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Environmental Goods and Services Sector in Malaysia: Regulatory Shortcomings and Policy Constraints

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Abstract: *Environmental regulation is a key driver for the growth of environmental goods and services (EGS), while trade facilitates the diffusion of these goods and services. There has been no shortage of initiatives to develop the EGS sector in Malaysia. However, some policy (non-market) failures are already observed in the governance of this sector. This paper identifies the inadequacies in the regulatory framework (environmental institutions and laws) for creating an enabling environment for the EGS sector. The paper also reviews the trade direction for EGS and delineates concerns related to the sectoral approach of policy making for the sector. The findings from the documentary analyses suggest that the laws and policies related to the EGS are fragmented as they come under the purview of different agencies. As a result of this regulatory incoherence, the coordination and enforcement are weak leading to low uptake of EGS. The absence of a national policy for EGS also obscures the trade direction for this sector. The policy priority and generous support accorded to the renewable energy segment, more specifically, are also a concern given the limited and uncertain role that this segment is expected to play in global energy use.*

Keywords: Environmental goods and services; renewable energy; regulatory framework; exports; Malaysia
JEL Classification: H70, P48, P45

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1. Introduction

The environmental goods and services (EGS)[1] sector gained global recognition after the conclusion of the Earth Summit in Brazil in 1992 (see Figure 1). It was then recognised that business activities and international trade contributed to environmental degradation. Following which,

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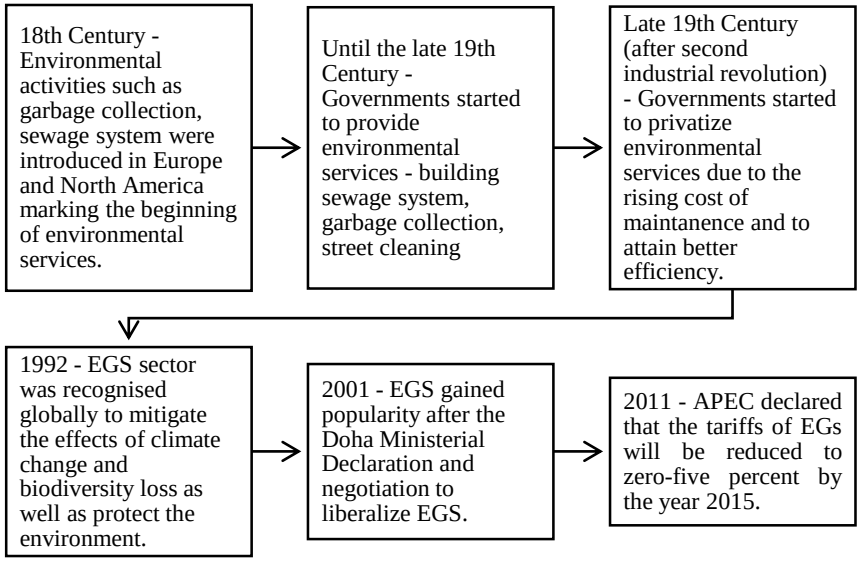
governments began to strengthen and enforce national environmental laws and regulations, while businesses were encouraged to adopt new standards to reduce environmental problems. EGS was considered necessary to mitigate the effects of environmental degradation with the help of environmental technologies (McEwen, 2016). The EGS sector, however, only gained popularity after the World Trade Organisation (WTO) Ministerial Meeting in 2001 which concluded that nations should focus on liberalising trade in EGS to support the sustainable development objective. The Ministerial Declaration of the WTO Doha Round in 2001 explicitly mandated negotiations aimed at the reduction or elimination of tariff and non-tariff barriers (NTBs) to EGS. Arguably, the most concrete international agreement on environmental goods (EGs) trade to date, the Asia Pacific Economic Cooperation (APEC) 2012 Vladivostok Declaration, made commitments to reduce tariff rates to 5% or less on an agreed list of EGs by 2015 (APEC, 2017).

Figure 1: Historical Development of EGS



Source: Compiled from the literature.

The manner in which the EGS sector has developed to date, however, differs considerably across countries. Some developed naturally as service providers to other industries or public institutions, some developed by diversifying out of similar industrial sectors, some developed from interactions with Multinational Corporations (MNCs) and through

integrating into global value chains, while others developed through state-led initiatives. Irrespective of the manner of growth, it is now recognised that the EGS sector is strongly driven by environmental regulation (ITC, 2014).

The EGS sector in Malaysia, though considered well-structured and vibrant (APEC, 2010) given the many governing policies, is delicate and complex (KeTTHA, 2017). At an early stage, the sector was somewhat unregulated as Malaysia followed a market-based approach to promoting green growth, by solely encouraging private sector participation in renewable energy (RE) without deliberated public facilitation in terms of a proper regulatory framework (Govindaraju, 2016). This led to market failures in the form of abuse of monopsony power, arbitrary or incomplete pricing of inputs and information asymmetry, which then constrained the development of the RE sector. It was only in 2009 that non-market-based policy instruments were introduced, upon the realisation for the need for a conducive policy and institutional setup to facilitate the adoption of market-based approaches.

Notwithstanding that, Kalirajan and Singh (2013) forward that further public interventions with effective enforcement and coordination are still needed to increase the participation by the private sector, induce innovation in clean technologies, foster the transfer of environmentally sound technologies (ESTs) and ensure international standards are complied with. In turn, it is also recognised that the government sector is not devoid of policy failures. Non-market and institutional failures include the lack of political will and commitment to environmental protection; limited financing for environmental improvement; continued dominance of sectoral approaches to policy-making; poor compliance; and weak enforcement (Gunatilake & Guzman, 2008). In Malaysia, companies continue to cite inconsistent or non-existent enforcement as the most important problem inhibiting the development of the EGS sector (APEC, 2010).

Ultimately, robust regulations are needed to increase the uptake of EGS and boost local and external demand for EGS. As such, trade capacity in EGS is critical for Malaysia as the domestic demand (market) is too small to sustain the sector. The real challenge, therefore, is to ensure that the regulatory framework, environmental and trade policies, are mutually supportive in order to spearhead the growth of the sector and balance the international commitments on sustainable development with the national agenda. Being in the list of top 20 countries importing and exporting EGS (derived from the ITC Trade Map, 2018), it is crucial for Malaysia to identify the challenges in ensuring the regulatory framework supports the growth of this sector. This paper contributes to the literature and field by critically reviewing two key rudiments for the development of the EGS sector in Malaysia, with reference to the trade participation and regulatory framework, to qualify the related-problems and identify proactive intervention.

The rest of the paper is organised as follows. Section 2 reviews the theoretical framework for the EGS sector based on arguments for a national policy to address the social problem of the environment, and quality of regulations (environmental and trade) to promote growth and support the demand for this sector. It also describes the qualitative study approach of the paper and describes the data sources. Section 3 explores the trade patterns in EGS and the policy emphasis on the RE sector to set the background of the study. Section 4 identifies the shortcomings of the regulatory setup for the EGS sector and examines concerns related to the trade direction for the RE sector. The last section, Section 5, concludes with policy recommendations.

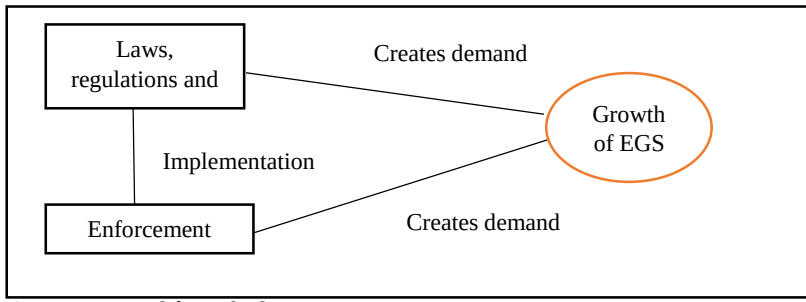
2. Theory and Methodology

2.1 Institutional Theory of Regulations

Institutions play an essential role in developing regulations to adhere to the external pressure caused by societal demands (Cetin, 2017; Campbell, 2007). This external pressure forces government institutions to respond to those demands by developing higher standards of regulations. Likewise, environmental needs and social pressures also demand changes within the firms to respond to the regulatory requirement set by the government (Berthod, 2016; Potoski & Prakash, 2004). The institutional theory forwards that firms are required to follow a set of norms and values established through a social morphism in order to remain relevant (Deligonul, Elg, Cavusgil, & Ghauri, 2013; Peng, 2012; Busenitz, Gomez & Spencer, 2000).

Institutional theory is therefore concerned with how firms are complying with regulations set by government agencies within the norms of the institutional environment (Glover, Champion, Daniels, & Dainty, 2014; Scott, 2007; DiMaggio & Powell, 1991; Meyer & Rowan, 1991). One of the arguments forwarded by Zucker (1987) is that regulatory interventions are needed to alter the behaviour of firms to adopt the higher (environmental) standards and regulations. For such interventions to take place, changes within the government institutions are also required to ensure the quality of the regulations and the subsequent growth of the sector (Acemoglu & Robinson, 2008). On the link between the quality of institutions and regulations, effective implementation and enforcement of those laws are seemingly important as they will direct firms to opt for cleaner products and technology. Sutinen and Kuperan (1999) emphasise that with effective enforcement, the compliance level by firms will improved, which, in turn, creates demand. Figure 2 presents the general analytical framework based on the institutional theory of the role of government institutions in the regulatory context.

Figure 2: Analytics of Regulatory Framework and Sectoral Growth



Source: Derived from the literature.

The arguments forwarded in the literature show that a comprehensive regulatory framework comprises a single path setting of sectoral laws, regulations and policies, of which through implementation and enforcement, demand (internal and external) is created and the sector is developed. Specifically, policies set the direction and goals (Reimer, Simpson, Hajer, & Loxley, 2009) for the development of the sector, while regulations (environmental and trade regulations) enacted pursuant to those policies play an important role in creating demand for the sector. Previous studies have alluded to the importance of a sound regulatory framework for the EGS sector. For example, Martinez-Zarzoso and Nunez-Rocha (2017) and Andrew and Thompson (2000) highlighted that having a high quality of laws and regulations is essential to induce the adoption of sound environmental management systems, enhance the environmental performance of a sector and bring about positive growth for the EGS sector. From the trade perspective, Anton, Deltas, and Khanna (2004) and Jose and Disdier (2002) stressed that a good regulatory framework would act as a catalyst for firms to adopt higher environmental standards in order to fulfil the trading partners' requirements by integrating EGS into their daily operations. Sauvage (2014) therefore argued that developed countries with stringent environmental regulations will build green supply chains (Intravaia & Viana, 2016) and grow to become larger exporters of EGS. Alternatively, developing countries that focus less on the quality of the regulations, lose in terms of seizing the market opportunities globally.

For producing effective laws and regulations, a specific national level policy that favours the EGS is considered a prerequisite to steer sectoral growth (Zaei, 2014). It also serves as a tool to convince traders and investors to further engage in the sector because it gives the assurance and provides some certainty that the regulations and enforcement activities will not be changed without prior consultation with all stakeholders. From the examples

of countries with national policies that relate to the environment, Japan and Canada are two success stories that are worth referencing. Japan adopted several policies related to the green sector starting in 2007. The strategy for a sustainable society, adopted in 2007, was followed by another guiding principle to transform the nation towards a low carbon society in 2008 in line with the target set under the Kyoto Protocol. In 2010, Japan further deployed a new growth strategy that focused on demand-driven rather than supply-oriented green growth, and subsequently, in 2012, Japan resorted to an Innovative Strategy for Energy and Environment policy that prioritised green innovation for green growth. The latest policy to revitalise green growth is the Procurement of Eco-friendly Goods and Services in February 2018 to promote comprehensive and planned procurement of materials, components, products and services with low environmental impact in order to create the market for these products and services. The progressive adoption of various green policies towards a demand- and market-driven emphasis saw a formidable increase in market size for the EGS sector in Japan, from JPY 55 trillion in 2000 to almost JPY 86 trillion in 2012 (Capozza, 2011). Likewise, the Pan-Canadian Framework on Clean Growth and Climate Change was formulated in 2016 in Canada to reduce emissions, grow the economy and build resilience to climate change. The EGS sector in Canada contributed between USD19 billion to USD38 billion in gross domestic product (GDP) (Mullen, 2014).

There are significant gaps in the regulatory framework, policy interventions and quality and stringency of regulations for the EGS sector between the developed and developing countries. Section 4 draws on the Malaysian case to provide an understanding of the inadequacies in the regulatory framework for the EGS sector.

2.2 Definition, Method and Data

At present, there is no internationally agreed definition for EGS due to the complexity and nature of the EGS functions. The definitions and classifications vary based on countries' priorities (Chaytor, 2002). Malaysia, for one, has not attempted to classify or define EGS because the harmonised system (HS) nomenclature does not identify EGS. Hence it does not see the relevance of creating her own list that may not suit her trading partners. The government has however agreed to refer to the 54 items in the APEC list because a large number of goods under that list is already applying tariffs below 5% (Vossenaar, 2013), apart from the fact that Malaysia is a member of APEC.

For the purpose of this study, the 54 items are grouped into four different categories based on their functions and usage (see Table 1). They include renewable energy (RE; goods used to produce RE or parts that contribute to

the production of RE); environmental protection (EP; goods that manage and protect the environment, especially in solid and hazardous waste management, air pollution control and other environmental protection services); environmental monitoring, measuring and analysis instruments (EMA; goods used in monitoring environmental performances as well as to measure and analyse environment-related data); and environmental preferable products (EPP; goods that contribute to the objective of sustainable development and have more than one usage or function which could be used in non-environmental activities).

Table 1: Classification of Environmental Goods

Category	No. of sub-headings
Environmental Protection	18
Environmental Monitoring, Measuring and Analysis	20
Renewable Energy	15
Environmental Preferable Products	1
Total	54

Note: The categories and the number of sub-headings may be subject to different interpretation and identification of the usage/function of these products.
Source: APEC (2010).

The trade patterns of the EGs and RE are profiled based on the categories listed in Table 1. The main source of trade data is UNComtrade (2018) and ITC Trade Map (2018), while the ERIA-UNCTAD (2016) database is used to identify the non-tariff measures (NTMs) for this sector. The regulatory framework is analysed using qualitative data based on document analysis. This includes reviews of legal (Acts and Regulations) and policy documents related to the EGS, all of which were sourced from the various ministries and government departments/agencies. The document reviews involved an examination of the related laws, policies and strategies (action plans) and their objectives, and the relevant agencies and their corresponding functions. The purpose of the document reviews is to identify the extent of the regulatory clarity and coverage for the EGS sector, and the coherence and consistency in the policies and actions plans for developing the sector. A comparative approach was then taken to identify the commonalities and distinctions between regulations and policies at the national level and to compare the overall regulatory setup with countries at the forefront of EGS.

3. Trade in Environmental Goods and Services in Malaysia

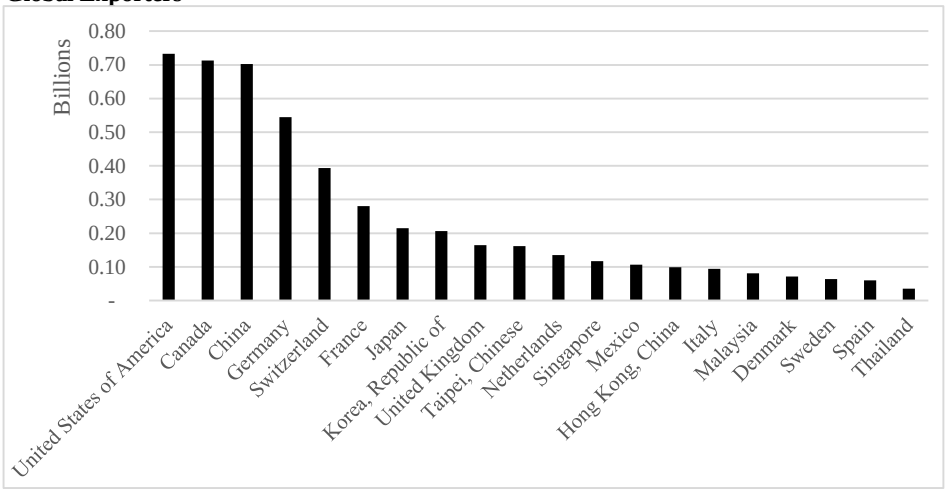
3.1 Dependence and Concentration

Malaysia has been consistently listed as among the top 20 global exporters and importers of EGS since 2001 (see Figure 3). Within ASEAN, Malaysia

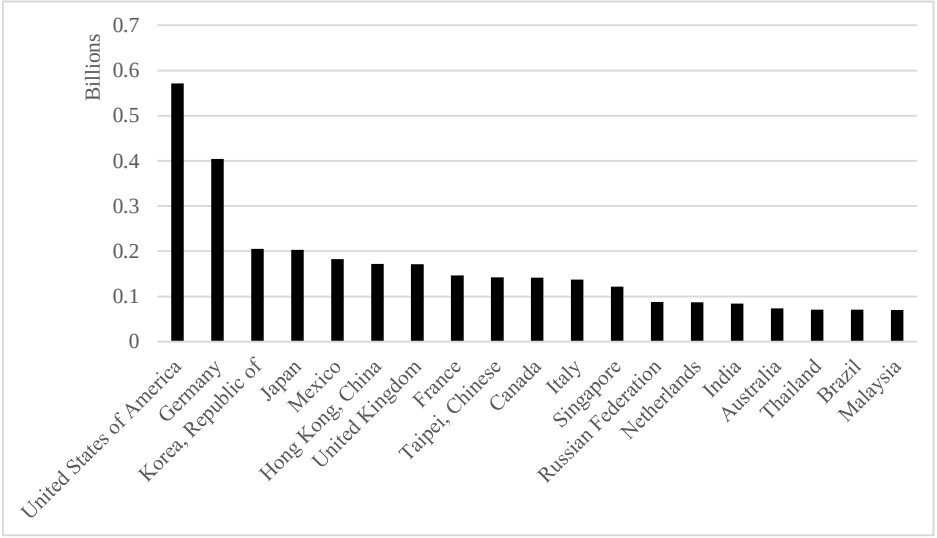
remained the second largest exporter and third largest importer of EGs for the period of review. From the national perspective, total trade for this sector was worth an estimated USD12.25 billion in 2016, with total exports and imports valued at USD6.95 billion and USD5.29 billion, respectively (Figure 4). Malaysia has emerged as a net global exporter of EGs; exports grew at a healthy 13.1% per annum relative to 4.3% for imports for the period 2000-2016.

Figure 3: Leading Global Exporters and Importers of Environmental Goods, 2001-2016 (USD billion)

Global Exporters

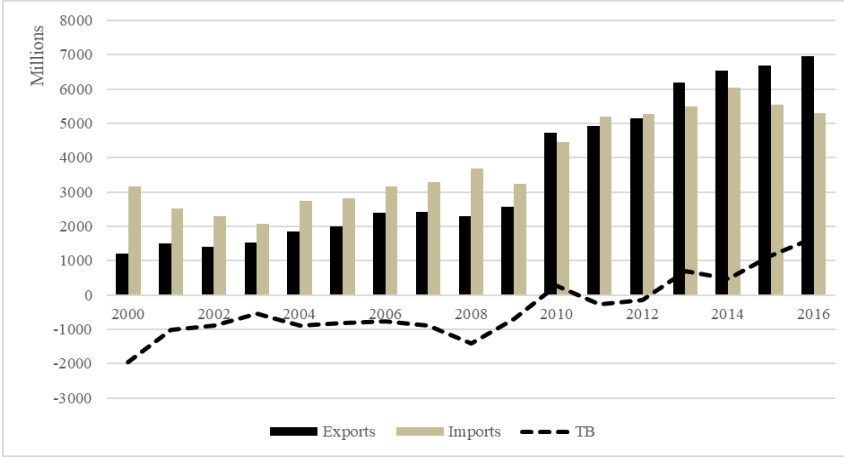


Global Importers



Source: ITC Trade Map using APEC List.

Figure 4: Malaysia – Trade Flows of Environmental Goods, 2000-2016 (USD million)



Note: TB – trade balance. Based on the 54 items identified in Table 1.
Source: UNComtrade.

In 2014, a major global milestone was achieved for this sector, whereby 18 participants out of 46 countries started the negotiation on the Environmental Goods Agreement at the WTO to liberalize a number of important EGs (WTO, 2016). They did not conclude the negotiation but made significant progress in trade liberalization. The APEC countries, more specifically, made a commitment to liberalize the identified EGs by 2015. Following which, numerous initiatives were launched in Malaysia to increase the usage of EGS, namely the National Climate Change Policy, National Renewable Energy Policy, National Green Technology Policy and 'Green Growth' (11th Malaysia Plan, 2016-2020). The then 2014 budget also introduced several tax incentives to be accorded to companies involved in this sector (MOF, 2014). This included the investment tax allowance (ITA) for the purchase of green technology equipment and income tax exemption on the use of green technology services and system. The government also introduced the Green Procurement initiative (Treasury Circular No. 2 Year 2014) wherein priority is given to the purchasing of green products in all government related projects or activities since government procurement contributes about 15 percent of the GDP (EPU, 2013).

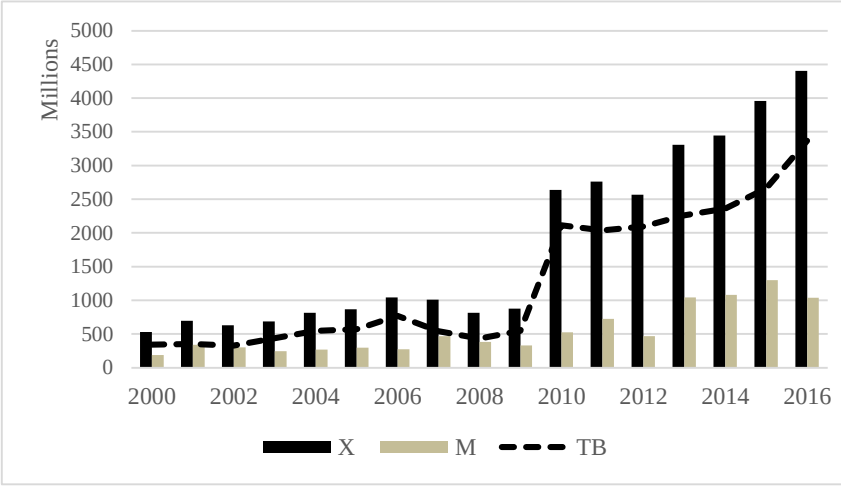
Apart from those initiatives listed above, the government also regulates the EGS sector by enacting NTMs. In total there are 5 technical barriers to trade (TBTs) and one export measure for this sector (derived from the ERIA-UNCTAD database). There are several TBTs, such as differing standards, which are protective in nature. For example, Malaysia has set a higher standard biodiesel, which is B5 (5 percent methyl ester blend with 95 percent

diesel), to be used in the country. This reduced the total imports from foreign countries by half. Since Malaysia is also producing high quality of biodiesel with optimized cost, the shortage of the supply was supported by local suppliers. This eventually protected Malaysia's domestic producers. (Alavi, 2007). Tax and subsidies are also known to be protective in nature. Malaysia subsidized prices for blended diesel using palm oil. This measure helped plantation owners to secure the supply to produce sustainable biofuel (Masjuki, Kalam, Mofijur & Shahabuddin, 2013).

By segments of the EGS sector, 63.3 percent of total exports and 19.3 percent of total imports of EGS (calculated from UNComtrade) comprised RE[3] in 2016 (see also Jacob and Moller, 2017). Malaysia has thereby emerged as a leading exporter of RE, particularly solar energy, and is currently ranked as the world's third largest producer of photovoltaic (PV) cells and modules, after China and Taiwan. This follows from Malaysia's focus on the adoption of cleaner technologies and the usage of EGs that reduce carbon emission as she committed to reduce her carbon emission up to 40 percent in terms of emissions intensity of GDP by the year 2020 at the Conference of Parties 15 (COP15) in Copenhagen. According to the Sustainable Energy Development Authority of Malaysia (SEDA), the country also has the necessary ecosystem for solar power with 250 companies involved in upstream activities, such as poly silicon, wafer, cell and module production and downstream activities such as inverters and system integrators (The Star, 19 June 2017).

Figure 5 shows the trade flows for RE. Unlike that for EGs (Figure 4), Malaysia has consistently remained as a net exporter of RE for the period of review. Trade flows were minimal in RE in the early 2000s despite the fact that Malaysia's interest in this alternative energy started since the Seventh Malaysia Plan (7MP, 1996-2000), when the Fifth Fuel Policy was introduced in 2000, followed by the launch of the Small Renewable Energy Power Programme (SREPP) in 2001 and the implementation of the Malaysia Building Integrated Photovoltaic Technology Application (MBIPV) in 2005. The steep increase in RE exports between 2009 and 2010 was largely due to the three key 2009 policies (National Climate Change Policy, National Renewable Energy Policy and National Green Technology Policy) and the subsequent introduction of the Renewable Energy Act (2011) with the feed-in-tariff (FiT) scheme. While the FiT scheme is lauded and has produced positive outcomes for the sector, the new 2017 tariff called Net Energy Metering (NEM) is somewhat counterintuitive. The NEM decreased the interests of Malaysians' to continue with solar energy usage (in residential installations) (Jovanovic, 2017). Worth mentioning here is that while this new policy is not unique to Malaysia, the timing of its implementation is worth considering as Malaysia has not garnered enough support from the community for the green idea.

Figure 5: Malaysia – Trade Flows of Renewable Energy, 2000-2016 (USD million)



Notes: X – exports; M – imports; TB – trade balance. Based on 15 items identified in Table 1.
Source: UNComtrade.

Trade in RE is highly skewed, generated largely by HS854140 (photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes). The top manufacturers, such as First Solar, Jinko Solar, JA Solar, Flextronics, Q-Cells (now Hanwha Q-Cells) and SunPower, are located in Malaysia. The markets with greatest potential for Malaysia's exports of 854140 are China, the United States (US) and Japan (ITC, 2017). It is without a doubt that Malaysia has built a comparative advantage[4] in solar, as foreign companies outsourced their production parts of the manufacturing processes, particularly for the PV segment, thereby linking Malaysia to the global environmental supply chain. As of 2015, 48 solar projects have been implemented with total investments of RM28.0 billion, to produce solar wafers, cells, modules and balance of system components. Of this, 95.3% was from foreign investments (MIDA, 2017). One of the major issues for PV manufactured in Malaysia to integrate into the global supply chain is the efficiency of the PV in converting solar energy into electricity. Currently, the PV energy conversion efficiencies are in the range of 10% to as high as 21% for modules produced for commercial use. Whereas, in the US, the efficiency rate has risen to 25.2%. Since space for solar technologies is crucial, increasing the efficiency in less space is the way forward for this sector. Another issue which affects the link with the global supply chain is the high cost of the installation or production of PV. In 2005, the cost of the PV

system per kW peak was about RM31,000. Currently, the cost has reduced to about RM15,000 which still being labelled as expensive. China has become the largest supplier of HS854140. Malaysia is actively engaged in re-exporting RE products especially solar panels which are assembled in Malaysia. This is also reflected in the high trade overlap for this segment.

4. Policies on Environmental Goods and Services in Malaysia

Even though Malaysia has more than 20 policies on green technology (KeTTHA, 2017), the coverage and scope of green application, as well as strategies, do not directly address the EGS sector. The shortcomings in the regulatory structure and the limitations of the trade policy geared towards the RE segment are identified and discussed below.

4.1 Multiple Green Initiatives

Malaysia, similar to many other developing countries, has yet to establish a single national policy for EGS. There is no specific agenda set for the development of EGS in any national documents such as the Malaysian Plans or related policies. The closest that Malaysia has for the EGS sector is the National Green Technology Policy, National Climate Change Policy and the National Renewable Energy Policy and Action Plans, which were launched in 2009. Even then, they do not specifically discuss the EGS sector. Table 2 compares the major elements of all the policies related to the EGS sector.

Table 2: Green Policies in Malaysia

Elements	National Green Technology Policy	National Environmental Policy	National Renewable Energy Policy	National Climate Change Policy
Definition	X	X	X	X
Reference	/	X	/	X
Strategy	/ (one– Industrial Training)	X	X	X
Action Plans	/ (National Green Technology Action Plan)	X	X	X

Source: Compiled from official documents.

The biggest challenge for Malaysia to incorporate the EGS into national policies is that there is no standardised definition for EGS across those

policies. Malaysia is still yet to identify and adopt an approach to define and classify EGS at the national level. Following which, different departments/agencies under the respective ministries have adopted their own definitions of EGS, with varying proposals of products that come under their jurisdiction to be recognised as EGS. Consequently, this has derailed trade negotiations of the country in this sector. For example, oil palm fibre mat, a product produced from oil palm fibre, was proposed by the Ministry of Plantation, Sector and Commodities (MPIC) to be included in the APEC EGs list in the year 2011, but was rejected by APEC because Malaysia was not able to convince the other countries that it is an environmental product or environmentally friendly product. No research was conducted to certify this product as an EG or to prove that it helps to minimise negative externalities to the environment. It was not even proposed as a national EG before it was brought to the attention of APEC. A clear takeaway here is that the government needs to understand its interests in the EGS sector before engaging in trade negotiations (ITC, 2014). Malaysia certainly falls short in this respect as many top global producers of EGS already have a national level definition and list based on various approaches and definitions provided by the APEC and the Organisation of Economic Cooperation and Development (OECD).

At the same time, Malaysia has not explored the possibility of having a comprehensive national policy or agenda exclusive for EGS. In the National Green Technology Policy, Malaysia underscores the process and application of technology that could produce products, equipment and systems used to conserve the natural environment and resources to reduce the negative impact of human activities on the environment. It has not been made clear whether the products or equipment produced using green technology can be considered conclusively as EGs and the services using these EGs as environmental services (ES). No doubt the definition provided in the Green Technology Policy includes a criterion for green technology, but the mechanism to identify a product/service that meets this criterion remains vague.

In general, the definition of green technology refers to the application of knowledge for practical purposes, where it involves a group of methods and materials ranging from techniques for generating energy to non-toxic cleaning products. The definition applies to the process and not the final product. For example, a bicycle produced using green technology is not recognised as an EG due to the dual or multiple uses of the former. Therefore, a clear definition of EGS is still needed to ensure that the relevant goods and services derived from green technology can be identified and categorised accordingly. Also, EGS is complex as it includes cross-sectoral products and services.

Consequently, many ministries and agencies are involved in this sector and they apply different laws and regulations of enforcement. As such, the various government stakeholders define EGS differently and take varying approaches to regulate the sector that befits the functions of their respective institutions. The sector is then denied a comprehensive policy.

In the National Renewable Energy Policy and Action Plans, only two references were made to the EGS. In para 4.4.4 of the policy, the EGS was referred to when explaining the world market value for EGS, and in para 4.4.4.1, the EGS was referenced when highlighting that stricter environmental laws will lead to innovation that eventually will help in developing the EGS sector. Again, despite having an exclusive policy for RE, there is no specific underlying strategy in the policy that targets trade in RE. A detailed assessment of the National Renewable Energy Policy reveals that the policy focuses solely on producing alternative energy and reforming legislation for better monitoring purposes. The primary objective is to reduce the dependency of the nation on fossil fuel energy to produce electricity and use RE as an alternative. There are five thrusts in this policy. Thrust 1 is the objective of this policy and sets the direction of the RE usage in the country. Thrusts 2, 3, and 4 are stimuli to provide a platform for industries to tap the market. Thrust 2 is related to the development of the RE sector, with strategies to introduce fiscal incentives as well as indirect assistance in the form of cost reduction by allowing government-linked companies (GLCs) and MNCs to lead the sector and provide assistance to the small and medium enterprises (SMEs). The strategies cover the ease of approval of bank loans to companies involved in the production of RE goods, tax incentives to companies using/buying locally manufactured RE goods and tax relief for companies that fulfil the local content requirements. While the incentives are generous, the action plans do no emphasise the marketability of the products and market access to new destinations.

Another policy that is closely related to the green economy and the EGS is the National Climate Change Policy. This policy was launched in 2009 in an effort to document the mitigation and adaptation[5] measures in order to be climate-resilient. Though the EGS sector plays an important role for both purposes, the policy only discusses strategies to protect the environment. This policy outlines ten strategic thrusts to ensure the nation is fully prepared to embrace the impact of climate change in years to come and at the same time to take measures to reduce the negative consequences of the greenhouse gas (GHG) effect. However, no reference is made in the action plan to use EGS to address climate change problems. The closest reference to the EGS was made in Strategic Thrust 3, where it supports the development of climate-resilient industries through key action number 11 which highlights that a proper mechanism be developed to facilitate business and industries for financial incentives, training experts, technology management and

conducting awareness programmes. This means that this policy does not contribute directly to the development of the EGS sector through mitigation and adaptation efforts.

4.2 Shortcomings in the Regulatory Structure

4.2.1 No Single Entity

One of the major challenges in Malaysia is that no single entity that has been assigned to regulate, promote and monitor the development of the EGS sector. In comparison, in New Zealand, the EGS sector is regulated and monitored solely by the Ministry of Environment, while in the European Union (EU), the European Environment Agency (EEA) is responsible for regulating and implementing policies related to EGS. Instead, five ministries are involved in regulating the EGS sector in Malaysia (Table 3). The different ministries assume different roles in managing and developing this sector. Several federal level departments come under these ministries and are directly involved in the EGS sector. Though the EGS is a highly diversified sector ranging from wastewater management to pollution control, a fuller understanding of the distinct roles of the ministries/agencies is needed to ensure no overlapping functions (or redundancies).

Table 3: Regulators for EGS in Malaysia

No.	Ministry/ Agency	Role
1.	Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC)	• Enact, enforce and monitor all environmental laws; • Prevent, control and monitor all types of pollution; • Implement Multilateral Environmental Agreements (MEAs); • Implement programmes for renewable energy and energy efficiency; and • Promote and implement policies for green technology.
2.	Ministry of Water, Land and Natural Resources (MWLNRE)	• Regulate the water sector upstream and downstream; • Regulate and implement policies on sustainable land use; and • Regulate and implement policies on natural resources.
3.	Ministry of International Trade and Industry (MITI)	• Regulate and implement policies on international trade in EGS; • Regulate and develop the local sector; and • Implement international trade agreements.

Table 3: (Continue)

No.	Ministry/ Agency	Role
4.	Ministry of Domestic Trade, Co-operatives and Consumerism (MDTCA)	• Formulate policies, strategies and review matters pertaining to the development of domestic trade.
5.	Ministry of Housing and Local government (MHLG)	• Provide integrated, efficient and cost-effective policy for development, and overseeing solid waste management services and public cleansing.
6.	Ministry of Primary Industries (MPI)	• Formulate and enforce laws, regulations and policies related to timber trade; and • Regulate timber and plantation related certification schemes.

Source: Compiled from official documents.

For example, the Department of Environment and Department of National Solid Waste Management are the enforcement agencies for the Ministry of Natural Resources and Environment and the Ministry of Housing and Local Government. Both agencies are responsible for waste collections services (solid waste and schedule waste). However, the nature of the job of these agencies is very similar. Therefore, rather than having two separate entities with similar functions, waste management could be consolidated under one agency for service improvement. This could reduce the expenditure as well as encourage the optimum use of human resources. Further, it will ensure a smooth administration of waste management. Investors and industries will also be less burdened with different sets of laws and regulations on waste management if the process of transporting, disposal and recovery is consolidated under one regulation.

Due to the involvement of different agencies in this sector, policies related to this sector are also scattered among the different agencies and each policy does not 'talk to each other' (APEC, 2010). Hence, the coordination between the policies is at best weak. Each ministry seemed to have formulated policies based on their core functions rather than taking an integrated approach towards developing the EGS sector. The Ministry of Natural Resources and Environment (NRE) (now the component of environment transferred to Ministry of Science, Technology and Innovation and known as Ministry of Energy, Technology, Science, Climate Change and Environment, METSCCE) formulated the National Policy on Environment and National Policy on Climate Change to address environmental issues that affect the ecosystem as well as climate change. The National Policy on Environment acts as an umbrella policy to address environmental issues, particularly pollution. The 1974 Environmental Quality Act (EQA) was

enacted pursuant to this policy to monitor and regulate the elements that could harm the environment. Therefore, all industries are subject to the rules and regulations set out in the EQA to ensure their by-products, as well as discharges of industrial wastes, are treated well before their release to the air or water.

Upon scrutiny of the National Policy on Environment, no explicit reference has been made to the application of EGS to address issues on pollution, and no mandatory usage of green technologies stipulated to force industries to opt for cleaner production. The policy does not make any cross-reference with other related ministries such as the Ministry of International Trade and Sector (MITI). The policy is solely implemented by the NRE, thereby resulting in overlapping responsibilities across government agencies. The effectiveness of the policies on EGS is called into question, aside from the confusion it poses among investors (Yatim, Mamat, Mohamad-Zailani & Ramlee, 2016).

4.2.2 No Single Governing Law

Each government department, in turn, is governed by different laws and regulations to monitor companies' performances in maintaining high standards of environmental quality. These departments have also imposed different standards for environmental governance without giving sufficient consideration to the common objective of preventing environmental degradation. The EQA is under the Department of Environment, the chief regulator and enforcement agency for environmental laws, rules and regulations. The Solid Waste and Public Cleansing Management Act (2007) comes under the Department of National Solid Waste Management to regulate solid waste, the Water Service Sector Act (2006) (integration of drinking water and sewerage services) is under the National Water Services Commission regulating water supply to domestic households and industries. Common policies should be rightfully supported by common laws and regulations that come under one single agency with enforcement power. Table 4 reports the legislation related to EGS enforced by different agencies.

Having too many laws weaken enforcement (this issue will be dealt with in the next section). By having a complex web of policies and regulations (US Department of State, 2015), industries are burdened to comply with many different standards. This hampers the development of the sector, which is highly technical in that it requires technical knowledge from the fundamentals of defining and classifying EGS to promoting the usage and production of the products and services. The weak legal framework acts as an informal trade barrier (Jose & Disdier, 2002). The lack of a uniform set of guidelines for traders and service providers with harmonised standards has emerged critical for this sector. Notwithstanding that, it is not that difficult

to consolidate the regulations and coordinate the strategies for the EGS sector. The EQA, with 34 subsidiary regulations, covers a range of issues, from pollution control to schedule waste management. A similar arrangement can be applied to cover wastewater, solid waste and other related issues.

Table 4: Legislations on EGS in Malaysia

No.	Legislations	Ministry /Agency	Function
1.	Environmental Quality Act (1974)	Department of Environment	• For pollution control and environmental management.
2.	Industrial Coordination Act (1975)	Ministry of International Trade and Industry	• To provide for the coordination and orderly development of manufacturing activities.
3.	Water Service Industry Act (2006)	Ministry of Water, Land and Natural Resources	• To manage water services.
4.	Solid Waste and Public Cleansing Management Act (2007)	Department of National Solid Waste Management	• To regulate the management of controlled solid waste and public cleansing to maintain proper sanitation.
5.	National Mineral Policy 2 (2009)	Ministry of Water, Land and Natural Resources	• To regulate and manage the mineral sector and trade in minerals.
6.	National Policy on Climate Change (2009)	Ministry of Water, Land and Natural Resources	• To ensure climate-resilient development to fulfil national aspirations for sustainability.
7.	National Green Technology Policy (2009)	Ministry of Energy, Science, Technology, Environment and Climate Change	• To increase energy efficiency, sustainable development and facilitation of Green Tech.
8.	Renewable Energy Act (2011)	Ministry of Energy, Science, Technology, Environment and Climate Change	• To establish and implement a special tariff system to catalyse the generation of renewable energy.

Table 4: (Continue)

No.	Legislations	Ministry /Agency	Function
9.	National Water Resources Policy (2012)	Ministry of Water, Land and Natural Resources	• To manage water resources.
10.	Green Technology Master Plan (2017-2030)	Ministry of Energy, Science, Technology, Environment and Climate Change	• Outlines strategic plans for green technology development while creating a low carbon and resource efficient economy.
11.	Treasury Circular on Green Procurement No. 1	Ministry of Finance	• To regulate and promote green procurement in government procurement practice.

Source: Compiled from official documents.

4.2.3 Lack of Enforcement

Due to the existence of multiple regulators, enforcement coordination also appears to be an issue. The major enforcement power lies with the Department of Environment, except for Solid Waste Management, which comes under the Local Authority. In such instances, the power to enforce other environmental laws should rightfully be given to the Department of Environment to ensure effective enforcement. This, however, is not the case. The enforcement activities of environmental laws remain compartmentalised. Departments/agencies do not engage with each other when conducting enforcement activities. Furthermore, most of the environmental elements such as forest, water, land and minerals are under the jurisdiction of the state. So, the states have absolute rights to determine the standards that the industries must follow, leading to differing compliance levels. This could be one of the reasons for industries not to opt for environmental compliance, or to adhere to environmental regulations.

One important case relating to the conflict between the federal and state jurisdiction is the construction of the Bakun Hydroelectric Dam; should it be executed under the EQA or the Natural Resources Ordinance 1949 (Sarawak Ordinance)? This project is considered an environmental service to generate electricity using RE (hydro). In 1995, the amendment order made by the Minister of Science, Technology and Environment excluded the requirement for the Environmental Impact Assessment (EIA) for any construction of dams in the State of Sarawak. At the same time, the Sarawak Ordinance does not contain a vigorous process of EIA as in the federal law. The execution process under the Sarawak Ordinance was simplified without any

requirement for public consultation. Without public engagement, the local communities accused the government that they are destroying the environment by building this dam. The project was stalled for several years and caused heavy losses to investors. This amendment also created double-standards on the application of the EIA requirement between the states in Malaysia. Investors and stakeholders were also confused whether to follow state or federal laws when it comes to the environmental projects since states have their own laws and policies as stated in Article 74 of the Federal Constitution.

Besides that, poor enforcement has led to the illegal trade of substances and products to avoid high export or import duties (Amirullah, Fazira, & Salman, 2017). On November 3 2016, the Department of Environment had foiled an attempt to dump 177 tonnes of toxic waste containing arsenic and cadmium from Romania. Another high-profile case reported was the involvement of Syenviro Sdn. Bhd. in the massive illegal importation of metal hydroxide from Taiwan in 2004 (Department of Environment, 2004). Illegal dumping of batteries, hazardous substances, transboundary movement of hazardous substances without prior informed consent and other illegal activities caused heavy losses to the EGS sector. Proper coordination and monitoring of enforcement activities are therefore essential to generate demand for the usage of EGS and for businesses to comply with environmental standards set by authorities.

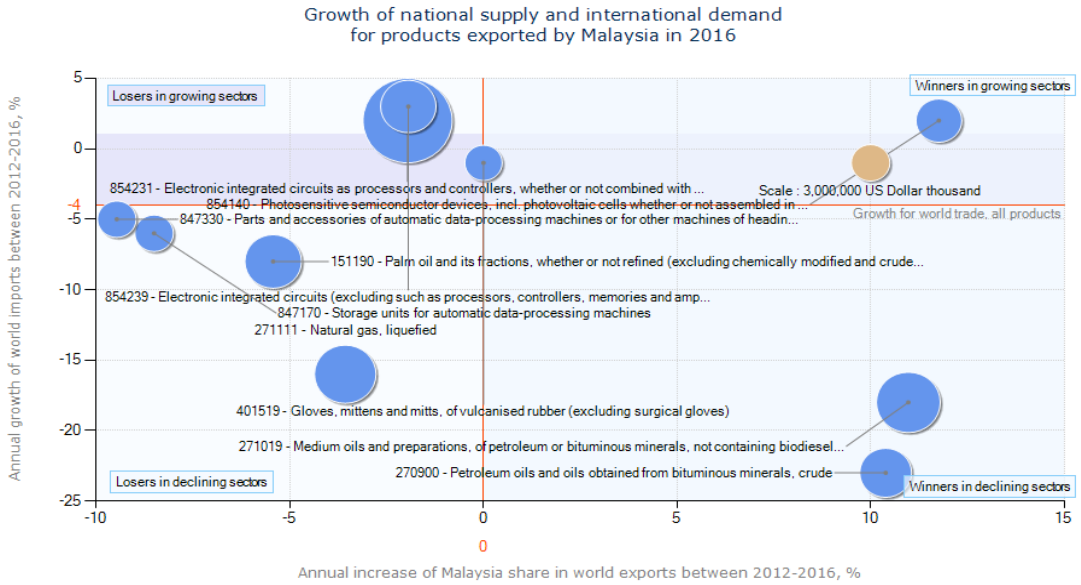
4.3 Picking 'Winners'

Though the EGS sector is considered vibrant, it may be argued that picking solar energy, the EGS segment that is over-performing (yet the capacity is under-utilised; Hui & Kock, 2017; Jovanovic, 2017; and the sector is not yet cost competitive, UNIDO, 2015), can either be a 'game-changer' or 'trouble in the making'. To date, policymakers have given attention largely to RE, whereby policies and laws are being formulated exclusively to cater to this segment. The Malaysian government has been investing large effort to support the development of RE technology through its official institution, the Ministry of Energy, Green Technology and Water (KeTTHA) and her two agencies SEDA and Green Tech. Many (financial and investment) incentives based on tax exemptions such as ITA of 100% of statutory income and pioneer status are also given for RE initiatives.

It seemed feasible to focus on solar (Webb, 2013) given the accumulated experience, infrastructure and labour skills acquired from the electrical and electronics (E&E) sector, which then propelled the production and exports of PV cells used to produce RE parts such as solar panels. Malaysia's regional presence in E&E also attracted international manufacturers to expand their businesses of solar plants to Malaysia. The latest statistics

reveal that there are 538 foreign affiliates in E&E in Malaysia, of which 404 are parent companies with affiliates (ITC, 2017). However, it should be noted that despite the progress, the Malaysian solar sector is still fragile as competitive positions are rapidly shifting (OECD, 2016). Malaysia has already lost its position to China as the world's top solar PV manufacturer as the latter's scale, and supply chain development has given her a price advantage over her competitors (Goodrich, Powell, James, Woodhouse, & Buonassisi, 2013; Hill, 2016). Recently, Malaysia seems to be benefiting from the US-China trade dispute as Malaysia is now used as a trans-shipment point for China (APEC, 2017) and Taiwanese solar cells and panels to enter the US and EU markets. Nevertheless, Malaysia cannot rest on China-US trade wars to maintain her current role in global solar trade.

Figure 6: Malaysia - Growth of National Supply and International Demand for Products Exported, 2016



Notes: (1) Represents the annual increase of Malaysia's share in world exports between 2012 and 2016. (2) Only the top 10 exported products are considered.
Source: ITC Trade Map (2018).

In relation to Malaysia's strength in solar, that is, the national supply vis-à-vis international demand, HS854140 is considered a 'winner in a growing sector' (Figure 6). The size of the national supply of this segment is 8.32% in global terms. Malaysia recorded an annual increase of 11.76% in world market share for this segment between 2002 and 2016, while the annual

growth of global imports was only 2%. Policy priority and the generous support accorded to this segment appears justified (APEC, 2017), despite the relatively limited and uncertain role that the RE sector is expected to play in global energy use.

5. Concluding Remarks

The EGS sector in Malaysia is a fast-growing sector similar to the non-environmental sector. There are, however, shortcomings in the regulatory framework. This paper argues that no single entity responsible for this sector and the absence of a single law to regulate this sector contribute to the policy incoherence and poor enforcement coordination. The sector should be well regulated to support liberalisation efforts globally. This paper also recognises that the lack of an internationally agreed definition is a challenge that needs to be addressed at the national level. There is a case for indigenous development of EGS to provide consensus and clarity on the goods and services that can be included based on the needs. A national consensus on the list of goods and services is needed before it is taken up at the international forum to harmonise standards and facilitate trade in EGS. This paper also forwards that while Malaysia should leverage on her advantage as the third largest producer of RE, namely solar panels, other segments of the sector should not be neglected.

On the whole, Malaysia may be considered as being in the middle of the continuum of developing a robust national environmental regulatory framework for the EGS sector. Accordingly, the support from the government is further needed in creating policies that are specific and favourable to the EGS sector. First, the government must enforce the use of green products on local users and industries, in development projects, automotive and other end users to create the local demand/ market for EGS. Second, Malaysia needs to enforce (and if possible, make mandatory) the adoption of green standards by the sector to ensure the products and services comply with global requirements to increase their marketability. Mandatory adoption will pave the way for uniformity of standards across the countries rather than adopting different standards for different countries. This will boost the confidence level of the stakeholders as well as investors due to the absolute certainty of policies. Apart from that, enforcement activities could be carried out fairly when all industries adopt the same standard according to the nature of the business. If voluntary and there are no trade implications, many industries will avoid adopting on the excuse that it is costly which will jeopardise the environmental protection efforts. Third, Malaysia could consider profit rebates to reduce cartel activities and illegal trade of such products, and thereby enhance market competition of these products.

Notes

1. EGS is a sector devoted to solving, limiting or preventing environmental problems (APEC, 2010).
2. After the general election (PRU-14), the entire component of the Ministry of Science, Technology and Innovation (MOSTI), Green Technology and Energy Components from the Ministry of Energy, Green Technology and Water (KeTTHA) and related components of Climate Change and Environment from the Ministry of Natural Resources and Environment (NRE) has been restructured and formed the Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC).
3. RE is derived from a source that is continuously replenished, such as the sun, a river, wind, or the thermal power of world oceans (UNIDO, 2015). For this paper, it is based on 5 product codes at the HS6-digit level, comprising biomass boilers, solar, wind and hydro (small).
4. Despite the comparative advantage in exports of some EGs, in general, Malaysia is already off patent and hence does not command any premium price.
5. Mitigation efforts involve reducing the negative impact of climate change, while adaptation requires adapting to the changes to protect the people and the environment.

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