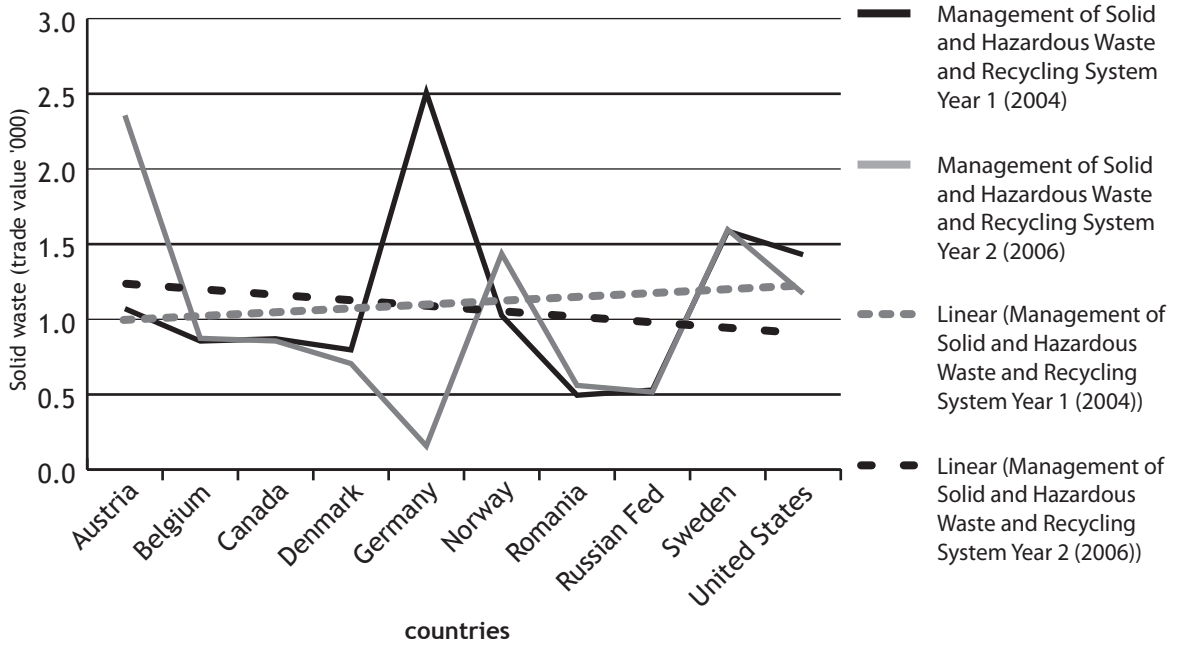


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Management of Solid and Hazardous Waste and Recycling System

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	1.070912144	2.356696901
Belgium	0.855477075	0.873566534
Canada	0.870563779	0.855813206
Denmark	0.796837523	0.705758988
Germany	2.508398027	0.157543788
Norway	1.025283523	1.436154094
Romania	0.495042571	0.560373108
Russian Fed	0.529575798	0.516561691
Sweden	1.586592808	1.596065463
United States	1.42970235	1.171715096

Forecast Value	Year 2015
Base Year 2004	1.2589
Base Year 2006	0.8856

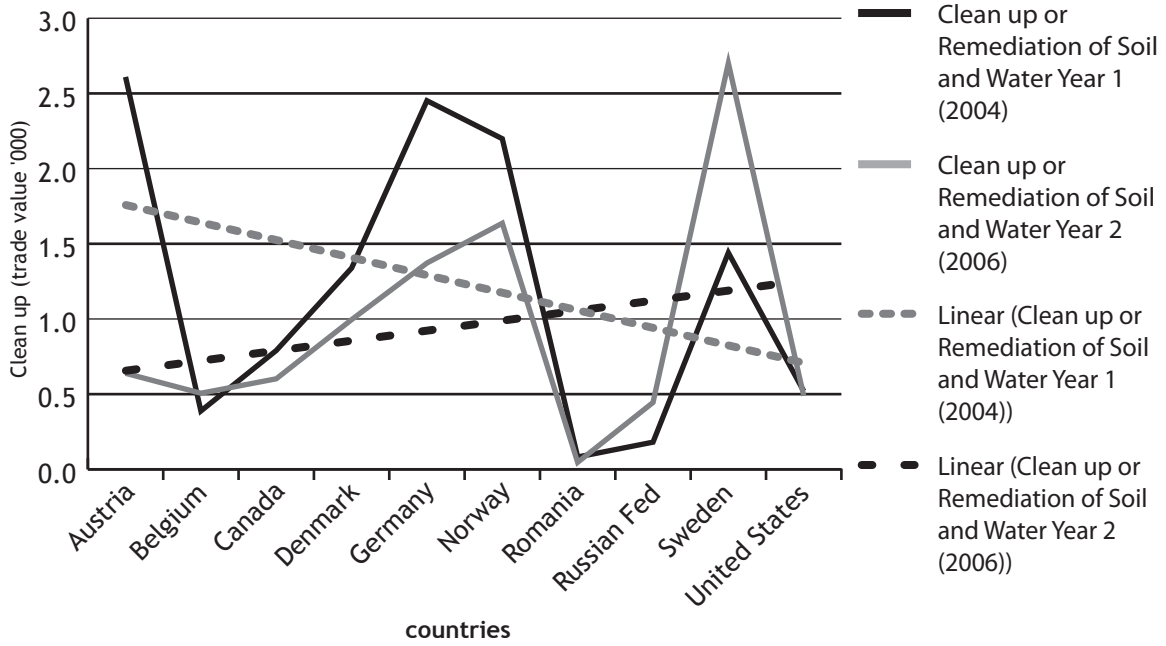


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Clean up or Remediation of Soil and Water

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	2.609772204	0.638736991
Belgium	0.388070246	0.50611255
Canada	0.790255301	0.602062191
Denmark	1.338320331	0.995470716
Germany	2.451587741	1.371921638
Norway	2.198710183	1.636667518
Romania	0.082131363	0.046611456
Russian Fed	0.180656916	0.444511105
Sweden	1.440448681	2.701188653
United States	0.520040375	0.48914301

Forecast Value	Year 2015
Base Year 2004	0.5828
Base Year 2006	1.1688

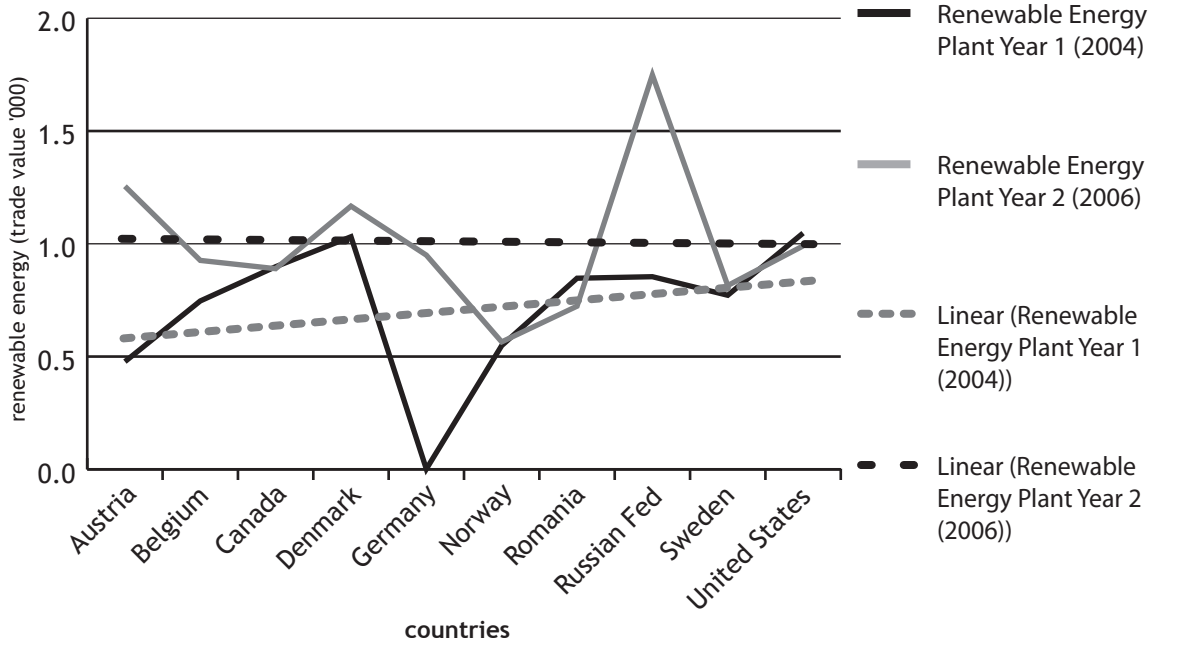


NOTE: *line represents the trend for the year 2004.*
line represents the trend for year 2006.

Trend Developed Countries: Renewable Energy Plant

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	0.47741092	1.255093189
Belgium	0.746503143	0.926328017
Canada	0.898278241	0.889647798
Denmark	1.031217573	1.166987314
Germany	0.001355686	0.949741875
Norway	0.548398313	0.564998257
Romania	0.847288518	0.723356448
Russian Fed	0.854070883	1.748731211
Sweden	0.771742523	0.814907527
United States	1.047384008	0.990493762

Forecast Value	Year 2015
Base Year 2004	0.8918
Base Year 2006	0.9909

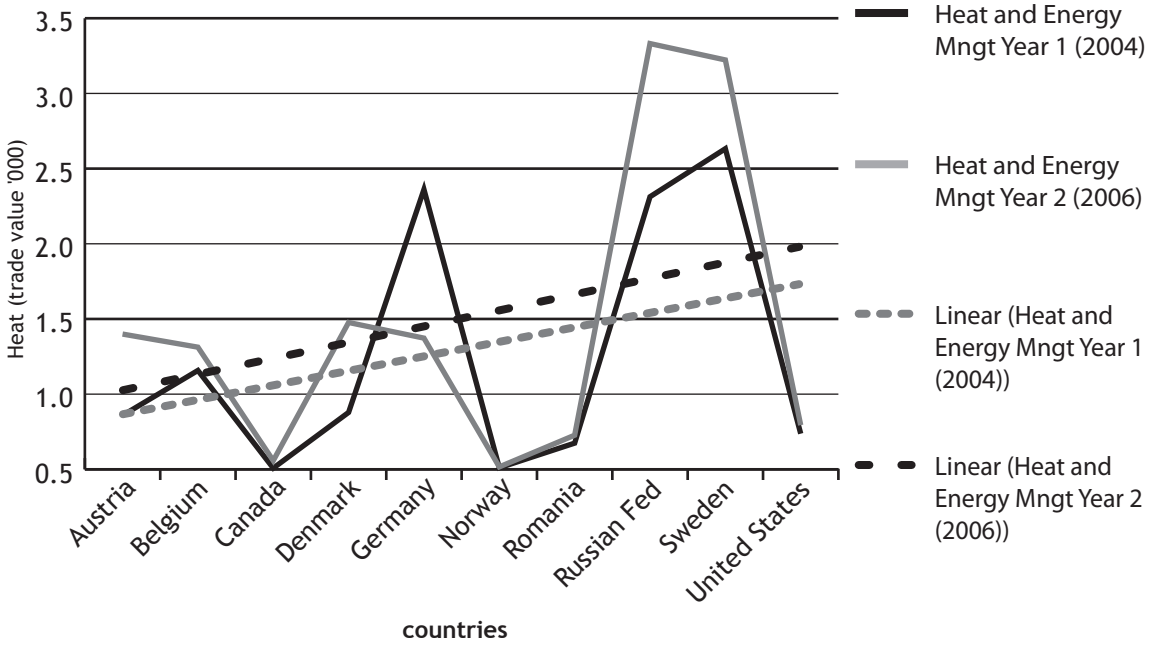


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Heat and Energy Mngt

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	0.85849642	1.399590546
Belgium	1.157544732	1.312432247
Canada	0.507914043	0.557667464
Denmark	0.87860367	1.476658662
Germany	2.361218771	1.372564793
Norway	0.51031514	0.516169652
Romania	0.674178407	0.726955716
Russian Fed	2.312800273	3.331643689
Sweden	2.632378151	3.222724213
United States	0.736976305	0.793699317

Forecast Value	Year 2015
Base Year 2004	1.7894
Base Year 2006	1.867

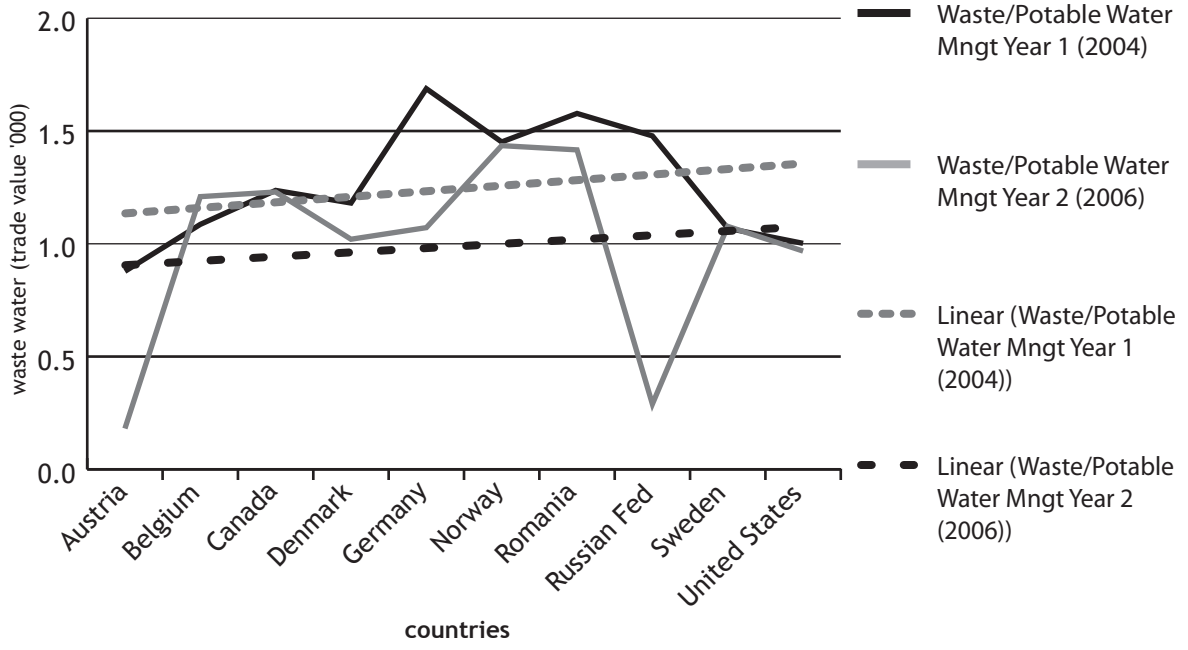


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Waste/Potable Water Mngt

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	0.877823262	0.180899593
Belgium	1.085976046	1.209015966
Canada	1.236712319	1.22962607
Denmark	1.180633185	1.020190978
Germany	1.687809194	1.071602954
Norway	1.451522982	1.435181133
Romania	1.57790277	1.416349376
Russian Fed	1.478412257	0.289397214
Sweden	1.068804075	1.077263223
United States	1.001989479	0.967724138

Forecast Value	Year 2015
Base Year 2004	1.3706
Base Year 2006	1.0532

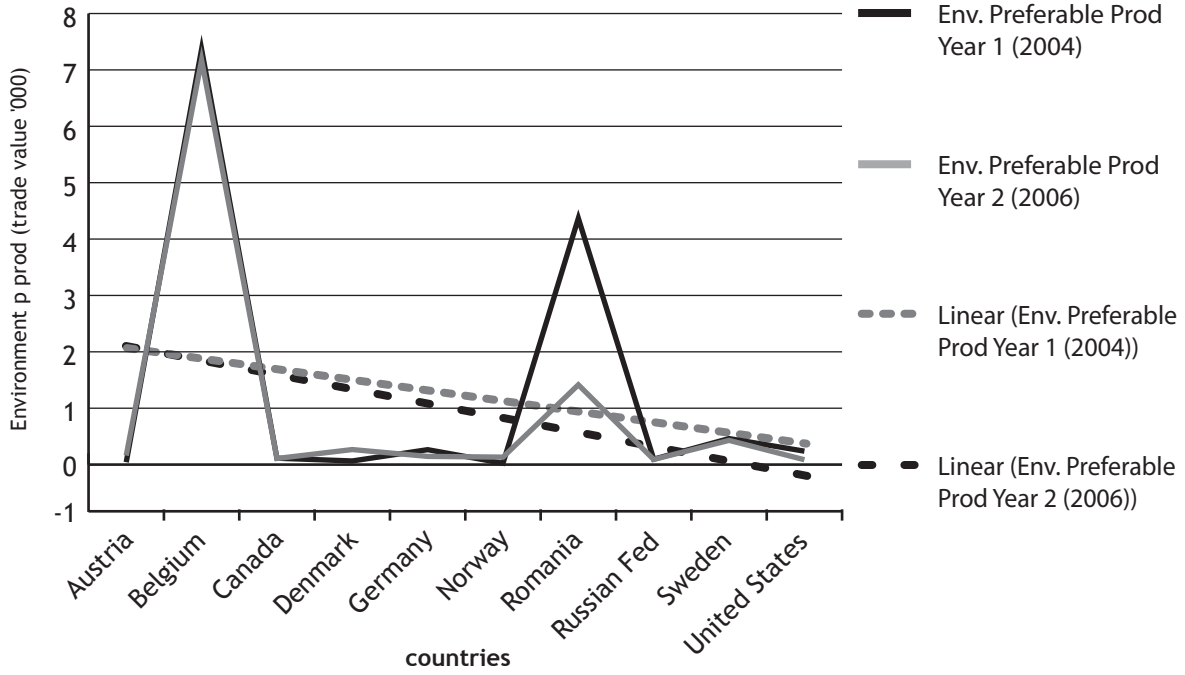


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Env. Preferable Prod

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	0.04198326	0.160257461
Belgium	7.365844276	7.176061705
Canada	0.113107706	0.10838755
Denmark	0.064553003	0.26665444
Germany	0.26466565	0.145371163
Norway	0.023934573	0.132501792
Romania	4.368101534	1.415444229
Russian Fed	0.096132345	0.090994173
Sweden	0.461350808	0.429410887
United States	0.238324022	0.086165491

Forecast Value	Year 2015
Base Year 2004	0.1715
Base Year 2006	0.056

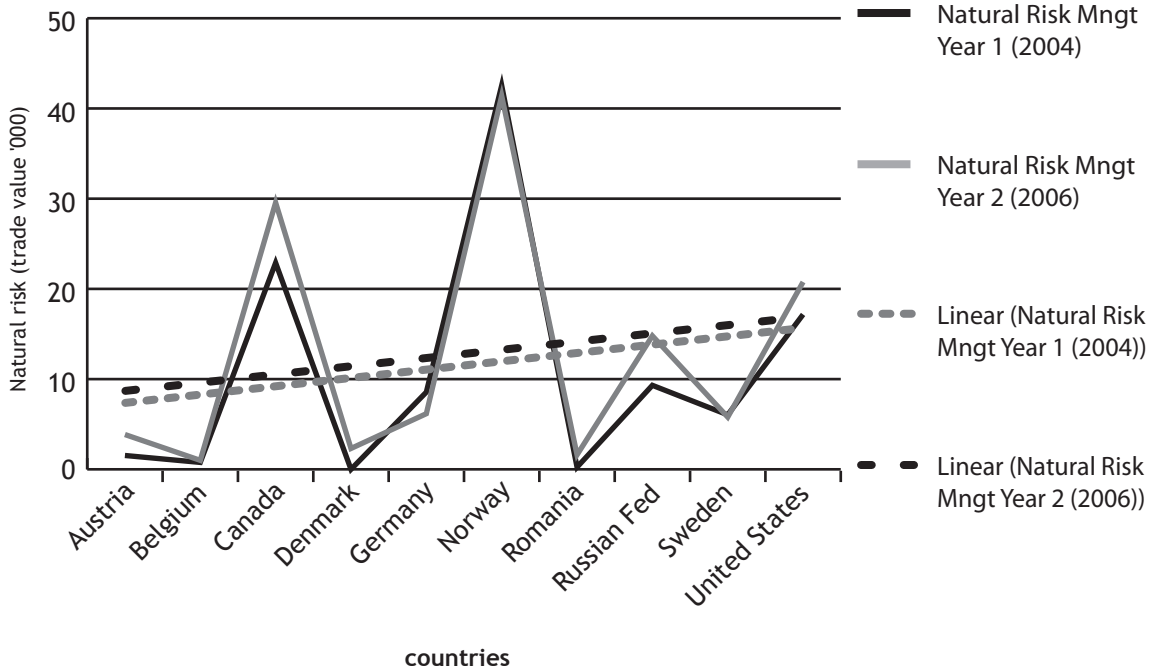


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Natural Risk Mngt

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	1.534709513	3.856649377
Belgium	0.765386409	0.994555289
Canada	22.88741425	29.56531032
Denmark	0	2.312191632
Germany	8.557139983	6.16752005
Norway	42.5445593	41.40297928
Romania	0.240424297	1.60650601
Russian Fed	9.31194184	14.79493082
Sweden	6.039315711	5.786885746
United States	17.16737083	20.76647468

Forecast Value	Year 2015
Base Year 2004	15.7195
Base Year 2006	15.8012

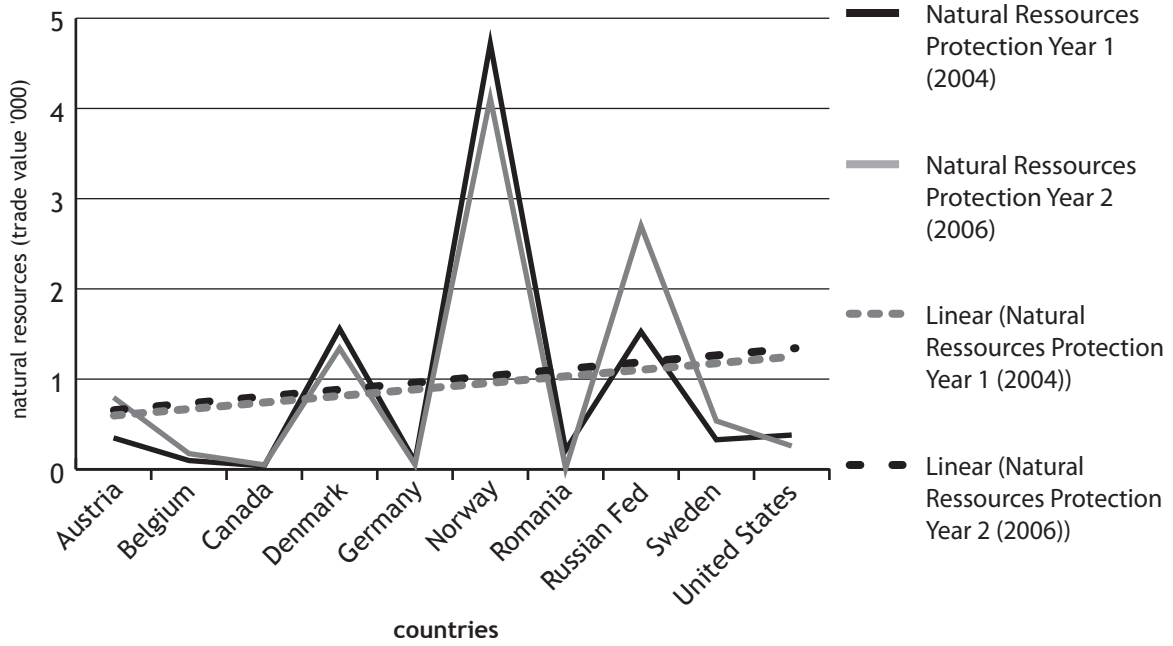


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Natural Resources Protection

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	0.348316219	0.796185157
Belgium	0.097343018	0.174440214
Canada	0.037400375	0.049349218
Denmark	1.55708949	1.341377563
Germany	0.085414241	0.052410003
Norway	4.719168516	4.113082366
Romania	0.213201957	0.010192214
Russian Fed	1.525409541	2.699705737
Sweden	0.327783982	0.536217099
United States	0.37983289	0.258464199

Forecast Value	Year 2015
Base Year 2004	1.26
Base Year 2006	1.2364

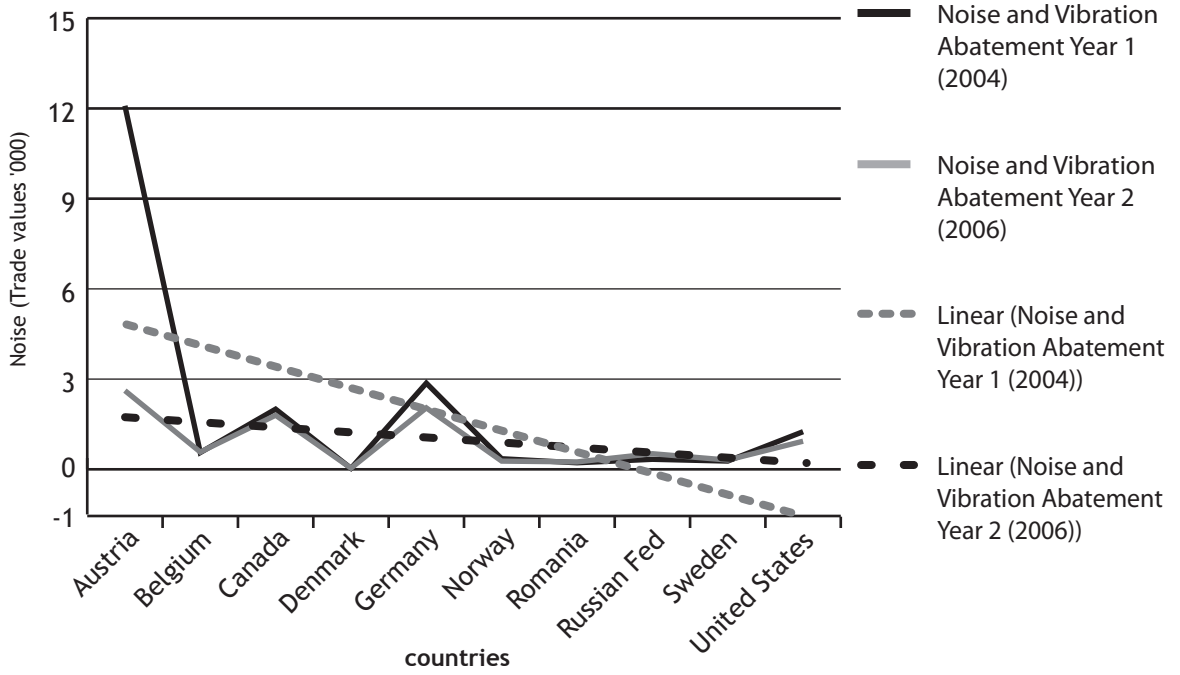


NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

Trend Developed Countries: Noise and Vibration Abatement

AIR POLLUTION CONTROL		
Trade value '000	Year 1 (2004)	Year 2 (2006)
Austria	12.08895174	2.617200702
Belgium	0.55748053	0.574794648
Canada	2.000527615	1.797846033
Denmark	0.03407782	0.037780994
Germany	2.865883749	2.043368785
Norway	0.351561151	0.272689285
Romania	0.21730921	0.245991538
Russian Fed	0.332949202	0.51885025
Sweden	0.273683437	0.308058775
United States	1.251715056	0.934776011

Forecast Value	Year 2015
Base Year 2004	-1.6634
Base Year 2006	0.4143



NOTE: line represents the trend for the year 2004.
line represents the trend for year 2006.

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