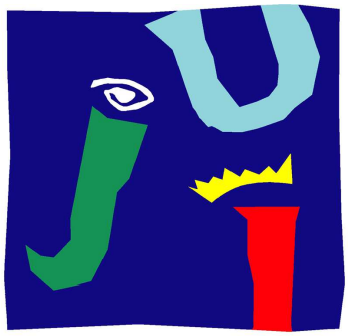

UNIVERSITAT JAUME·I

EFFECTS OF TRADE LIBERALIZATION IN ENVIRONMENTAL GOODS

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ABSTRACT

The need to protect and preserve the environment in a globalized world is causing countries to reach agreements through international organizations to enable the co-existence of trade and environment. Through the World Trade Organization, efforts are being made to reduce barriers in the trade of environmental goods, with the ultimate objective of encouraging their use. This is likely to imply benefits for trade, the environment and the development of countries. From the analysis of studies by different authors, the present paper focuses on the effects of a decrease in tariffs on environmental goods within countries, especially in Spain. Through the observation of the signing of the Agreement on Environmental Goods, the elimination of tariff barriers concludes to be not sufficient for the adhesion of developing countries. Additionally, a highly beneficial effect on Spain is reported, due to the large number of exports of environmental goods performed annually. With this in mind, it is expected that environmental services and the removal of non-tariff barriers will be comprised in the Agreement in the near future.

KEYWORDS

Environmental Goods, Environmental Goods Agreement, Trade Liberalization, World Trade Organization, APEC, OECD, Tariffs, Developing Countries, Developed Countries, Spain.

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GLOSSARY

ABBREVIATION	EXPLANATION
APEC	Asia-Pacific Economic Cooperation
CEPAL	United Nations Economic Commission for Latin America and the Caribbean
CITES	Convention on International Trade in Endangered Species
EGs	Environmental Goods
EGA	Environmental Goods Agreement
EPP	Environmentally Preferable Products
EVSL	Early Voluntary Sector Liberalization
GDP	Gross Domestic Product
GVA	Gross Value Added
HDI	Human Development Index
HS code	Harmonized System Code
ICTSD	International Centre for Trade and Sustainable Development
ITA	Information Technology Agreement
MFN	Most Favoured Nation
OECD	Organisation for Economic Co-operation and Development
UNCTAD	United Nations Conference on Trade and Development
WCO	World Customs Organization
WTO	World Trade Organization

FIGURES

1 INTRODUCTION

With the growing commitment that society is acquiring concerning the care of the environment, the governments and other international institutions have the responsibility to provide agreements devoted to it. Therefore, since the 1990s, lists of environmental goods (EGs) have been proposed; that is, the environmental goods that have an environmental purpose or those whose production process requires less consumption of natural resources. The objective of the lists is to liberalize them internationally and thus promote their consumption. These lists include the OECD list and the APEC list, both based on the OECD definition of the environmental labor industry together with Eurostat in 1995.

The first institution that focused on this issue was the World Trade Organization (WTO) in 2001, and the main objective was to reduce and eliminate tariffs on trade in environmental goods, but its negotiations failed. For this reason, in 2014, 45 countries signed the Environmental Goods Agreement (EGA), whose negotiations are within the framework of the WTO. The signatories of this agreement decided to implement the Most Favored Nation (MFN) clause, by which the countries that had not signed the agreement could benefit from tariff reductions without having to reduce their tariffs. The EGA was scheduled to become effective in 2016, but it is currently at a standstill.

The majority of countries that participated in the signing of this agreement are developed countries. The developing countries, with three exceptions, prefer to be free-riders and maintain special treatment. Thus, they do not have the necessary technology or the financial resources to face the liberalization of trade through the reduction of tariffs on goods industrial. The products in which developing countries tend to have the highest tariffs.

In recent years, several studies have deepened on the issue, offering different perspectives on the effects that the EGA could have on the countries, the environment, and the trade. The studies gave a hopeful vision for the future regarding the trade of the EGs.

Thus, the main objective of this project is to show, through the analysis of the publications of different authors, the scope that is expected to be obtained from the EGA, and the effects it would have for both developed and developing countries, focusing on the case of Spain. To do so, section 2 defines environmental goods and presents their trends and prospects in trade. In section 3, a brief analysis of the lists of EGs is carried out.

Moreover, the EGA is analyzed in detail as well as its potential effects on trade and the environment in the countries. Section 4 presents a review of the literature based on several papers published in international journals on the liberalization of EGs. Then, section 5 examines the production, the exports and gross value added of the EGs in Spain, and compares the magnitudes of these variables with those of France and Italy. Finally, in section 6, the conclusions are presented.

2 THEORETICAL FRAMEWORK: ENVIRONMENTAL GOODS LIBERALIZATION: DEFINITION, TRENDS AND FUTURE PROSPECTS

2.1 Environmental Goods

Despite the fact that 'environmental goods' is a highly frequent term in the field of research, there is still little consensus on their sorting, as there is currently no commonly accepted definition or single criterion for their classification (Muñoz, 2005). Although differences of opinion still exist, there appears to be some agreement that these can be identified as those assets that are environmentally preferable. Likewise, some of the assets qualified as 'environmental goods' are often qualified as public goods, i.e. governed by the properties of *exclusion* (i.e. a given good cannot be prevented from being offered to the general public once it has been offered to an individual), and *non-rivalry* (i.e. in the event of an individual consumption of the good, there is no subsequent prevention of further consumption by other individuals). Furthermore, the action of the State is generally required for their use, as the State is usually elected as the representative, considering the absence of property rights over them. In addition, another defining feature of environmental goods is that these are not offered in the quantities that one would desire. Hence, and for instance, some examples of environmental goods are water, air, and plants. Nonetheless, due to the advancement of technology, environmental equipment and technologies that are friendly to the environment are also considered environmental goods. This refers to goods with an environmental purpose and assets requiring a lower consumption of natural resources in the productive process, such as solar panels, water heaters, wind turbines, and renewable energy generators. Precisely the latter are the ones that find most difficulties to achieve an unhindered liberalization in international trade.

Several organizations have been interested in the liberalization of these goods, among which we can highlight the World Trade Organization (WTO). According to Claro and Ruz (2005), since the Ministerial Meeting in Doha in November 2001, WTO members

committed themselves to *"the reduction or as appropriate elimination of tariff and non-tariff barriers to environmental goods and services*" (WTO, 2001, para 31(iii)).

Additionally, in 1995, the OECD (Organization for Economic Cooperation and Development) and the Eurostat (the Statistical Office of the European Communities) worked together for the development of the Informal Working Group on the Environment Industry, in which they gave a definition of environmental industry that was later very useful to elaborate lists of environmental goods that need to be liberalized: "The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products, and services that reduce environmental risk and minimize pollution and resource use" (OECD, 1999).

A definition and classification of environmental goods is important so as to facilitate the exchange of information between countries, and also for it helps the decision-making process in the medium- and long-term within the country itself (Muñoz, 2005).

2.2 Environmental goods liberalization

The objective of trade liberalization is reaching economic growth, which is the reason behind the strong tension found historically between free trade and the protection of the environment. According to Esty (2001) it cannot be ignored that trade and environment are linked, and that explains the reason behind the decrease of both tariff and non-tariff barriers in recent years, giving more access in the market to environmental goods.

The market for environmental goods is a growing market, due to the worsening of environmental problems worldwide, such as the case of water quality. This deterioration is due to delays in environmental infrastructure, and also due to an increase in the institutional response to environmental requirements (Muñoz, 2005).

Since 2001, environmental goods have been included in the multilateral trade negotiations of the World Trade Organization (WTO). Since then, an attempt has been made to facilitate the procurement of high-quality goods. This has been achieved by offering these goods at lower prices thanks to the development of environmental technology, i.e. technology that can be used radiating no damage to the environment.

Likewise, since 2008, WTO members began to identify the goods of highest interest to countries, and thus made an attempt to liberalize them. Among these goods are broad

categories of environmental products such as the fight against air pollution, renewable energy, waste management and the treatment of water and wastewater.

Be that as it may, negotiations are progressing notably slowly due to the difficulty of reaching an agreement on which products will be liberalized, i.e. what products can be defined as environmental, since there often exists products of dual-use (environmental and non-environmental), and hence the difficulty of determining the approach in which these will be liberalized. For instance, the option proposed in the Doha Ministerial Declaration of the WTO is the removal of barriers to thus reduce the cost of these goods within international markets.

Likewise, Vossennar (2014) claims that "the removal or reduction of tariff and non-tariff barriers to trade in renewable energy equipment and components could further facilitate the use of renewable energy in the total energy matrix, while trade liberalization could also provide export opportunities and economic development". Hence, that is the reason for which the liberalization of the environmental goods market is expected to result beneficial and subsequently boost economic growth, generate employment and improve the environmental quality both locally and globally with an efficient use of natural resources, especially in the developing countries (Claro and Ruz, 2005).

3 THEORETICAL IMPLICATIONS OF TRADE LIBERALIZATION IN EGs

3.1 Lists of environmental goods

The main institution dealing with the liberalization of these goods is the WTO. Notwithstanding, the Doha Declaration does not specify *what* is considered environmental goods or what scope and significance are expected to be obtained with their liberalization. Therefore, given the difficulty of agreement on what to class as environmental goods, some institutions began to discuss this issue. The elaboration of a list of environmental goods with a high internationally-recognized potential to be liberalized could facilitate the removal of barriers on environmental goods.

According to Claro and Ruz (2005) the lists of environmental goods is one of the main elements in countless programs of international agencies of economic and environmental cooperation. These bodies decided to elaborate their own lists, mainly to facilitate trade negotiations.

Among these lists, we might find the catalog made by the Organization for Economic Cooperation and Development (OECD), composed mainly of developed countries, the list

of APEC (Forum of Asia-Pacific Economic Cooperation), consisting of both developed and developing countries, and the World Bank's '43 Environmental-friendly' list, which is the most comprehensive with 153 goods. Furthermore, this is conformed by Canada, the EU, Japan, Korea, New Zealand, Norway, Chinese Taipei, Switzerland and the USA.

Likewise, the following organizations have also developed their own lists. Firstly, the International Center for Trade and Sustainable Development (ICTSD), which has addressed the issue intensively. Secondly, the Economic Commission for Latin America and the Caribbean (ECLAC), which has focused on the detection of opportunities, challenges and proposals of these countries to obtain economic and environmental benefits with the liberalization of the market of environmental goods. And finally, the United Nations Conference on Trade and Development (UNCTAD), which is oriented to support a definition of environmental goods and to investigate the relevant factors for developing countries.

These lists were considered by the WTO as useful reference lists, although not as definitive catalogs. As claimed by Lendo (2005), despite the efforts made internationally, it has not been possible to reach a consensus on the definition and classification of environmental goods, and this has thus hindered their liberalization.

From the lists mentioned above, the present study will focus on the first two, which based their environmental categories on the definition of the OECD's environmental industry of work together with Eurostat of 1995, and have served as an international reference, both for the confection of lists and for the liberalization of environmental goods.

The OECD list emerged with analytical purposes derived from a piece of work co-elaborated with the Eurostat with the aim of illustrating the scope of the environmental industry. This list bases its structure on three levels. In the first place, level 1 classifies industrial activities according to their final use, i.e. classified in pollution management, in cleaner technologies and products and in resource management. Secondly, level 2 establishes commercial activities of environmental protection for each group of level 1 categories. Hence, we find the following labels: production of specific equipment and materials, provision of services, and construction and installation. Finally, level 3 distinguishes the main classes of environmental protection activities for each group of Level 2. Hereafter, the subcategories present are: air pollution control, liquid waste management, solid waste management, remediation and cleaning of the soil and water, and abatement of noise and vibrations (Claro and Ruz, 2005).

Meanwhile, the APEC list, for its part, develops and identifies a list of 109 products under a liberalization agreement. In this list, the goods are defined as environmental according to their final use rather than in relation to their environmental characteristics.

Emerged from the 'request-offer', traditionally used in negotiations, this list aims at achieving a better tariff treatment for these goods, thus seeking both economic and environmental benefits.

All in all, the fact that the objective of the APEC list was to achieve a more favorable tariff treatment on environmental goods, led to the inclusion of easily recognizable and differentiated products by customs, i.e. products with low environmental impact in its production or lifecycle were not considered. Conversely, the OECD list did take them into account as potential environmental goods were also included (Steenblik, 2005, 13).

Essentially, both the OECD list and the APEC list tend to reflect the interests of the industrialized economies, which adversely affects the competitiveness of developing countries (Claro and Ruz, 2005).

Besides, it should be noted that, according to Steenblik (2005), although the OECD and APEC lists were created for different reasons and procedures, they are both interrelated and analogous. The APEC was the first to propose a list to liberalize environmental goods according to the Early Voluntary Sector Liberalization (EVSL) initiative, while the OECD proposed the broader list. Yet, both lists overlap only in 30%.

The classification of these lists is performed by means of the six-digit HS Code (Harmonized System Code), which is an internationally standardized tariff code created by the World Customs Organization (WCO) that has been in use since 1988. It is used to categorize the goods that are imported and exported according to their nature, the type of product and its function. Identification through the HS Code is of high importance due to the large number of products that are sold daily and the name that the product receives in each country.

Hereinafter, each product is assigned a numeric code, in which the first two digits indicate the generic product, the two following numbers refer to parts and accessories, and the last two digging in detail all the above. Consequently, six digits is the most detailed level of specification in the WTO negotiations. The problem derived from this, however, is that the fact of reducing tariffs to a given numerical code might also enable access to non-environmental (iContainers, 2018).

Both lists have been criticized internationally, since it is considered that their definition and classification does not represent every country within the WTO, especially developing countries (Lendo, 2004).

Still, both lists result of great help in the WTO negotiations. According to the International Institute for Sustainable Development, there are at least three types of

candidate goods that have been proposed by the WTO to be treated with the special designation of «environmental». The first type of goods comprises those that cause less environmental damage in their final use than conventional technologies, such as efficient appliances. Then, the second type of goods embraces those the main objective of which is the environmental improvement, such as technologies that allow water to be separated from oil. And finally, the third type of goods covers those that use processing and production methods that are less harmful to the environment, such as organic agriculture (Cosbey et al., 2010).

3.2 Worls trade organization agreement: Environmental Goods Agreement (EGA)

With the elaboration of these lists, the WTO was in tenure of better facilities to work on the liberalization of environmental goods. Nonetheless, despite the fact that it is an accepted fact that environmental problems throughout the world transcend national borders, the Doha Round negotiations of 2001 toward such agreement foundered (Goff, 2015, 2).

For this reason, on 8th July 2014 in Geneva (Switzerland), a group of members of the WTO –initially 14 and currently 18 participants in representation of 45 countries[1]–, started negotiations to foster the Environmental Goods Agreement (EGA).

At the time of signing, the members made a statement: "We the representatives of Australia; Canada; China; Costa Rica; the European Union; Hong Kong, China; Japan; Korea; New Zealand; Norway; Singapore; Switzerland; Chinese Taipei; and the United States... announce our commitment to achieve global free trade in environmental goods, and pledge to work together, and with other WTO Members similarly committed to liberalization, to begin preparing for negotiations in order to advance this shared goal" ("Joint Statement", 2014, 1). The talks on the Agreement were presided by Andrew Martin, Counselor at the Permanent Mission of Australia to the World Trade Organization.

Hitherto, the EGA represents the most recent effort for the liberalization of environmental goods, and it is based on other predecessor agreements. For instance *The Convention on International Trade in Endangered Species (CITES)* of 1973, in which trade restrictions over a large variety of species of flora and fauna were successful, being considered the most effective environmental treaty (Goff, 2015, 3).

With these considerations, the objective of this multilateral agreement is to reduce tariffs of a series of products beneficial for the environment and thus promote its

[1] Australia, Canada, China, Costa Rica, the 28 countries of the European Union, Hong Kong (China), Iceland, Israel, Japan, Korea, New Zealand, Norway, Singapore, Switzerland, Liechtenstein, Chinese Taipei, Turkey and United States.

commercialization. Even though. While not all the members of the WTO participate, given that they are not obliged, the members who take part of EGA represent the largest part of trade in environmental goods, i.e. almost the 90% of the global trade of these goods. To carry out this agreement, the number of participants needed to achieve a minimum critical mass threshold. In other words, they needed there existed the requisite of a minimum percentage of member countries to guarantee a profitable viability of the agreement, as well as to reduce concerns, so that there are no incentives to quit the agreement and become a free-rider. In this context, a free-rider may be described as a state that does not remove or reduce its own tariffs on environmental goods, while this nation does benefit from the reduction or removal of the other participants in the Environmental Goods Agreement.

The members of EGA initially considered regarding the threshold of critical mass in 90%, as it had been previously stated in the successful multilateral agreement of the WTO in the year 1996 *Information Technology Agreement* (ITA), regulating trade in information technology goods performed (Goff, 2015).

Since the threshold of critical mass accomplished, the improvements achieved will be spread among all the members of WTO, including the free-riders, on a most-favored-nation (MFN) basis. Nevertheless, quoting Vossenaar (2014) there are various free-riders interested in the trade of environmental goods, such as Mexico, Brasil, South Africa or India. This is explained as, generally, the developing countries usually import sufficient environmental goods while they export very little and thereupon are not receptive to join the agreement and prefer to receive special treatment.

Furthermore, it should be pointed out the highly positive effect resulting from the signature of the agreement by manifold countries, given that this may reduce the costs exponentially, as well as increasing the access consumption of environmentally friendly technologies, such as clean energies. Therefore, according to Jegou (2015) the next objective of the WTO with respect to the EGA is to expand its influence. Hence, including not only liberalization in tariff barriers and environmental goods, but also reductions in environmental services and in the main obstacles that prevent the free trade of environmental goods, which are principally: non-tariff barriers, compensatory and anti-dumping policies, and weak intellectual property.

Tariffs for green products in most of the negotiating countries are already quite low and almost insignificant. Therefore, only through the reduction of tariff barriers, the objective of the agreement cannot be achieved. In addition, including further reductions might attract a greater number of nations, especially developing countries. Additionally, the EGA can

contribute to achieving the target of the Paris Agreement[2] against climate change and the 17 Sustainable Development Goals[3] of the United Nations, adopted after the launch of the EGA talks (Araya, 2016).

Between the years 2014 and 2016, eighteen rounds of meetings were celebrated. These meetings clarified the benefits of this agreement, which, additionally to favor trade and development of environmental goods, it has the potential of benefiting the protection of the environment, brake of environmental deterioration and pave the way towards a green economy and energy efficiency. This may be possible thanks to the fact that the EGA is based on the list of 54 environmental goods of the APEC of 2012, elaborated in Russia. The Asia-Pacific region has been called *"an environmental goods trade hub"* (Sugathan and Brewer 2012, 2), even if EGA expect to go further at a geographical scale and in terms of categories of environmental goods (Goff, 2015, 2).

Firstly, the objective is to reduce the tariffs on an enormous quantity of environmental goods until 5% or less. Additionally, the ambition is to remove the bureaucratic processing obstructing trade, and thus decrease the cost of environmental goods in the national markets of the importing countries. And finally, to mitigate climate change through the use of renewable energies (Garg, 2017).

In addition to that, the Environmental Goods Agreement has also social benefits, since they will benefit from the liberalization of environmental goods. This action is likely to incur a drop in the price of environmental goods, and hence causing demand to increase- Consequently, this would trigger consumers to use more efficient goods in the consumption of energy and, therefore, causing families to save costs (Mahlstein and McDaniel, 2017).

On the one hand, the success of the EGA could help to diminish the idea that trade is harmful to the environment, proving that trade can be a useful instrument with the capacity to provide solutions that the world needs. If the implementation of environmental technologies in the countries is successful, these are likely to attain a greater production and export capacity of clean energy and environmental goods in the future (Garg, 2017).

[2] The main objective of this Agreement, signed by 195 countries, is to prevent the average temperature of the planet from exceeding 2ºC in respect to pre-industrial levels.

[3] 1. No poverty, 2. Zero hunger, 3. Good health and well-being, 4. Quality education, 5. Gender equality, 6. Clean water and sanitation, 7. Affordable and clean energy, 8. Decent work and economic growth, 9. Build resilient infrastructure, promote sustainable industrialization and foster innovation, 10. Reduced inequalities, 11. Sustainable cities and communities, 12. Responsible consumption and production, 13. Take urgent action to combat climate change and its impacts, 14. Conserve and sustainably use the oceans, seas and marine resources, 15. Sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss, 16. Promote just, peaceful and inclusive societies, 17. Revitalize the global partnership for sustainable development.

On the one hand, although it was anticipated that the Agreement -–the crafting of which initiated in 2014– would be concluded in 2016, this was eventually not possible. In December 2016, the negotiations were halted due to the political uncertainty surrounding trade. More precisely, the growth of nationalism triggered countries to think more individualistically than for the common good. Hence, there appeared great difficulty to reach a consensus on which exact goods were to be included in the Agreement, especially since China demanded to include further goods at the last moment (Garg, 2017). Today, the EGA has not yet concluded and is in a deadlock (Sell, 2017).

3.3 Who benefits from a reduction in tariffs of EGA?

3.3.1 Developed and developing countries

Nations can be divided into developed and developing countries. Developed countries are nations that, generally, managed to industrialize themselves before other regions. Therefore, the basic needs of people are satisfied; they have a high degree of industrialization and excellent standards of living as well as education. Moreover, they achieved a high rate of human development, and their democratic institutions are strong. On the contrary, the developing countries are nations that depend industrially on the wealthiest nations, which prevent them from being able to rise. Additionally, they present important inequalities among their citizens and are often victims of undemocratic and authoritarian regimes.

According to the Human Development Index (HDI), of the 45 countries that signed the Agreement on Environmental Goods, almost all of them are countries with a very high level of human development. The exceptions from less to more human development are China, Turkey, and Costa Rica.

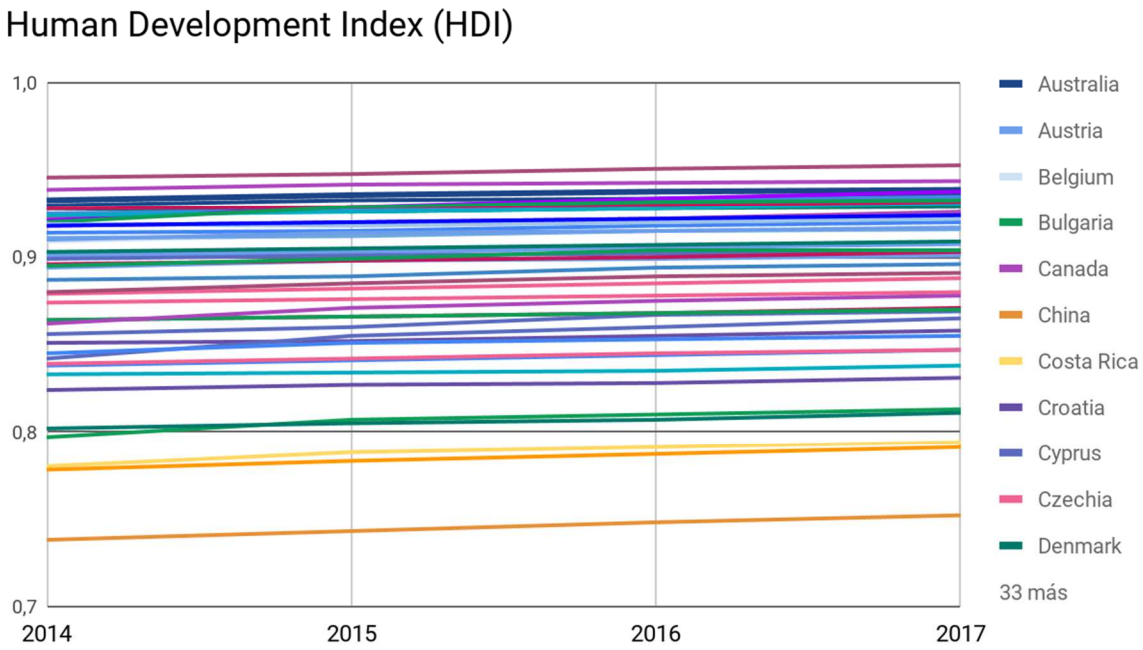

Figure 1. Human Development Index
(source: United Nations Development Programme)

Overall, there are 58 nations in the world with very high Human Development Indexes. From the 58 nations, 42 are signatories of the EGA. However, as we have seen in the previous section, according to the Most Favored Nation (MFN) clause, the tariff improvements that are achieved with the EGA will be transferred to all WTO members. These members represent almost 90% of all the international trade; therefore, both developed and developing countries are considered.

Once it is clear the differences of the two groups of countries to which a tariff reduction in environmental goods will be applied, we can analyze the impact it will have on each nation type.

3.3.2 Effects of trade liberalization in environmental goods in countries

The purpose of trade liberalization on environmental goods is to improve the protection of the environment. To do so, exports are promoted, and their access in the markets is improved. International trade is helping the economic development of nations; therefore, a higher number of developing countries base their growth strategies on opening internationally to trade. The problem appears when they cannot compete with developed countries, and when developed countries feel threatened by developing countries. Moreover, both of them introduce tariffs on imports and exports (Hamwey, 2005).

According to Lottici, Galperín and Hoppstock (2013), it is not reasonable or adequate to protect the environment by placing restrictions on trade. Many developed countries opt for the implementation of protectionist environmental policies that are socially well regarded. The reason is to justify the distortion of international trade to the detriment of developing countries. Concerning the developing countries, they consider they should have a different treatment from the developed countries because they have difficulties in exports. Thus, developing countries do not have the necessary technology or financial resources, as well as safeguards to protect their industries in the case in which liberalization produces losses.

Occasionally, intending to block trade, developed countries maintain their barriers through non-tariff instruments in sectors where developing countries are more competitive; for example, agriculture and the manufacturing industry. Developed countries do so since they have a high intensity of labor. This fact is difficult to eradicate, although a reduction in trade barriers would favor a more significant trade in these goods. However, the effects may differ depending on the country.

The fact that most of the goods included in the EGA list are industrial goods, a sector in which tariffs in developed countries are lower than in developing countries, makes it beneficial for the exports of the former. The developed countries also benefit from the non-inclusion of agricultural products in the agreement, that is, the products resulting from crops and animal husbandry, which maintain high tariffs in these countries. In addition, most of the patents related to the environment are under the supervision of developed countries, especially Japan, the US, and Germany. Therefore, it blocks the technological progress of developing countries (Lottici et al. 2013).

Developing countries have the fear that trade liberalization will end with successful discrimination against their products, based not on non-environmental but social concerns. Due to this fact, they consider free-riding the least risky option for them (De Melo and Solleder, 2015, 4).

According to Hamwey (2005), the list of environmental goods of the WTO must be broad and contain a wide variety of goods to ensure that trade liberalization is beneficial for all nations. Moreover, it should provide profits, even for developing countries. The liberalization of trade on environmental goods in developing countries could allow them to industrially diversify their economies, since developing countries with lower tariffs import and export more.

Consequently, it can be said that *a priori*, the liberalization of the environmental goods of the WTO would have more benefits for developed countries, but “inasmuch as trade liberalization decreases prices of imported goods, lower barriers to trade in EG

would translate into greater access to the most efficient, diverse, and least expensive EG in countries that do not produce them. This, in turn, would encourage local governments to set more ambitious environmental objectives" (Nimubona, 2012, pp.337-338).

4 LITERATURE REVIEW: EXISTING STUDIES AND MAIN RESULTS

The theory on economics claims that with a reduction of tariffs in international trade, not only the imports increase but also the consumption of products whose protection was removed. Consequently, domestic production of products without tariff decreases. Besides, since it is easier to import and export products, there is an implication of the increases in international competition and global supply. This fact makes prices to be reduced and increases the development and quality of products. Therefore, productivity is stimulated, and efficiency increases (Góngora and Medina, 2010). Moreover, according to Jeffrey and Rose (2005), by increasing production gas emissions also increase, which has a detrimental effect on the environment, especially by air pollution with greenhouse gases.

Given the importance of a tariff reduction for international trade, several authors wrote about the effects it would have on environmental goods. This issue is addressed from different perspectives.

Firstly, De Melo and Solleder (2015), focused on the subject from the perspective of the importance of a reduction of tariff barriers for developing countries. These authors explain why, with few exceptions, developing countries have not participated in either the Doha negotiations in 2001 or the Environmental Goods Agreement (2014). The Doha Round, which was called the Round for Environment and Development, promised to have benefits for trade, the environment, and development. However, almost 20 years later, little progress has been made in this issue. Additionally, the EGA negotiations stalled even before the arrival of Brexit and the presidency of Donald Trump.

Developing countries feel that the lists included in the negotiations do not represent their interests. They claim that the lists mainly include industrial products, of which developed countries have a comparative advantage, and Environmentally Preferable Products (EPP) are excluded. Furthermore, developing countries fear that their products will be discriminated based on social concerns rather than on environmental ones. What is more, they consider that the EGA may create a substantial increase in imports and not in exports in developing countries. Consequently, they consider that the less risky option is to be a free-rider. So far, the impact of the agreements has been insignificant (since they have not been concluded) mainly due to the lack of consensus among the countries.

Secondly, Jacob and Møller (2017) addressed the issue, trying to advise nations dealing with the issue of environmental goods and services. They mainly focus on the Asia-Pacific region, which accounts for almost half of the GE trade in the world, analyzing trends in trade flows and policies.

These authors believe that trade in environmental goods could facilitate compliance with the 2030 agenda for sustainable development and the achievement of the objectives set out in the COP21 Paris agreement (2015). Moreover, it may promote the transfer of renewable energy technologies and the use of cleaner energy sources. Although the lack of a universally accepted definition of environmental goods makes negotiations difficult, they believe that if the EGA is achieved, the trade will increase, and the cost of environmental goods and global CO2 emissions will be reduced.

The document warns that although these goods tend to have very low tariffs, we can still find environmental goods with high tariffs, especially in less developed countries. They also consider that in order to accelerate the liberalization process in world trade, complementary services and goods should be included in the negotiations. Additionally, trying to reduce non-tariff barriers, which have a strong negative impact, should still be considered. Given the 2030 agenda, the importance of GE's trade is expected to increase in the future.

Thirdly, Tamini and Sorgho (2018) referred to the trade of environmental goods from a more empirical perspective. They analyzed the elasticities of trade costs to observe the degree of impact that a reduction in tariff barriers of the EGs would have on the achievement of sustainable development objectives.

For these authors, the different interests and perceptions of the countries make different approaches to trade liberalization; therefore, different modalities have emerged. The most used approach is to develop a list. However, they believe that it would benefit developed countries commercially because of their large export capacity and would benefit developing countries environmentally since they would import more. These conditions make it more difficult for small EG exporters to defend their market share.

Considering the OECD and APEC lists, as well as non-constant substitution elasticities (which are a function of the size of the importing country and the number of EGs imported from a specific supplier), it is concluded that liberalization of environmental goods would have a weak impact for most countries. Moreover, those countries that dominate international trade would strengthen their positions.

Finally, it is considered that in the future, there should be some considerations to include non-tariff barriers in the negotiations. Only if we reduced them, there would be benefits in the economies of developing countries.

In fourth place, Lottici, Galperín and Hoppstock (2013) analyze how, despite “green growth”, the measures against climate change and the liberalization of environmental goods and services, the developing countries are affected by what they call the “green protectionism”. These authors criticize that developed countries, in order not to lose competitiveness for developing countries, while lowering tariffs on GE, they apply non-tariff measures to limit trade with the legitimate argument of protecting the environment. These measures, which are well regarded socially and are more discreet, negatively affect exports from developing countries.

In line with the liberalization of environmental goods and services, exports of certain goods and technologies are promoted. Generally, they are produced by developed countries and, with the argument of caring for the environment; these countries are allowed to reduce tariffs on industrial goods in developing countries. In this way, the growth of technologies from developed countries is favored, harming the innovation capacity of developing countries.

Therefore, these authors consider essential for developing countries to ensure that the international climate change system does not result in covert restrictions on trade and does not aggravate the economic differences existing between rich countries and those with fewer resources. Besides, developed countries have better resources to assist specialists with international meetings and thus achieve a consensus of interest. Subsequently, developing countries demand more control to prevent them from using “hidden green protectionism”. However, despite the criticisms of this article, it is challenging to prove the fact that the developed countries have negotiated the EGA for mainly protectionist purposes and not to protect the environment.

Lastly, Wan, Nakada and Takarada (2018) analyze the effects of the liberalization of environmental goods on local pollution, global environment and well-being, from the use of dirty inputs to produce clean goods. For these authors, without an environmental policy, countries do not necessarily benefit from the liberalization of GE trade. The reason is that dirty intermediate goods are often needed for its production, and it is not clear whether the use of EG reduces emissions in their entirety. With environmental policies that control externalities, liberalization would always improve the welfare of the country. However, they consider that with a lower demand for EG, the world welfare and the well-being of the country

will improve, since lower production will imply lower contamination with the dirty intermediate inputs.

Finally, they consider it interesting to analyze the liberalization of environmental goods, including non-environmental goods or using a dynamic model.

5 HOW IMPORTANT ARE EGs FOR SPANISH ECONOMY?

Spain is the thirteenth economy in the world (Portillo, 2018), as well as the 16th economy in the worldwide ranking of exports, out of a total of 221 countries, according to The Observatory of Economic Complexity (n.d.). The most recent data found today referring to Spanish exports are those of 2017. According to the Monthly Report of Foreign Trade (Ministry of Economy, Industry and Competitiveness, 2017), the exports of goods declared this year reached a total value of 277,126 million euros, achieving historical value (ICEX Spain Exports and Investments, 2018). These exports represented 23.27% of the GDP, which in that year equaled 1,166,319 million euros.

According to the Spanish National Institute of Statistics (2018), the production of environmental goods in the year 2017 reached a value of 44,569.58 million euros. From these, a corresponding total of 6,297.93 millions of euros were destined for export. As a matter of fact, the production of EGs represents 3.82% of total GDP. Furthermore, the most prominent sectors of activity in the production of 2017 were the supply of electricity, gas, steam and air conditioning; together with water supply, sanitation activities, waste management and decontamination, with 0.71% and a 0.48% of the GDP respectively. In terms of exports of environmental goods, these services accounted for 2.27% of total merchandise exports. Likewise, the environmental areas that had more weight were: on the one hand, the Production of Energy through Renewable Sources, in which wind turbines stand out, placing Spain in the fourth place of exporting countries (Monforte, 2019). On the other hand, Management and Saving of Energy and Heat, an area in which appliances with the highest energy certification are highlighted. As a matter of fact, these two areas represent 30.8% and 20.6% respectively of total environmental exports.

Let us now consider the Environmental Gross Value Added (GVA), which measures the total value created in the country by the production of environmental goods and services. This indicator represented 21,814 million euros in 2017, increasing by 6.0% with respect to the previous year, and representing 1.87% of the total GDP of Spain. The activities that had a greater weight were the supply of electricity, gas, steam and air conditioning (37.8% of the

total) and water supply, sanitation activities, waste management and decontamination (25.9%).

In addition, the environmental economy, which embodies both environmental goods and services, generated 274,000.0 jobs, 1.53% of the total Spanish economy in 2017. The sectors with the highest environmental employment were also those of water supply, sanitation activities, management of waste and decontamination, with a 36.5% of the totality of environmental employment, followed by the services sector, with 26.6% (Instituto Nacional de Estadística, 2018). Henceforth, departing from the information collected from these data we can consider that the EGs have a significant weight in the Spanish economy. Nonetheless, in order to attain a clearer vision of their relevance, let us now compare the Spanish data with those of similar countries, such as France and Italy, through the observation of the GDP per capita.

At the current time, France is the sixth economy in the world (Portillo, 2018), in addition to be the sixth exporting economy (The Observatory of Economic Complexity, nd). Alternatively, Italy is the eighth largest economy in the world and ranks seventh in the classification of countries exporting the most. With these data, we can observe that, in spite of the nearness and cultural similarities with respect to Spain, these economies are more advanced. Having discussed these differences, let us now analyze the weight implied by EGs in each nation. Considering that the most recent available data for the three nations belongs to that of 2014, 2015 and 2016, we will focus on these periods to elaborate the comparison, with a special focus in 2016, as it represents the most current data.

With this objective, the Gross Domestic Product (GDP) is one of the most used macroeconomic measures, assessing the monetary value of the production of final goods and services of a country at a specific time. GDP takes into consideration the consumption, investment, public expenditure and the trade balance, i.e. the difference between exports and imports; and it thus possesses data of the internal production of a given country. According to Datosmacro.com (nd), Spain's GDP was 1,118,743 million euros in 2016, while it represented 2,234,129 million euros in France for the same period, and 1,689,824 million euros in Italy. As depicted in Figure 2, the GDP of the three countries has increased, but that of Spain is clearly the lowest by a great deal.

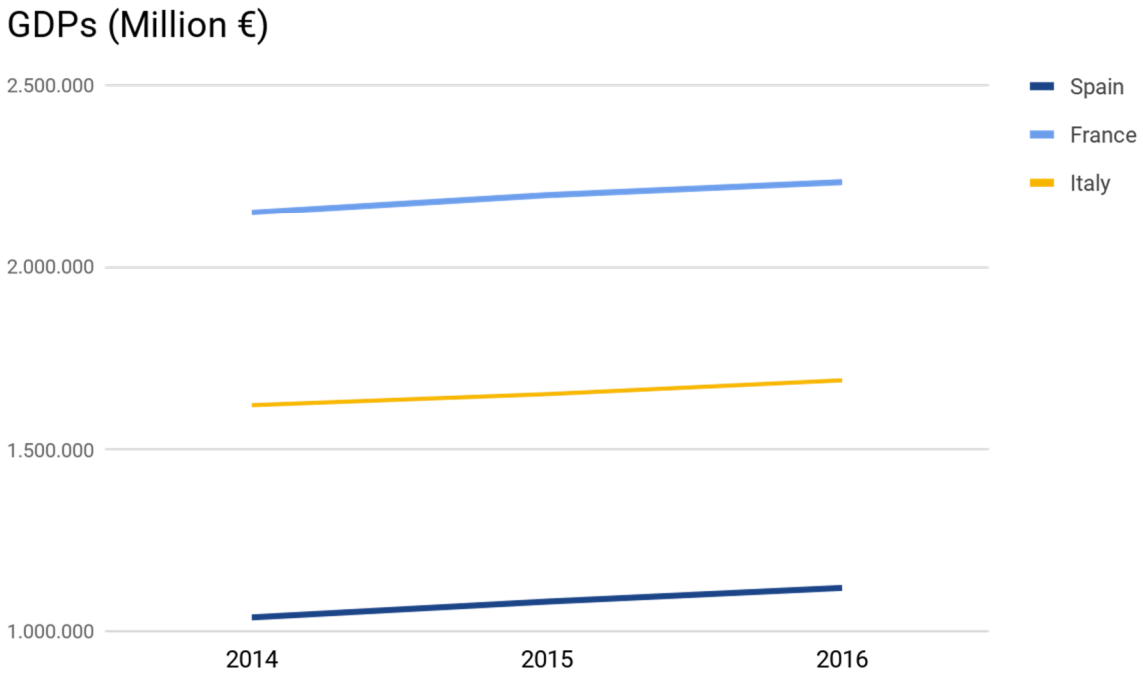

Figure 2. GDPs (source: own elaboration)

Analyzing the production of EGs of the three nations (Eurostat, nd), dividing it by the GDP and multiplying it by 100, we obtain a positive indicator in percentage for the comparison of the manufacture of these goods. Hence, by this means we can observe the percentage of GDP devoted to the production of these goods. Hereafter, the production ratio of EGs of Spain, France and Italy with respect to the GDP in 2016 respectively was 4'15, 3'8 and 4'52%.

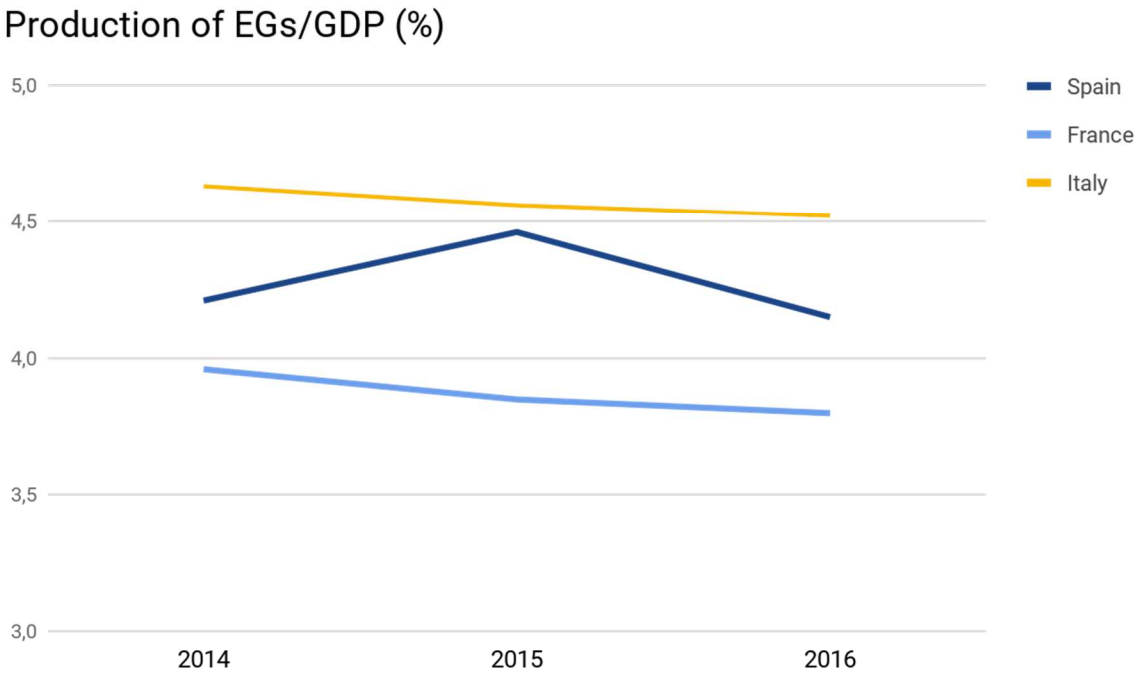

Figure 3. Production of EGs/GDP (source: own elaboration)

In this graphic, it is observed that the production of EGs in the three countries saw a slight decrease in the last year. In spite of this, the production of Spain remains above that of France, which despite being the economy with the highest GDP, does not dedicate a large percentage to the production of EGs. Italy, contrarily, remains the first.

Alternatively, in terms of exports of environmental goods and services divided by total merchandise exports, we obtain that in 2016, for Spain they represented 2.2%, for France 1.77% and for Italy, 0.94%.

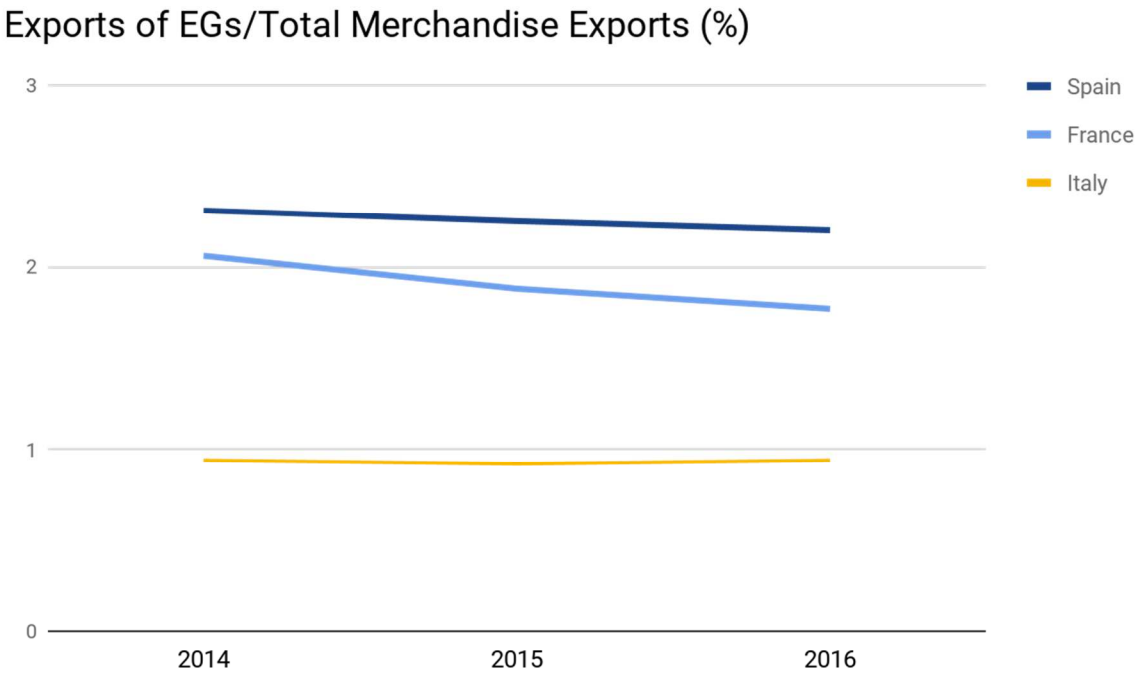

Figure 4. Exports of EGs/Total Exports (source: own elaboration)

Analyzing figure 4 we obtain that, on the one hand, Spain is the economy that exports the highest number of EGs, representing above 2% of total exports. On the other hand, Italy is the nation that produces the most EGs and, however, exports the least.

Regarding the ratio of the Gross Value Added Value to the Total Gross Value Added, we obtain that, in 2016, the production of EGs in Spain generated a value of 1.87% of the total value created in the economy, while it represented the 1.43% in France and the 2.13% in Italy.

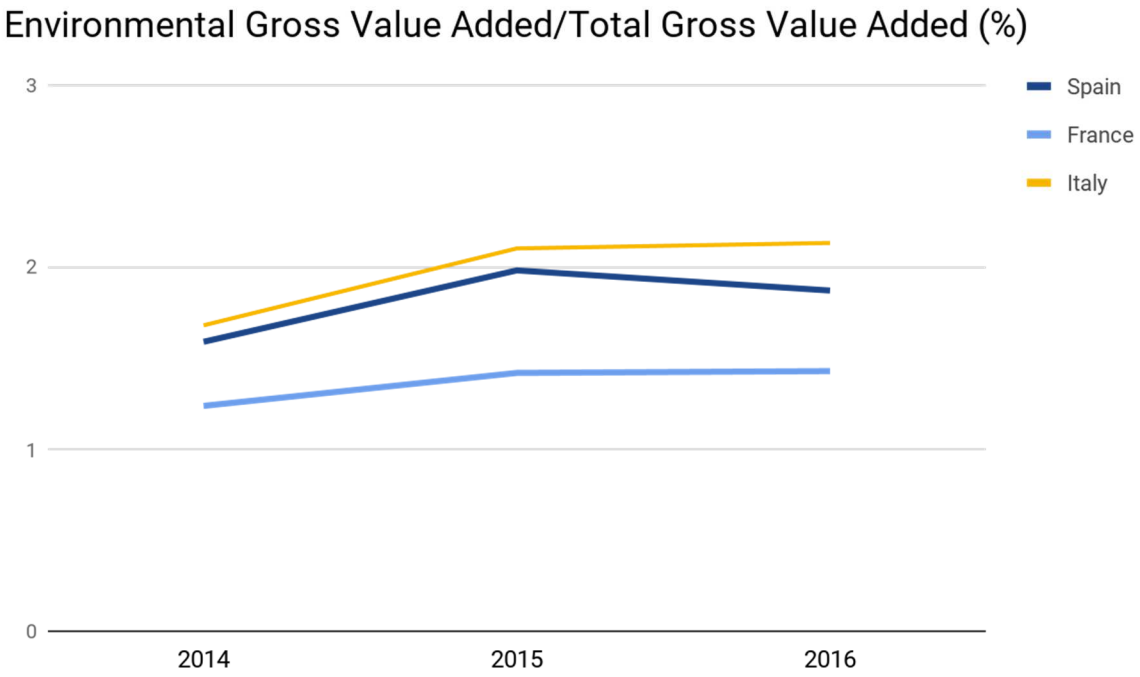

Figure 5. Environmental Gross Value Added/Total Gross Value Added (source: own elaboration)

In *Figure 5*, we observe that Italy is the nation where the production of EGs plus value creates the economy. Additionally, it is also the economy that produces the most and exports the least. Nonetheless, Spain and France dedicate a large part of their production to exports, which is the reason for which the production of EGs does not provide them with so much added value.

Therefore, we can conclude that the EGs are of high relevance within the Spanish economy. Although Spain is not among the top ten economies in the world in terms of goods production or among the ten economies that export the most, from the analysis of the data, we acknowledge that it is a great competitor with its direct rivals. While this country does not stand out in the production of EGs, it is, however, one of the countries that export them the most.

Henceforward, in the event that the EGA is finally concluded, this situation would increase the trade of EGs in the world, which would be in turn beneficial for Spanish exports. In addition, a greater demand for Spanish EGs will increase production, generating more jobs and increasing GDP.

6 CONCLUDING REMARKS

While the protection of the environment, the fight against climate change, and the sustainable development of nations are the objectives that all countries want to comply with, it is not easy to reach international agreements regarding the liberalization of trade in environmental goods. In recent decades, several organizations opted for the preparation of lists of EGs, and for the signing of agreements to try to reduce tariff barriers to these products. The aim of doing this was to facilitate their commercialization and to reduce their price in international markets. However, the lack of a globally accepted definition for EGs makes negotiations difficult. In this paper, we focused on the APEC and OECD lists, and the EGA.

The APEC and OECD lists of EGs emerged in the 1990s and soon served as a great help in the WTO negotiations. The problem with these lists is that they do not represent the interests of all the WTO countries to the detriment of the developing countries. Furthermore, they are classified by the six-digit HS Code, which is sometimes insufficient to classify the EGs.

Regarding the EGA, it is difficult to evaluate its impact because as the negotiations were halted, they have not been carried out. At first, its objective was to reduce tariffs on a series of goods to promote their commercialization. The next objective of the WTO is to include tariff reductions in environmental services as well as to include the elimination of the main obstacles that prevent free trade of EGs, non-tariff barriers. Therefore, this fact could encourage developing countries to join the signature of the EGA. Additionally, trade liberalization is also expected to benefit the environment by increasing environmental protection and energy efficiency. If the EGA were implemented, in the future, the countries would have more environmental technologies, and they will increase their productivity and exporting capacity of clean energies and environmental goods.

Besides, from the analysis of the works of several authors on the reduction of tariffs to the EGs in the international markets, it appears that the EGA should take into consideration the demands of the developing countries. The EGA should include more environmentally friendly goods and not so many industrial goods, *i.e.*, to be based on the protection of the environment and not on what society requires. It is also important to remark that the countries should control the externalities of the production of EGs, because, in this way, the welfare of the country will increase. This fact would require a great consensus among the nations, if not; the developing countries will prefer not to sign the agreements since they consider it less risky for the stability of their economy. In addition, environmental services, complementary goods and, the reduction of non-tariff barriers should be included in the negotiations. Moreover, it is considered that the liberalization of the EGs will have a

low impact for most of the countries, although it is expected that in the future the importance of the trade of EGs will increase.

In this context, the analysis for Spain of the EGs reveals that environmental economics has relevance in the Spanish economy, especially in exports. Therefore, for this country, the EGA would be beneficial, since a reduction of the tariffs for the EGs would increase its exports. Moreover, one of the sectors of the environmental economy that generates more jobs is the service sector. It is the reason why Spain could also benefit itself from the inclusion of services in the EGA.

ANNEXES

APEC list of environmental goods (2012)

HS	HS Code Description	EX-OUT / ADDITIONAL Product Specification	REMARKS / ENVIRONMENTAL BENEFIT
840290	Steam or other vapour generating boilers (other than central heating hot water boilers capable also of producing low pressure steam); super-heated water boilers. [Ca, J, NZ, K] Steam or other vapour generating boilers (other than central heating hot water boilers capable also of producing low pressure steam); super-heated water boilers; Parts: [US] Parts for super-heated water boilers and steam or other vapour generation boilers (other than centra heating hot water boilers) [HK] Super-heated water boilers and parts of steam generating boilers [S, BD]	Parts for 840219x. [Ca, J, NZ, K, Au] Parts for biomass boilers. [US] Management of solid and hazardous waste [BD]	Parts for the biomass boilers described above. [Ca, J, NZ, US, K, HK, Au] Parts for the boilers for the production of heat and power on the basis of (renewable) biomass fuels. [HK] Part for biomass boilers for the production of heat and power on the basis of renewable biomass fuels. This product should be seen in relation to HS840219, biomass boiler. Biomass in heating systems uses agricultural, forest, urban and industrial residues and waste to produce heat and electricity with less effect on the environment than fossil fuels. This type of energy production has a limited long term effect on the environment

			because the carbon in biomass is part of the natural carbon cycle. [S, BD]
840410	Auxiliary plant for use with boilers of heading 84.02 or 84.03 (for example, economisers, super-heaters, soot removers, gas recovers'); condensers for steam or other vapour power units. [C, J, NZ, K, Au, Ru, M, BD] Auxiliary plant for use with boilers of heading 8402 or 8403 (for example, economizers, super-heaters, soot removers, gas recovers'). [US] Auxiliary plant for use with steam or other vapour generating boilers, super-heated water boilers and central heating boilers. [HK] Auxiliary plant for steam, water and central boiler [S]	Auxiliary plant for use with 840219x. [Ca, J, NZ, K, Au] For central heating boilers of heading 8403 [M, BD]	Components of industrial air pollution control plant which minimise the release of pollutants into the atmosphere. This equipment is also used to support waste heat recovery processes in waste treatment, or renewable energy resource recovery applications. [Ca, J, NZ, K, Au, BD] Components of industrial air pollution control plant which minimise the release of pollutants into the atmosphere. This equipment is also used to support waste heat recovery processes in waste treatment, [biomass energy generation - US only] and other renewable energy resource recovery applications. [US, HK, M] These are soot removers and components of industrial air pollution control plant, which minimise the release of pollutants into the atmosphere. This equipment is also used to support waste heat recovery processes in waste treatment or renewable energy resource recovery applications. [S]
840420	Auxiliary plant for use with boilers of heading 84.02 or 84.03 (for example, economisers,		Used to cool gas streams to temperatures which allow the removal of contaminants, e.g.

	super-heaters, soot removers, gas recovers'); condensers for steam or other vapour power units.		volatile organic compounds (VOC) like benzene.
840490	Parts for auxiliary plant for boilers, condensers for steam, vapour power unit. [Ca, J, NZ, K] Auxiliary plant for use with boilers of heading 8402 or 8403 (for example, economizers, super-heaters, soot removers, gas recovers'); condensers for steam or other vapour power units; Parts. [US, Au, Ru] Parts for subheading 840410100 [M, BD]	Air pollution control [BD]	These parts are used in the repair and maintenance of the equipment classified under 840410 above. This secondary equipment is also used to support waste heat recovery processes, such as boilers mentioned above, in waste treatment, or renewable energy resource recovery applications. [C, J, NZ, US, Au, R, Th, M] Components of industrial air pollution control plant which minimise the release of pollutants into the atmosphere. This equipment is also used to support waste heat recovery processes in waste treatment, or renewable energy resource recovery applications. [BD]
840690	Parts for steam and other vapour turbines. [Ca, J, NZ, K, Au, BD] Parts of steam turbines. [US, M]	Optional ex-outs may include parts suitable for use with stationary steam turbines over 40MW; stationary steam turbines not over 40 MW, other vapour turbines; parts for 840681x and 840682x. [Ca, J, NZ, K, Au] Parts for 840681x and 840682x. [US] Renewable energy plant [BD] Only for stator blades, rotors and their blades [R]	Parts used for repair and maintenance of energy recovery turbines listed in 840681 and 840682 above. [Ca, J, NZ, K, Au] Parts for the aforementioned ex-outs/goods of 8406 [US] Turbines designed for the production of geothermal energy (renewable energy) and co-generation ((CHP) which allows for a more effective use of energy than conventional generation) [BD]

841182	Other gas turbines of a power exceeding 5,000 kW. [Ca, J, NZ, US, Au, Th, S, BD] Gas turbines, except turbo-jets and turbo-propellers, of a power exceeding 5,000 kW. [HK] Turbojets, turbo-propellers and other gas turbines of a power exceeding 5,000 kW [M]	Possible ex-out may include gas turbines that burn natural gas [Au] Gas turbines for electrical generation from recovered landfill gas (exceeding 5,000 kW) [BD] Of a power exceeding 5000 kW but not exceeding 50 000 kW [R]	Gas turbines for electrical power generation from recovered landfill gas, coal mine vent gas, or biogas (clean energy system). Note that these turbines do "exceed 5,000 kW". [Ca, J, HK, NZ, Au, M, BD] Gas turbines for clean power generation including recovered landfill gas, coal mine vent gas, or biogas. [US] Gas turbines are used for electrical power generation from recovered landfill gas, coal mine vent gas, biogas or national gas. Lower emission of pollutants compared with traditional fire power generation methods. [S]
841199	Parts of gas turbines.	Parts for 841181 and 841182.	Parts for gas turbines described above.
841290	Engine and motor parts, nesoi [US] Parts of the engines & motors of 8412.10-8412.80 [S, BD]	Wind turbine blades and hubs [US] Only for civil aviation [R]	These blades and hubs are integral components to wind turbines. [US] Parts thereof wind turbines. Parts used for repair and maintenance of wind turbines with the attendant benefits. [S, BD]
841780	Other industrial or laboratory furnaces and ovens, including incinerators, non-electric [Ca, J, NZ, K, Au, Ru, M, BD] Industrial or laboratory furnaces and ovens, including incinerators, nonelectric, and parts thereof: Other, except	Optional ex-outs may include: waste incinerators; heat or catalytic incinerators. [Ca, J, NZ, K, Au, M] Waste incinerators; Heat or catalytic incinerators [US] Waste incinerator; Flue gas treatment system for	These products are used to destroy solid and hazardous wastes. Catalytic incinerators are designed for the destruction of pollutants (such as VOC) by heating polluted air and oxidation of organic components. [Ca, J, NZ, K, Au, M, US, BD]

	parts. [US] Municipal Waste Incinerator (ex-84178090); incinerators for radioactive waste (84178020) [Ch]	incinerator [BD]	Used to achieve innocent treatment and disinfection of household waste through high-temperature incineration disposal.Used for radioactive waste disposal. [Ch]
841790	Industrial or laboratory furnaces and ovens, including incinerators, non-electric: Parts. [Ca, J, NZ, K, Au, Ru, M] Industrial or laboratory furnaces and ovens, including incinerators, nonelectric, and parts thereof: Parts. [US] Parts [BD]	Optional ex-outs may include: parts for 841780x. [Ca, J, NZ, K, Au] Parts of waste incinerators and heat or catalytic incinerators. [US, BD]	These parts can help maintain and repair products that are used to destroy solid and hazardous wastes. Similarly, the parts for catalytic incinerators can help maintain and repair items that can assist in the destruction of pollutants (such as VOC) by heating polluted air and oxidation of organic components. [Ca, J, NZ, US, K, Au, R, BD]
841919	Instantaneous or storage water heaters, non-electric (other than instantaneous gas water heaters). [Ca, J, NZ, K, HK, BD] Instantaneous or storage water heaters, non-electric: Other [US, Au] Solar water heaters [S] Solar water heaters (84191910) [Ch]	Solar water heaters. [Ca, J, NZ, US, K, HK, Au, BD] Excluding other - - Domestic; of copper and other [M]	Uses solar thermal energy to heat water, producing no pollution. Use of solar water heating displaces the burning of other, pollution-creating fuels. [Ca, J, NZ, US, K, HK, Au, Th] Uses solar energy to heat water, producing no pollution. Use of solar water heating displaces the burning of other pollution-creating fuels. [S, BD] Used for water heating through solar energy which is regenerative and clean compared to burning fuel. [Ch]
841939	Dryers, other:	Sludge driers.	Device used in waste water management, which requires sludge to be treated.

841960	Machinery for liquefying air or other gases.		For separation and removal of pollutants through condensation. [Ca, J, NZ, US, K, Au] Air Pollution Control. Used in condensation to remove condense contaminants from vapor to liquid form for easier removal and storage [Th]
841989	Machinery, plant or laboratory equipment, whether or not electrically heated (excluding furnaces, ovens and other equipment of heading 85.14), for the treatment of materials by a process involving a change of temperature such as heating, cooking, roasting, distilling, rectifying, sterilising, pasteurising, steaming, drying, evaporating, vaporising, condensing or cooling, other than machinery or plant of a kind used for domestic purposes; instantaneous or storage water heaters, non-electric. [Ca, J, NZ, Au] Industrial machinery, plant or equipment for the treatment of materials, by process involving a change in temperature, nesoi. [US] Machinery, plant or laboratory equipment - Other machinery, plant and equipment: Other. [Ru] Chlorine dioxide generator; Other Machinery, Plant & Equip For Treat of Mat. B (84198990) [Ch]	Evaporators and dryers, for water and waste water treatment. Condensers and cooling towers. Biogas reactors; digestion tanks and biogas refinement equipment. [Ca, J, NZ, Au] Evaporators and dryers, for water and waste water treatment. Condensers and cooling towers. Anaerobic biogas reactors, digestion tanks and biogas refinement equipment. PV cell coaters. [US]	For processing water and waste water and the separation and removal of pollutants through condensation. Includes fluidised bed systems (bubbling, circulating, etc.) and biomass boilers. Can also help anaerobic digestion of organic matter. [Ca, J, NZ, Au] For processing water and waste water and the separation and removal of pollutants. Includes fluidised bed systems (bubbling, circulating, etc.) and biomass boilers. Can also help anaerobic digestion of organic matter. Wet cooling towers are very efficient air scrubbers. PV cells generate renewable energy. [US] Used in producing chlorine dioxide. These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch] Thermal cyclers serving multiple environmental purposes.

	Other machinery, plan or laboratory equipment [S]		
841990	Parts of machinery, plant and equipment [BD] of heading No 84.19. [Ca, J, NZ, CT, Au, Ru] Parts of machinery, plant or laboratory equipment for the treatment of material involving temperature change (except domestic machinery), nesoi. [US] Parts of machinery, plant or laboratory equipment of heading 84.19 [S] Parts, other [M] Parts of Water Heaters (84199010) [Ch]	Optional ex-outs may include: Parts for 8419.19 ex, including for solar boiler/water heater; insulation, temperature sensor for solar boiler/water heater; Differential temperature controller for solar boiler/water heater; Evacuated glass tubes for solar boiler/water heater; Heat pipes for solar boiler/water heater. Parts of 841940x, 841950x, 841960, 841989x [Ca, J, NZ, CT, Au] excluding 8411990100, 841990200, 841990300 [M] Solar water heater parts [BD]	Parts used in the maintenance and repair of solar water heaters (etc). which use solar thermal energy to heat water, producing no pollution. Use of solar water heating displaces the burning of other, pollution-creating fuels. [Ca, J, NZ, CT, Au] Parts for aforementioned goods/ex-outs of heading 8419. [US] Parts used in the maintenance and repair of the above products. [S] These are parts and accessories for the solar water heater classified in 8419 and described above [BD] Used for water heating through solar energy which is regenerative and clean compared to burning fuel. [Ch]
842121	Filtering or purifying machinery and apparatus for liquids: for filtering or purifying water. [Ca, J, NZ, K, Au, Ru, S] Water filtering or purifying [M] machinery and apparatus. [US, BD] Household filtering or purifying water machinery and equipment (84212110), Device for the removal of Heavy metal ions for industry uses; Membrane	Waste water management [BD]	Used to filter and purify water for a variety of environmental, industrial and scientific applications, including water treatment plants and wastewater treatment facilities. [Ca, J, NZ, K, Au] Used to filter and purify water for a variety of environmental, industrial and scientific applications, including water treatment plants and wastewater

	bioreactor; High rate anaerobic reactors; reverse osmosis filters for industry uses; Water purification Machine; EDI ultra-pure water equipment (ex-84212190) [Ch]		treatment facilities. This line also includes newer water/wastewater filtration technologies like ozone and ultraviolet disinfection equipment. [US] For wastewater. Used to filter and purify water for a variety of environmental, industrial and scientific applications including water treatment plants and wastewater treatment facilities. For instance, membrane systems can be used to produce water from wastewater, seawater or brackish groundwater, either through purification or filtration; [S] Such devices are essential components for filtration and purification of drinking water. [Ch]
842129	Filtering or purifying machinery and apparatus for liquids: other. [Ca, J, NZ, US, K, Au] Other [M] Press Filters (84212910); etching solution recycling equipment for printed circuit board; equipment for the recycling and treatment of reclaimed water; ion exchanger; complete sets of equipment for alkali recovery of black liquor; aerator; electrodialysis device (ex-84212990) [Ch]	Refrigerant recovery and recycling units. [US] excluding oil filter and for use in oil drilling operation [M]	Used to remove contaminants from wastewater, by chemical recovery, oil/water separation, screening or straining. [Ca, J, NZ, K] These units recover both liquid and gaseous refrigerants from refrigeration and air conditioning equipment and purify the refrigerant after its recovery. This process prevents the emission of a variety of air pollutants. [US] Excluding other filters of a kind used as components in motor vehicles. [Au]

			Used for filteration by injecting mechanical force on filtering media. [Ch] Etching solution is an essential component of PCB etching but is on kind of high pollutant. These equipment are designed for recycle-processing-reuse of etching solution through solvent extraction,membrane treatment and electrode method. [Ch] These equipment are used to turn wastewater into nonpotable water, which can be widely applied in irrigation,afforestation,flushing supply,etc. [Ch] These equipments are designed for water softening,alkali removal and desalination by ion exchange resins swaping bits of themselves with ions which have same electrical property in the pre-treated water under certain conditions. [Ch] These equipment, designed for the purification and recycling of black liquor,effectively eliminate pollution and improve resourve utilization.Applications include pulp washing machine,pre-hung filter,putting-down machine,causticizer,etc. [Ch] Aerators both above and below the water's surface are essential components of oxygenic aeration of drainage. [Ch] Electrodialyzers exploit ion exchange membrane

			and DC electric field, making electrolytes develop migration selectivity, thereby desalinate the water. [Ch]
842139	Filtering or purifying machinery and apparatus for gas (other than intake air filters for internal combustion engines). [Ca, J, NZ, K, S] Filtering or purifying machinery and apparatus for gases, nesoi. [US, Au, Th] Laminar flow units [M] Filtering Purifying Machines For Gases Nes, Househ (84213910); Electrostatic Dust Collectors For Industry Uses(84213921); Baghoused Dust Collectors For Industry Uses (84213922); Cyclone Dust Collectors For Industry Uses (84213923); Other Dust Collectors for Industry Uses (84213929); Flue Gas Desulfurization Apparatus (84213940); Spraying Saturator; Concentrated adsorption - catalytic combustion equipment; Activated carbon fiber - granular activated carbon equipment; (ex-84213990) [Ch]	Optional ex-out may include: Catalytic converters / Gas separation equipment / Pneumatic fluid power filters rated at 550 kPa or greater / Industrial gas cleaning equipment / Electrostatic filters (precipitators). [Ca, J, NZ, K] Excluding other filters of a kind used as components in motor vehicles. [Au] Catalytic converters / Dust collection and air purification equipment / Gas separation equipment / Pneumatic fluid power filters rated at 550 kPa or greater / Industrial gas cleaning equipment / Electrostatic filters (precipitators) / Ozone disinfection equipment. [US] possible ex-out: air purifier and laminar flow units [M] Laminar flow units, catalytic converter and carbondyoxide removal unit imported to use at natural gas service station [Th]	Physical, mechanical, chemical or electrostatic filters and purifiers for the removal of COV, solid or liquid particles in gases, etc. [Ca, J, NZ, K, Au] Catalytic converters convert harmful pollutants, like carbon monoxide, into less harmful emissions. Other technologies in this line include physical, mechanical, chemical and electrostatic filters and purifiers for the removal of VOCs, solid or liquid particles in gases, etc. [US] For wastewater. Used to filter and purify water for a variety of environmental, industrial and scientific applications including water treatment plants and wastewater treatment facilities. For instance, membrane systems can be used to produce water from wastewater, seawater or brackish groundwater, either through purification or filtration. [S] Air Pollution Control [Th] Indoor hazardous gas purification equipment, especially for formaldehyde and benzene. [Ch]

842199	Centrifuges, including centrifugal dryers; filtering or purifying machinery and apparatus, for liquids or gases: parts (other than of centrifuges and centrifugal dryers): filtering or purifying machinery and appartatus for water and parts thereof. [Ca, J, NZ, K] Parts for filtering or purying machinery and apparatus forliquids or gases [US] Centrifuges, including centrifugal dryers; filtering or purifying machinery and apparatus, for liquids or gases: parts (other) [Au] for subheading 842129300 [M, BD] Parts Of Household Filtering and Purifying Machines For Gases (84219910) [Ch]	Parts for 842121 and 842129 [Ca, J, NZ, K], excluding parts for other filters of a kind used as components in motor vehicles [Au]. Parts for 842121, 842129x and 842139 [US]. Excluding for subheadings 842123100, 842129510 [M, BD].	Including sludge belt filter presses and belt thickeners [Ca, J, NZ, K, Au]. Parts for aforementioned goods/ex-outs ofheading 8421. [US]
847420	Crushing or grinding machines.[Ca, J, NZ, US, K, CT, Au, Ru] Crushing/grinding machines for earth/stone/ores/other mineral substance, in solid (incl. powder/paste) form [S] Machinery for sorting, screening, separating, washing, crushing, grinding, mixing or kneading earth, stone, ores or other mineral substances, in solid (including powder or paste) form; machinery for agglomerating, shaping or moulding solid mineral fuels, ceramic paste, unhardened cements, plastering	excluding concrete or mortar mixers [M, Au]	Used for solid waste treatment or recycling. Waste compactor machines. Used for solid waste treatment or recycling. [S]

	materials or other mineral products in powder or paste form; machines for forming foundry moulds of sand. Crushing or grinding machines, mixing or kneading machines [M]		
847982	Mixing, kneading, crushing, grinding, screening, sifting, homogenising, emulsifying or stirring machines not elsewhere specified in Chapter 84. [Ca, J, NZ, K, CT, S] Mixing, kneading, crushing, grinding, screening, sifting, homogenizing, emulsifying or stirring machines. [US, Ru, BD] Waste sorting, screening, crushing, grinding, shredding, washing and compacting devices. Agitator for wastewater treatment; flash mixer and flocculator. [Au] Dosing and mixing equipment for water treatment (ex-84798200); Recycling equipment for waste plastics /rubber /broken tire (84798200) [Ch]	Waste sorting, screening, crushing, grinding, shredding, washing and compacting devices. Agitator for wastewater treatment; flash mixer and flocculator. [Ca, J, NZ, K, US, CT] Other machines and mechanical appliances: Mixing, kneading, crushing, grinding, screening, sifting, homogenising, emulsifying or stirring machines. [Au] Waste compactor machines [BD]	Used to prepare waste for recycling; mixing of wastewater during treatment; preparing organic waste for composting; (composting can minimise the amount of waste going to landfill as well as recovering the valuable nutrient and energy content of the waste). [Ca, J, NZ, K, CT, Au] Used to prepare waste for recycling; removing or shredding the rags and debris typically found in wastewater; mixing of wastewater during treatment; preparing organic waste for composting (composting can minimise the amount of waste going to landfill as well as recovering the valuable nutrient and energy content of the waste). [US, BD] Waste separator machines. Prepares waste for recycling; separating waste allows for more efficient treatment of each type; for example, separating organic waste allows for composting, which minimises the amount of waste going to landfill as well as recovering the valuable nutrient and energy content of the

			waste). [S] These equipments are used to release and mix medicament,which is an essentical step of putting flocculant in wastewater in water treatment industry. These equipments are designed for recycling waste tires. [Ch]
847989	Machines and mechanical appliances having individual functions, not specified or included elsewhere in this Chapter: Other. [Ca, J, NZ, US, CT, Ru] Other machines & mechanical appliances, other than Machines & mechanical appliances for treating metal, incl. Industrial catalysers, electric wire coil-winders/ Mixing/ kneading/ crushing/ grinding/ screening/ sifting/ homogenising/ emulsifying/ stirring machines [S] Air Humidifiers Or Dehumidifiers (84798920); Machines For Squeezing Radioactive Waste (84798950); Suction Machine; Mud Scraper; Sand suction machine; Trash compactor;Vacuum extruder for making hollow brick with Gangue and fly ash; (Fan) muffler (ex-84798999) [Ch]	Optional ex-outs may include; trash and other waste presses; shredders; dust collection and storage devices; water and wastewater collecting and sampling equipment; chlorine generators; equipment for solid/liquid separation; flocculation or thickening of sewage sludge; machinery and apparatus for landfill gas monitoring; anaerobic digesters for treatment of organic waste including production of biogas; machinery and apparatus for landfill leachate treatment; machinery, apparatus and vehicles for composting; soil sampling equipment; soil remediation equipment; machines and appliances for oil spill recovery; and aquatic weed harvesters. [US, CT] Excluding machines and mechanical appliances used as components in motor vehicles. [Au]	Machines and appliances designed for a wide range of areas of environmental management including waste, waste water, drinking water production and soil remediation. In-vessel composting systems can handle large amounts of waste and speed up decomposition. Trash compactors reduce the volume of solid waste, allowing more efficient transport and disposal. Very broadly, products under HS847989 are machines and appliances designed for a wide range of areas of environmental management, including waste, waste water, drinking water production and soil remediation. [S] Parts to ensure the balance of indoor humidity. Travelling suction dredgers are designed for sevage treatment plants and horizontal sedimentation tanks of waterworks. These machines can scrape and assemble the sludge to the mouths of their pumps and

			remove it from sewage tank whithout stop. [Ch]
847990	Parts of the mach. and mech. appls. of 84.79 [Ca, J, NZ, CT, US, Ru] Parts of Machines & mechanical appliances having individual functions, not specified/incld. elsewhere in this Ch. [S] Parts Of Air Humidifiers Or Dehumidifiers (84799020) [Ch]	Parts for 847982x and 847989x. [US, CT] Excluding machines and mechanical appliances used as components in motor vehicles. [Au]	See the environmental benefit under 847989 [Ca, J, NZ] Parts for aforementioned goods/ex-outs of heading 8479. [US] Parts thereof waste separator/ compactor machines. Parts used for the maintenance and repair of waste separators and compactor machines, with the attendant benefits, for example, membrane systems which can be assembled to recover resources from waste. [S] Parts to ensure the balance of indoor humidity [Ch]
850164	AC generators (alternator), of an output exceeding 750 kVA	To be used with turbines and generators in combination to produce electricity from renewable energy fuels [BD]	Used in conjunction with boiler and turbines (also listed under 840681 and 840682) to generate electricity in renewable energy plants. Must use these turbines and generators in combination to produce electricity from renewable fuels (e.g., biomass). Size is "exceeding 750 kVA." [Ca, J, NZ, K, Au, BD] Used in conjunction with boiler and turbines to generate electricity in renewable energy plants. Must use these turbines and generators in combination to produce electricity from renewable fuels (e.g., biomass). [US]

850231	Other electric generating sets: Wind-powered. [Ca, J, NZ, US, K, HK, Ru, M] Wind-powered electric generating sets [S] Wind-powered electric generating equipment [T] Electric generating sets and rotary convertors: Wind-powered [BD] Wind-Powered Electric Generating Sets (85023100) [Ch]	Amorphous Transformers [BD]	Electricity generation from a renewable resource (wind). [Ca, J, NZ, US, K, HK, BD] For wind turbines. Used to generate electricity from wind power - a form of renewable energy. [S] Some heat exchanges are specifically designed for use in relation to renewable energy uses such as geothermal energy. Electricity generation from a renewable source (wind) [M] Used to produce electricity from wind energy. [Ch]
850239	Electric generating sets and rotary convertors: other. [Ca, J, NZ, K, Ru, BD] Generating sets, electric, nesoi. [US, Au] Biogas generator sets; Gas Generator (ex-85023900) [Ch]	Optional ex-outs may include: combined heat and power systems using biomass and/or biogas; Portable solar power generation equipment; solar power electric generating sets; Small hydro powered generating plant; Wave power generating plant; and Gas turbine sets for biomass plants [Ca, J, NZ, K] and for waste heat applications [Au] Small hydro, ocean, geothermal and biomass gas turbine generating sets. [US] For heat recovery systems [BD]	Combined heat and power systems produce usable power (usually electricity) and heat at the same time. Micro combined heat and power systems are very efficient for domestic use, particularly in places where reticulated natural gas and hot water central heating are the norm. 'Distributed generation' also minimises transmission losses through national grids, reducing the need to increase centralised generating capacity and transmission networks. [Ca, J, NZ, K, Au, BD] Electricity generation from renewable resources. [US] Used to produce electricity from methane. [Ch]

850300	Parts suitable for use solely or principally with the machines of heading 8501 or 8502. [Ca. J, NZ, CT, Au, Ru, Th, M, BD] Parts for 850231 and optional ex-out may include: 850239x. Parts suitable for use solely or principally with the machines of heading 85.01 or 85.02 Parts of the generators and generating sets listed under HS 850231 (for renewable energy systems). Relevant parts include for instance nacelles and blades for wind turbines. [S] Parts of Wind-Powered Electric Generating Sets (85030030) [Ch]	Parts for 850231 and optional ex-out may include : 850239x.[Ca, J, NZ, K, CT, Au] Parts for 850161, 850162, 850163, 850164, 850211x, 850212x, 850213x, 850220x, 850231 and 850239x. [US] Combined cycle generator parts [BD]	Parts of the generators and generating sets listed under 848340 (for renewable energy systems). Relevant parts include for instance nacelles and blades for wind turbines. [Ca, J, NZ, K, M] See environmental benefit under 847989 [CT] Parts for aforementioned goods/ex-outs of headings 8501 and 8502. [US] Parts of the generators and generating sets listed under HS 850231 (for renewable energy systems). Relevant parts include for instance nacelles and blades for wind turbines. Renewable Energy [S] Parts and accessories for electricity generation from renewable resource. [BD]
850490	Parts for electrical transformers, static converters and inductors	Parts for 850440x Not magnetic ferrite memory [R]	Used to convert DC current from renewable energy generating sets into conventional AC electricity.
851410	Resistance heated furnaces and ovens Industrial or laboratory electric furnaces and ovens (including those functioning by induction or dielectric loss); other industrial or laboratory equipment for the heat treatment of materials by induction or dielectric loss: resistance heated furnaces and ovens [M]	Optional ex-outs may include: waste incinerators and heat or catalytic incinerators. [Ca, J, NZ, K, CT, Au]	These products are used to destroy solid and hazardous wastes. Catalytic incinerators are designed for the destruction of pollutants (such as VOC) by heating polluted air and oxidation of organic components. These instruments are used to measure, record, analyse and assess

	Controlled Atmosphere Heat Treatment Furnace (85141010); Industrial / Lab Electric Resistance Heated Furnace (85141090) [Ch]		environmental samples or environmental influences [Ch]
851420	Furnaces and ovens; functioning by induction or dielectric loss. Industry / Lab Electric Induction or Dielectric Fu (85142000) [Ch]	Optional ex-outs may include: waste incinerators and heat or catalytic incinerators. [Ca, J, NZ, K, CT, Au]	These products are used to destroy solid and hazardous wastes. Catalytic incinerators are designed for the destruction of pollutants (such as VOC) by heating polluted air and oxidation of organic components. These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
851430	Other furnaces and ovens. [Ca, J, NZ, K, CT, Au, Ru, M] Industrial or laboratory electric furnaces and ovens, nesoi. [US] Industrial & Laboratory Electric Furnaces & Ovens (85143000) [Ch]	Optional ex-outs may include: waste incinerators and heat or catalytic incinerators. [Ca, J, NZ, US, K, CT, Au]	Catalytic incinerators are designed for the destruction of pollutants (such as VOC) by heating polluted air and oxidation of organic components. [Ca, J, NZ, K, CT, Au] These products are designed for the destruction of pollutants (such as VOCs) embedded in solid and hazardous wastes. Pollutants are destroyed by heating polluted air and oxidizing organic components. [US] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
851490	Parts of industrial or	Optional ex outs include:	Parts for the equipment

	laboratory electric furnaces and ovens; other laboratory induction or dielectric heating equipment. [Ca, J, NZ, K, CT, M] Parts for industrial or laboratory electric furnaces and ovens (including those functioning by induction or dielectric loss); parts for other industrial or laboratory equipment for the heat treatment of materials by induction or dielectric loss. [US, Au, Ru]	Parts for 851410x, 851430x and 851430x. [Ca, J, NZ, K, CT, Au] Parts for 851410, 851420 and 851430. [US]	listed will facilitate the destruction of pollutants (such as VOC) by heating polluted air and oxidation of organic components. [Ca, J, NZ, K, CT, Au] Parts for aforementioned goods of heading 8514. [US]
854140	Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes. [C, J, NZ, US, K, HK, CT, Au, Th, S, M, BD] Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes; mounted piezo-electric crystals: Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes [M] Solar Cells (85414020) [Ch]	Photovoltaic cells, modules and panels. [Ca, J, NZ, US, K, HK, CT, Au, BD] Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes [M]	Solar photovoltaic cells generate electricity in an environmentally benign manner (with no emissions, noise or heat generated). They are particularly suited to electricity generation in locations remote from an electricity grid. [Ca, J, NZ, US, K, CT, Au, Th. M, BD] Generate electricity in an environmentally sound manner (with no emissions or noise generated). [S] Solar batteries are eco-friendly(emission-free,noiseless,non-hear generation)and are especially applicable for power supply in remote area. [Ch]
854390	Parts of the machines and apparatus of 85.43 [Ca, Ja, NZ, K, CT, Au,	Parts for 854389x. [Ca, Ja, NZ, K, CT, Au]	Water disinfection. Parts thereof UV

	Ru, S] Parts of other machines / apparatus of heading 85.43 (85439090) [Ch]		disinfection ozonisers. Parts used in maintenance and repair of the UV disinfection instruments. UV light is extremely effective in killing and eliminating bacteria, yeasts, viruses, moulds and other harmful organisms. UV systems can be used in conjunction with sediment and carbon filters to create pure drinking water. Water disinfection Ozone (O3) can be used as an alternative to chlorine for water disinfection. [S] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
901380	Optical devices, appliances and instruments, nesoi	Solar heliostats.	Heliostats orient mirrors in concentrated solar power systems to reflect sunlight on to a CSP receiver.
901390	parts and accessories for optical devices, appliances and instruments, nesoi	Parts for solar heliostats	Heliostats orient mirrors in concentrated solar power systems to reflect sunlight on to a CSP receiver.
901580	Other surveying, hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances, excluding compasses, not elsewhere specified in 90.15 [Ca, J, NZ, K, CT] Surveying instruments and appliances,		Includes instrument and appliances necessary for measuring the ozone layer and to monitor, measure and assist planning for natural risks such as earthquakes, cyclones, tsunamis etc.

	hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances nesoi [US, Au]		
902610	Instruments for measuring or checking the flow, level, pressure or other variables of liquids or gases. [Ca, J, NZ, K] Instruments and apparatus for measuring or checking the flow or level of liquids. [US, CT, Au, BD] Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example, flow meters, level gauges, manometers, heat meter), excluding instruments and apparatus of heading 9014, 9015, 9028 or 9032. For measuring or checking the flow or level of liquids [M] Instruments / Apparatus For Measure / Checking Liq (90261000) [Ch]	Air quality monitors; and dust emissions monitors. [Ca, J, NZ, K] Excluding gauges of a kind used as components in motor vehicles. [Au] Air quality monitoring; automated air quality monitoring [BD]	Monitors to measure air pollution; basis for possible correcting measures (notably in view of health effects). [Ca, J, NZ, K] Meters, which check and record the level and/or flow of liquids or gases, are routinely used during complex auditing and testing to ensure the efficient operation of environmental systems such as water and wastewater treatment plants, air pollution control systems, and hydroelectric facilities. [US, CT, Au, BD] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
902620	Instruments and apparatus for measuring or checking pressure. [Ca, J, NZ, K, CT, Au] Instruments and apparatus for measuring or checking pressure of liquids or gases, nesoi. [US] For measuring and checking pressure [M]	Excluding gauges of a kind used as components in motor vehicles. [Au]	Manometers (devices that measure pressure) are used in power plants, water delivery systems, and other applications such as monitoring indoor air. There are two principal types: digital manometers and tube manometers, both of which have important environmental

	Other Instruments / Apparatus For Measuring / Chec (90262090) [Ch]		applications. [Ca, J, NZ, US, K, CT, Au] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
902680	Other instruments and apparatus [Ca, J, NZ, K, CT, Au, M] Instruments and apparatus for measuring or checking other variables of liquids or gases, nesoi. [US]	Excluding gauges of a kind used as components in motor vehicles. [Au]	These instruments include heat meters that are used to monitor and measure the distribution of heat from geothermal or biomass district heating systems. [Ca, J, NZ, US, K, CT, Au]
902690	Parts and accessories [M] for articles of subheading 9026. [Ca, J, NZ, CT, K] Parts and accessories for instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases, nesoi. [US] Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example, flow meters, level gauges, manometers, heat meters), excluding instruments and apparatus of heading 90.14, 90.15, 90.28 or 90.32 [Au] Parts of liquid and gas measurement/ test instrument (90269000) [Ch]		These are parts for the instruments and devices in 9026.10, 9026.20, and 9026.80. [Ca, J, NZ, US, CT, Au, K] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
902710	Gas or smoke analysis apparatus	Air pollution emission monitoring systems	Gas analysers are designed to continuously

	Automatic NOX and NO2 sampler and measuring apparatus; Automatic SO2 sampler and measuring apparatus (ex-90271000) [Ch]		monitor single or multiple gas components, and such an instrument is used to analyse air emissions from automobiles. To be used for monitoring / analysing environmental pollution. ii. Gas analysers are designed to continuously monitor single or multiple gas components and such an instrument is used to analyse air/gas emissions. Equipment used in the measurement, recording, analysis and assessment of environmental samples or environmental impact. iv. This Facility can take precautionary measures to control air pollution. [M] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
902720	Chromatographs and electrophoresis instruments		Gas and liquid chromatographs use an analytical method where a physical separation of the sample components occurs prior to detection. These instruments can be use to monitor and analyse air pollution emissions, ambient air quality, water quality, etc. Electrophoresis instruments can be used to monitory and analyse materials such as particulates emitted from incinerators or from diesel exhaust.

			DNA Sequencers, Polymerase Chain Reaction (PCR) Systems. Thermal cyclers serving multiple environmental purposes, for example: Environmental Monitoring, Waste Management, Water Treatment, Pollution Remediation, Renewable Energy, Natural Resources Protection, Endangered Species Protection, Genetically Modified Organisms (GMO) Detection [S]
902730	Spectrometers, spectrophotometers and spectrographs using optical radiations (ultraviolet, visible, infrared)		Spectrometers are used in a wide range of environmental applications, including to identify and characterise unknown chemicals and in environmental applications to detect toxins and identify trace contaminants. They are also used for qualitative and quantitative analysis inter alia in quality control departments, environmental control, water management, food processing, agriculture and weather monitoring. Used in a wide range of environmental applications, including identification of unknown chemicals, toxins and trace contaminants. Also used for qualitative and quantitative analysis in quality control departments, environmental control, water management, food processing, agriculture and weather monitoring. [S]

902750	Other instruments and apparatus using optical radiations (UV, visible, IR) [Ca, J, NZ, CT, Au, K, S] Instruments and apparatus for physical and chemical analysis using optical radiations (ultraviolet, visible, infrared), nesoi. [US] Automatic on-line monitor on UV absorption water quality; Automatic infrared oil content analyzer (ex-90275000) [Ch]		These instruments can be used for chemical, thermal, or optical analysis of samples, including water quality photometers which are used to determine the concentration of a solution from its colour intensity. [Ca, J, NZ, CT, Au, K] These instruments can be used for chemical, thermal, or optical analysis of samples, including water quality photometers which are used to determine the concentration of a solution from its colour intensity. Exposure meters are used, inter alia, to control light sources and for measurements in agriculture, horticulture, and other natural resources applications. [US] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch] DNA Sequencers, Polymerase Chain Reaction (PCR) Systems.
902780	Instruments and apparatus for physical or chemical analysis not elsewhere specified in 90.27. [Ca, J, NZ, CT, K] Instruments and apparatus for physical and chemical analysis, nesoi. [US, Au]	Optional ex-out may include: For analysing noise, air, water and hydrocarbons and heavy metals in soil. [Ca, J, NZ, CT, Au, K]	These instruments include: magnetic resonance instruments which are used in biologic and geologic analysis; and mass spectrometers which are used to identify elements and compounds. These instruments are

	Other Mass Spectrograph (90278019); PM10 automatic sampler and measuring apparatus; Automatic ammonia online monitor; Automatic TOD online monitor; Automatic BOD online monitor; Noise spectrum analyzer; Environmental noise monitor (ex-90278099) [Ch]		used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
902790	Microtomes; parts and accessories of instruments and appliances of 9027. [Ca, J, NZ, K, CT, Au, S] Microtomes; parts and accessories for instruments and apparatus for physical or chemical analysis . [US] Instruments and apparatus for physical or chemical analysis (for example, polarimeters, refractometers, spectrometers, gas or smoke analysis apparatus); instruments and apparatus for measuring or checking viscosity, porosity, expansion, surface tension or the like; instruments and apparatus for measuring or checking quantities of heat, sound or light (including exposure meters); microtomes: microtomes; parts and accessories [V] Microtomes; Parts & Access Of Instruments / Applia (90279000) [Ch]	Optional ex-outs may include: Parts for 902710 and 902780x. [Ca, J, NZ, K, CT, Au]	These instruments include microtomes which are devices that prepare slices of samples for analysis. Also included here are parts of the instruments classified in 9027 and described above. For use with Thermal Cyclers, DNA Sequencers, Polymerase Chain Reaction (PCR) Systems, etc. Thermal Cyclers, Serving multiple environmental purposes, for example: Environmental Monitoring - fast, cost-effective standard for pathogen detection from a broad range of sample types including water, soil, and food; detects pathogen contaminations of both food and environmental surface samples to minimize risks of food borne pathogens to public health; fundamental equipment for surveillance programs monitoring pathogens or viruses that can pose a significant risk to both human and animal

			health, including both naturally occurring viruses such as strains of influenza or organisms that have potential to be used in bio-terrorism activities, such as anthrax [S] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
903149	Other measuring and checking instruments, appliances and machines, not specified or included elsewhere in this chapter: ..Other optical instruments, appliances and machines elsewhere specified for measuring or checking. [Ca, J, NZ, K, CT] Measuring or checking instruments, appliances and machines, nesoi. [US] Other optical instruments and appliances: Other [Au] Optical Grating Measuring Device (90314920); Other Optical Instruments & Appliances (90314990) [Ch]	Optional ex-outs include: Profile projectors; Vibrometers; Hand vibration meters. [US]	Equipment used in the measurement, recording, analysis and assessment of environmental samples or environmental impact. [Ca, J, NZ, K, CT, Au] Profile projectors are used for critical tasks in engineering such as measuring and inspecting high precision, complex parts in many applications and industries. Equipment used in the measurement, recording, analysis and assessment of environmental samples or environmental impact. These products inc+F127lude inter alia, items such as vibrometers (that measure vibrations and assess structural and other effects of such vibrations) [US] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]

903180	Other instruments, appliances and machines. Other instruments, appliances and machines, not elsewhere specified in heading 90.31 [Th]	Optional ex-out may include: Vibrometers, hand vibration meters. [Ca, J, NZ, K, CT, Au] Instruments for measuring oxygen in oxygen censer operating with catalytic convertor [Th]	These products include inter alia, items such as vibrometers (that measure vibrations and assess structural and other effects of such vibrations) and electron microscopes for laboratory and testing applications. [Ca, J, NZ, K, CT, Au] Air Pollution Control [Th]
903190	Parts and accessories [M] of the instruments and appliances and machines of 9031. [Ca, J, NZ, K, CT, Au] Parts and accessories for measuring or checking instruments, appliances and machines, nesoi; parts and accessories for profile projectors. [US] Other measuring and checking instruments, appliances and machines, not specified or included elsewhere in this chapter; profile projectors: Parts and accessories [V] Parts & Accessories Of Instruments / Appl / Machin (90319000) [Ch]	Optional ex-out may include: Parts for 903180x. [Ca, J, NZ, US, K, CT, Au]	These are parts for the equipment classified in 9031 and described above. [Ca, J, NZ, K, CT, Au] Parts for 903110, 903120, 903149x. [US] These instruments are used to measure, record, analyse and assess environmental samples or environmental influences. [Ch]
903289	Automatic regulating or controlling instruments, other. [Ca, J, NZ, K, Au, Ru, BD] Automatic regulating or controlling instruments and apparatus (excluding thermostats, manostats and hydraulic types), nesoi. [US] Other: Electrically or electronically operated	Optional ex-outs may include: Heliostats, temperature sensor for solar boiler/water heater; Differential temperature controller for solar boiler/water heater. [Ca, J, NZ, K, Au] Light sensor; Sensor (elevators, escalators, etc.) [BD]	These include other automatic voltage and current regulators which have renewable energy applications as well as other process control instruments and apparatus for temperature, pressure, flow and level, and humidity applications. [Ca, J, NZ, K, Au] Includes other automatic

	and other [M]		voltage and current regulators which have renewable energy and smart grid applications, process control instruments and apparatus for temperature, pressure, flow and level, and regulators for humidity applications that help increase energy efficiency. [US, BD]
903290	Parts and accessories [M] for nominated articles of subheading 9032. [Ca, J, NZ, K, CT] Parts and accessories of automatic regulating or controlling instruments and apparatus. [US, Au, Ru]		These are the parts for the automatic regulating and control instruments classified in 9032 and described. [Ca, J, NZ, K, CT, Au] Parts for aforementioned goods of headings 9032. [US]
903300	Parts and accessories (not specified or included elsewhere in this Chapter) for machines, appliances, instruments or apparatus of Chapter 90. [Ca, j, NZ, US, CT, Au, Ru, Th, S] For subheading 902140 and 902150 and other [M]	Parts of the CH 90 products above, not elsewhere specified. [US]	These are the parts and accessories for the products described above. [Ca, J, NZ, CT, Au, M] Parts of the CH 90 products above, not elsewhere specified [US] Parts used in maintenance and repair of the liquid, electricity, radiation and measurement instruments listed above with the attendant environmental benefits. [S]

OECD list of environmental goods

Category and product description	HS code
A. POLLUTION MANAGEMENT	
1. Air pollution control	
1.1 Air-handling equipment	
Vacuum pumps	8414.10
Compressors of a kind used in refrigerating equipment	8414.30
Air compressors mounted on a wheeled chassis for towing	8414.40
Other air or gas compressors or hoods	8414.80
Parts for air or gas compressors, fans or hoods	8414.90
1.2 Catalytic converters	
Filtering or purifying machinery and apparatus for gases	8421.39
Parts for filtering or purifying machinery	8421.99
1.3 Chemical recovery systems	
Limestone flux	2521.00
Slaked (hydrated) lime	2522.20
Magnesium hydroxide and peroxide	2816.10
Activated earths	
Filtering or purifying machinery and apparatus for gases*	8421.39
Parts for filtering or purifying machinery*	8421.99
1.4 Dust collectors	
Filtering or purifying machinery and apparatus for gases*	8421.39
Parts for filtering or purifying machinery*	8421.99
1.5 Separators/precipitators	
Other glass fibre products	7019.90
Machinery for liquefying air or other gases	8419.60
Other machinery for treatment of materials by change of temperature	8419.89
Filtering or purifying machinery and apparatus for gases*	8421.39

Parts for filtering or purifying machinery*	8421.99
1.6 Incinerators, scrubbers	
Other furnaces, ovens, incinerators, non-electric	8417.80
Filtering or purifying machinery and apparatus for gases*	8421.39
Parts for filtering or purifying machinery*	8421.99
Industrial or laboratory electric resistance furnaces	8514.10
Industrial or laboratory induction or dielectric furnaces	8514.20
Other industrial or laboratory electric furnaces and ovens	8514.30
Parts, industrial or laboratory electric furnaces	8514.90
1.7 Odour control equipment	
Parts for sprayers for powders or liquids	8424.90
2. Wastewater management	
2.1 Aeration systems	
Compressors of a kind used in refrigerating equipment*	8414.30
Air compressors mounted on a wheeled chassis for towing*	8414.40
Other air or gas compressors or hoods*	8414.80
Parts for air or gas compressors, fans or hoods*	8414.90
2.2 Chemical recovery systems	
Limestone flux*	2521.00
Slaked (hydrated) lime*	2522.20
Chlorine	2801.10
Anhydrous ammonia	2814.10
Sodium hydroxide solid	2815.11
Sodium hydroxide in aqueous solution	2815.12
Magnesium hydroxide and peroxide*	2816.10
Activated earths*	
Aluminium hydroxide	2818.30
Manganese dioxide	2820.10
Manganese oxides (other)	2820.90

Lead monoxide	2824.10
Sodium sulphites	2832.10
Other sulphites	2832.20
Phosphinates and phosphonates	2835.10
Phosphates of triammonium	2835.21
Phosphates of monosodium or disodium	2838.22
Phosphates of trisodium	2835.23
Phosphates of potassium	2835.24
Calcium hydrogenorthophosphate	2835.25
Other phosphates of calcium	2835.26
Other phosphates (excl. polyphosphates)	2835.29
Activated carbon	3802.10
Water filtering or purifying machinery and apparatus	8421.21
Other machinery for purifying liquids	8421.29
Parts for filtering or purifying machinery*	8421.99
2.3 Biological recovery systems	
2.4 Gravity sedimentation systems	
Flocculating agents	
2.5 Oil/water separation systems	
Other centrifuges	8421.19
Parts of centrifuges	8421.91
Water filtering or purifying machinery and apparatus*	8421.21
Other machinery for purifying liquids*	8421.29
Parts for filtering or purifying machinery*	8421.99
2.6 Screens/strainers	
Other articles of plastic	3926.90
Water filtering or purifying machinery and apparatus*	8421.21
Other machinery for purifying liquids*	8421.29
Parts for filtering or purifying machinery*	8421.99

2.7 Sewage treatment	
Flocculating agents	
Woven pile & chenille fabrics of other textile materials	5801.90
Tanks, vats, etc., > 300l	7309.00
Tanks, drums, etc., >50 l < 300 l	7310.10
Cans < 50 l, closed by soldering or crimping	7310.21
Other cans < 50 l	7310.29
Hydraulic turbines	8410.00-13
Parts for hydraulic turbines	8410.90
Incinerators, non-electric*	8417.80
Weighing machines capacity <30 kg	8423.81
Weighing machines capacity >30 kg <500 kg	8423.82
Weighing machines	8423.89
Parts for sprayers for powders or liquids*	8424.90
Industrial/lab electric resistance furnaces*	8514.10
Industrial/lab induction, dielectric furnaces*	8514.20
Industrial/lab electric furnaces & ovens, n.e.s.*	8514.30
Parts, industrial & lab electric furnaces*	8514.90
2.8 Water pollution control, wastewater reuse equipment	
2.9 Water handling goods and equipment	
Articles of cast iron	7325.10
Root control equipment	
Positive displacement pumps, hand-operated	8413.20
Other reciprocating positive displacement pumps	8413.50
Other rotary positive displacement pumps	8413.60
Other centrifugal pumps	8413.70
Other pumps	8413.81
Valves, pressure reducing	8481.10
Valves, check	8481.30

Valves, safety	8481.40
Other taps, cocks, valves, etc.	8481.80
Instruments for measuring the flow or level of liquids	9026.10
Instruments for measuring or checking pressure	9026.20
3. Solid waste management	
3.1 Hazardous waste storage and treatment equipment	
Other articles of cement, concrete	6810.99
Other articles of lead	7806.00
Other electric space heating and soil heating apparatus	8516.29
Lasers	9013.20
Vitrification equipment*	
3.2 Waste collection equipment	
Household & toilet articles of plastic	3924.90
Brooms, hand	9603.10
Brushes as parts of machines, appliances	9603.50
Mechanical floor sweepers	9803.90
Trash bin liners (plastic)	
3.3 Waste disposal equipment	
Compactors	
Refuse disposal vehicles	
Polypropylene sheeting, etc.	3920.20
3.4 Waste handling equipment	
3.5 Waste separation equipment	
Magnetic separators	
3.6 Recycling equipment	
Magnetic separators*	
Machinery to clean, dry bottles, etc.	8422.20
Other mixing or kneading machines for earth, stone, sand, etc.	8474.39
Other machines for mixing/grinding, etc.	8479.82

Other machines, n.e.s., having individual functions	8479.89
Tire-shredding machinery	
3.7 Incineration equipment	
Other furnaces, ovens, incinerators, non-electric*	8417.80
Parts of furnaces, non-electric	8417.90
Industrial or laboratory electric resistance furnaces*	8514.10
Industrial or laboratory induction or dielectric furnaces*	8514.20
Other industrial or laboratory electric furnaces and ovens*	8514.30
Parts, industrial or laboratory electric furnaces*	8514.90
4. Remediation and cleanup	
4.1 Absorbents	
4.2 Cleanup	
Other electric space heating and soil heating apparatus*	8516.29
Lasers*	9013.20
Vitrification equipment*	
4.3 Water treatment equipment	
Surface active chemicals (not finished detergents)	
Oil spillage cleanup equipment	
Other electrical machines and apparatus with one function	8543.89
5. Noise and vibration abatement	
5.1 Mufflers/silencers	
Parts for spark-ignition internal combustion piston engines	8409.91
Parts for diesel or semi-diesel engines	8409.99
Silencers and exhaust pipes, motor vehicles	8708.92
5.2 Noise deadening material	
5.3 Vibration control systems	
5.4 Highway barriers	
6. Environmental monitoring, analysis and assessment	
6.1 Measuring and monitoring equipment	

Thermometers, pyrometers, liquid-filled	9025.11
Other thermometers, pyrometers	9025.19
Hydrometers, barometers, hygrometers, etc	9025.80
Other instruments for measuring liquids or gases	9026.80
Parts of instruments for measuring, checking liquids or gases	9026.90
Instruments for analysing gas or smoke	9027.10
Chromatographs, etc.	9027.20
Spectrometers, etc.	9027.30
Exposure meters	9027.40
Other instruments using optical radiation	9027.50
Other instruments for physical or chemical analysis	9027.80
Parts for instruments, incl. microtomes	9027.90
Ionising radiation measuring & detecting instruments	9030.10
Other optical instruments	9031.49
Other measuring or checking instruments	9031.80
Manostats	9032.20
Hydraulic/pneumatic automatic regulate, control instruments	9032.81
Other automatic regulate, control instruments	9032.89
Auto emissions testers	
Noise measuring equipment	
6.2 Sampling systems	
6.3 Process and control equipment	
Thermostats	9032.10
Electrical process control equipment	
On-board monitoring/control	
6.4 Data acquisition equipment	
6.5 Other instruments/machines	
B. CLEANER TECHNOLOGIES AND PRODUCTS	
1. Cleaner/resource efficient technologies and processes	

Electrochemical apparatus/plant	
Extended cooking (pulp)	
Oxygen delignification	
Ultrasonic cleaning	
Fluidised bed combustion	
2. Cleaner/resource efficient products	
CFC substitutes	
Hydrogen peroxide	2801.10
Peat replacements (e.g. bark)	
Water-based adhesives	
Paints and varnishes, in aqueous medium, acrylic or vinyl	3209.10
Other paints and varnishes, in aqueous medium	3209.90
Double-hulled oil tankers	
Low-noise compressors	
C. RESOURCES MANAGEMENT GROUP	
1. Indoor air pollution control	
2. Water supply	
2.1 Potable water treatment	
2.2 Water purification systems	
Chlorine*	2801.10
2.3 Potable water supply and distribution	
Water, incl. natural or artificial mineral water	2201.00
Distilled and conductivity water	2851.00
Ion exchangers (polymer)	3914.00
3. Recycled materials	
3.1 Recycled paper	
3.2 Other recycled products	
4. Renewable energy plant	
4.1 Solar	

Instantaneous gas water heaters	8419.11
Other instantaneous or storage water heaters, non-electric	8419.19
Photosensitive semiconductor devices, incl. solar cells	8541.40
4.2 Wind	
Windmills	
Wind turbines	
4.3 Tidal	
4.4 Geothermal	
4.5 Other	
Methanol	2905.11
Ethanol	2207.10
Hydroelectric plant	
5. Heat/energy savings and management	
Catalysts	3815.00
Multiple walled insulating units of glass	7008.00
Other glass fibre products*	7019.90
Heat exchange units	8419.50
Parts for heat exchange equipment	8419.90
Heat pumps	
District heating plant	
Waste heat boilers	
Burners: fuel other than oil or gas	
Fluorescent lamps, hot cathode	8539.31
Electric cars	
Fuel cells	
Gas supply, production and calibrating metres	9028.10
Liquid supply, production and calibrating metres	9028.20
Thermostats*	9032.10
6. Sustainable agriculture and fisheries	

7. Sustainable forestry	
8. Natural risk management	
Satellite imaging	
Seismic instruments	
9. Eco-tourism	
10. Other	

* Indicates that the HS code appears previously in the table.

REFERENCES

Araya, M. (2016). *Can the Environmental Goods Agreement help advance the Paris Agreement and Sustainable Development Goals?*. [online] Ictsd.org. Available at: https://www.ictsd.org/opinion/can-the-environmental-goods-agreement-help-advance-the-paris-agreement-and [Accessed 23 Apr. 2019].

Claro, E. and Ruz, A. (2005). *El mercado de los bienes y servicios ambientales en Chile: Elementos para la discusión*. [PDF] Santiago. Available at: https://www.economia.gob.cl/1540/articles-187053_recurso_1.pdf [Accessed 12 May 2019].

Cosbey, A., Aguilar, S., Ashton, M. and Ponte, S. (2010). *Environmental Goods and Services Negotiations at the WTO: Lessons from multilateral environmental agreements and ecolabels for breaking the impasse*. [ebook] Winnipeg (Canada): International Institute for Sustainable Development. Available at: https://www.iisd.org/sites/default/files/publications/bali_2_copenhagen_egs_lessons.pdf [Accessed 24 Jun. 2019].

Datosmacro.com (n.d.). *PIB - Producto Interior Bruto 2019*. [online] datosmacro.com. Available at: https://datosmacro.expansion.com/pib [Accessed 26 Jun. 2019].

De Melo, J. and Solleder, J. (2015). *Barriers to Trade in Environmental Goods: How Important they are and what should developing countries expect from their removal*. [PDF] Clermont-Ferrand (France): fondation pour les études et recherches sur le développement international. Available at: http://www.ferdi.fr/sites/www.ferdi.fr/files/publication/fichiers/wp_235_fichie_assemble.pdf [Accessed 17 Jun. 2019].

De Melo, J. and Solleder, J. (2019). *What's wrong with the WTO's Environmental Goods Agreement*. [online] Voxeu.org. Available at: https://voxeu.org/article/what-s-wrong-wto-s-environmental-goods-agreement [Accessed 7 Jun. 2019].

Eurostat (n.d.). *Production, value added and exports in the environmental goods and services sector*. [online] Database - Eurostat. Available at:

https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_ac_egss2&lang=en [Accessed 27 Jun. 2019].
Esty, D. (2001). *Bridging the Trade-Environment Divide*. [PDF] Journal of Economic Perspectives, pp.113-130. Available at: https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.15.3.113 [Accessed 22 Apr. 2019].

Frankel, J. and Rose, A. (2005). *Is trade good or bad for the environment? Sorting out the causality*. [PDF] Massachusetts: The Review of Economics and Statistics, pp.85-91. Available at: http://www.nathanielhiggins.com/uploads/3/6/4/2/3642182/frankel-rose.pdf [Accessed 24 Jun. 2019].

Góngora Pérez, J. and Medina Ramírez, S. (2010). *La política arancelaria y el comercio exterior*. [PDF] México: Bancomext. Available at: http://revistas.bancomext.gob.mx/rce/magazines/136/5/233_ARANCELES_comercio.pdf [Accessed 12 Jun. 2019].

Garg, A. (2017). *Environmental Goods Agreement (EGA) – What, When and Why?*. [online] Society of International Trade and Competition Law. Available at: https://nujssitc.wordpress.com/2017/03/05/environmental-goods-agreement-ega-what-when-and-why/#_ftnref17 [Accessed 23 Apr. 2019].

Goff, P. (2015). *The Environmental Goods Agreement: A piece of the puzzle*. [PDF] Waterloo, Ontario (Canada): Centre for International Governance Innovation Available at: https://www.cigionline.org/sites/default/files/cigi_paper_no.72.pdf [Accessed 17 Apr. 2019].

Hamwey, R. (2005). *Environmental Goods: Where Do the Dynamic Trade Opportunities for Developing Countries Lie?*. [ebook] Hong Kong: International Centre for Trade and Sustainable Development (ICTSD). Available at: https://www.ictsd.org/sites/default/files/event/2008/08/hamway.pdf [Accessed 28 May 2019].

ICEX España Exportación e Inversiones (2018). *España exportó por 277.126 millones de euros en 2017, récord histórico*. [online] Available at: https://www.icex.es/icex/es/navegacion-principal/que-es-icex/sala-de-prensa/sala-prensa/NEW2018780267.html [Accessed 20 Jun. 2019].

Instituto Nacional de Estadística (2018). *Cuentas medioambientales: Cuenta de bienes y servicios ambientales*. [online] Available at: http://www.ine.es/prensa/cma_2017_a_bys.pdf [Accessed 20 Jun. 2019].

Icontainers.com. (2018). *Código arancelario: código HS, HTS y TARIC*. [online] Available at: https://www.icontainers.com/es/ayuda/codigo-arancelario-hs-code/ [Accessed 5 Jun. 2019].

Jacob, A. and Møller, A. (2017). *Policy landscape of trade in environmental goods and services*. [PDF] Bangkok: ESCAP. Available at: https://www.unescap.org/sites/default/files/AWP%20No.%20166.pdf [Accessed 17 Jun. 2019].

Jegou, I. (2015). *Balance de la evolución en la relación entre comercio y cambio climático*. [online] Ictsd.org. Available at: https://www.ictsd.org/bridges-news/puentes/news/balance-de-la-evoluci%C3%B3n-en-la-relaci%C3%B3n-entre-comercio-y-cambio-clim%C3%A1tico [Accessed 23 Apr. 2019].

Joint statement regarding trade in environmental goods. (2014). [PDF] Davos, Switzerland: World Trade Organization (WTO). Available at: https://ustr.gov/sites/default/files/EGs-Announcement-joint-statement-012414-FINAL.pdf [Accessed 23 Apr. 2019].

Lendo, E. (2005). *Defining Environmental Goods and Services: A Case Study of Mexico*. 1st ed. [ebook] Geneva, Switzerland: International Centre for Trade and Sustainable Development (ICTSD). Available at: https://www.cbd.int/financial/pes/mexico-pesdefining.pdf [Accessed 24 May 2019].

Lottici, M., Galperín, C. and Hoppstock, J. (2013). *El "proteccionismo comercial verde" : un análisis de tres nuevas cuestiones que afectan a los países en desarrollo*. [ebook] Buenos Aires: Revista Argentina de Economía Internacional. Available at: http://cei.mrecic.gov.ar/userfiles/nota4.pdf [Accessed 23 May. 2019].

Mahlstein, K. and McDaniel, C. (2017). *The Environmental Goods Agreement: How Would US Households Fare?*. [PDF] Geneva, Switzerland: International Centre for Trade and Sustainable Development (ICTSD). Available at: http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/ICTSD_the_ega_-_how_would_us_households_fare.pdf [Accessed 11 May 2019].

Ministerio de economía, industria y competitividad (2017). *Informe Mensual de Comercio Exterior*. [online] Madrid: Ministerio de economía, industria y competitividad, p.4. Available at: https://www.comercio.gob.es/es-ES/comercio-exterior/estadisticas-informes/PDF/estadisticas-comercio-exterior/COMEX%20DICIEMBRE%202017/Informe%20de%20Comercio%20Exterior%20-%202017-12.pdf [Accessed 20 Jun. 2019].

Monforte, J. (2019). España es ya el cuarto país exportador de aerogeneradores. *Energética21*. [online] Available at: http://energetica21.com/noticia/espana-es-ya-el-cuarto-pais-exportador-de-aerogeneradores [Accessed 26 Jun. 2019].

Muñoz Villarreal, C. (2005). *Bienes y servicios ambientales en México: caracterización preliminar y sinergias entre protección ambiental, desarrollo del mercado y estrategia comercial*. [online] Repositorio.cepal.org. Available at: https://repositorio.cepal.org/handle/11362/5661 [Accessed 12 May 2019].

Nimubona, A. (2012). *Pollution Policy and Trade Liberalization of Environmental Goods*. [PDF] Waterloo, Canada: Springer, pp.337-338. Available at: https://link.springer.com/article/10.1007%2Fs10640-012-9564-4 [Accessed 3 Jun. 2019].

OECD (1999). *The environmental goods & services industry: Manual for data collection and analysis*. [PDF] Paris, p.9. Available at:

https://unstats.un.org/unsd/envaccounting/ceea/archive/EPEA/EnvIndustry_Manual_for_data_collection.PDF [Accessed 13 May 2019].

Portillo, J. (2018). ¿Cuáles son las mayores economías del mundo?. *El País*. [online] Available at: https://cincodias.elpais.com/cincodias/2018/10/09/midinero/1539108498_195177.html [Accessed 26 Jun. 2019].

Sell, M. (2017). *Climate and trade policy in a new era: Options ahead*. [online] Ictsd.org. Available at: https://www.ictsd.org/opinion/climate-and-trade-policy-in-a-new-era-options-ahead [Accessed 29 Apr. 2019].

Steenblik, R. (2005). *Environmental Goods: A Comparison of the APEC and OECD Lists*. [PDF] Paris: OECD, p.11. Available at: http://www.oecd.org/environment/envtrade/35837840.pdf [Accessed 26 Apr. 2019].

Sugathan, M. and Brewer, T. (2012). *APEC's environmental goods initiative: How climate-friendly is it?*. [online] Ictsd.org., p.2. Available at: http://ictsd.org/i/news/bioresreview/150577/ [Accessed 13 Apr. 2019].

Tamini, L. and Sorgho, Z. (2018). *Trade in Environmental Goods: Evidences from an Analysis Using Elasticities of Trade Costs*. [ebook] Quebec City: Springer. Available at: https://link.springer.com/article/10.1007%2Fs10640-017-0110-2# [Accessed 19 Jun. 2019].

The Observatory of Economic Complexity (n.d.). *Spain (ESP) Exports, Imports, and Trade Partners*. [online] Atlas.media.mit.edu. Available at: https://atlas.media.mit.edu/en/profile/country/esp/ [Accessed 20 Jun. 2019].

Vossenaar, R. (2014). *El Acuerdo sobre Bienes Ambientales y sus beneficios climáticos*. [online] Ictsd.org. Available at: https://www.ictsd.org/bridges-news/puentes/news/el-acuerdo-sobre-bienes-ambientales-y-sus-beneficios-clim%C3%A1ticos [Accessed 15 May 2019].

Wan, R., Nakada, M. and Takarada, Y. (2018). *Trade liberalization in environmental goods*. [ebook] Amsterdam, p.Elsevier. Available at: https://www.sciencedirect.com/science/article/pii/S0928765516303244 [Accessed 20 Jun. 2019].

Wto.org. (2001). *WTO | Doha 4th Ministerial - Ministerial declaration*. [online] Available at: https://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm#tradeenvironment [Accessed 15 Apr. 2019].