Evaluating the effectiveness of product-based environmental voluntary schemes in the Asia-Pacific region: Comparisons of labeling, certification and membership schemes at the national level in the region

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Abstract

In the global market, products and services are traded through the global supply chain. There are product-based voluntary schemes at the international level to make sure the products are produced sustainably in the production process and provide the information to consumers such as the Forest Stewardship Council (FSC) and the Roundtable on Sustainable Palm Oil (RSPO). Such voluntary schemes are being utilized in the energy and food sectors as well to inform consumers about the energy and environmental performance of the products. The importance of the schemes is increasingly recognized in the Asia-Pacific region, as the regional market grows and environmental degradation continues in the region.

A research project is under way to addresses key product-based environmental voluntary schemes at the national level in the energy and food sectors in the Asia-Pacific region. The schemes include labeling, certification, membership and award schemes in several countries in the region. The study compares the schemes based on several key attributes essential to evaluate their effectiveness including the rate of diffusion, use of indicators, and existing of auditing. In addition, this research project explores possible impacts of such schemes on other social environmental and social issues in the Asia-Pacific region. The schemes may have positive and/or negative implications to other social and environmental issues. In fact, the importance of the understanding for such linkages or nexus is highlighted among various research initiatives on Social Development Goals (SDGs).

This paper illustrates tentative results of the comparisons among environmental voluntary schemes. The target schemes of analysis include energy efficiency labels, fuel economy labels, green labels, and award schemes in several countries in the Asia-Pacific region. Based on the results of the comparisons of the schemes, this paper provides some suggestions to enhance effectiveness of each scheme and suggests institutional designs for further development of the voluntary schemes in the Asia-Pacific region.

Keywords: environmental voluntary schemes, certification, labeling, Sustainable Development Goals (SDGs)

1 Introduction

In the global market, products and services are traded through the global or regional supply chain. There are product-based voluntary schemes at the international level to make sure the products are produced sustainably in the production process and provide the information to consumers such as the Forest Stewardship Council (FSC) and the Roundtable on Sustainable Palm Oil (RSPO). The importance of the schemes is increasingly recognized in the Asia-Pacific region, as the regional market grows and environmental degradation continues in the region.

Such voluntary schemes have been utilized particularly in the energy sector among developed countries for two decades to inform individual consumers about the energy and environmental performance of the products. The European Union has introduced a labeling scheme in 1995 grading the energy efficiency performance of products from A to G (European Commission, 2015). The United States similarly has the
Energy Star Program since 1992 (EPA), whereas Japan also has an energy efficiency labeling scheme since 2000 (International Energy Agency, 2016). In response to those schemes, there have been various research initiatives and programs that have attempted to evaluate the effectiveness of the schemes among the developed countries (Dieu-Hang et al., 2017, Sanchez et al., 2008, Banerjee & Solomon, 2003, Schiellerup, 2002, Bertoldi, 1999). On the other hand, there is a limited number of studies that examine the effectiveness of the schemes in the Asia-Pacific region except Japan (Kimura, 2010) (Nordqvist, 2006). Few studies are found that attempt to compare different schemes in the region either.

This paper illustrates tentative results of the comparisons among environmental voluntary schemes. The target schemes of analysis include energy efficiency labels, fuel economy labels, green labels, and award schemes in several countries in the Asia-Pacific region. Based on the results of the comparisons of the schemes, this paper provides some suggestions to enhance effectiveness of each scheme and suggests institutional designs for further development of the voluntary schemes in the Asia-Pacific region.

2 Research framework

The first phase of this research project examines a list of key attributes essential to evaluate the effectiveness of environmental voluntary schemes. Discussions and inputs from subject experts have led to the following list of items to cover in this research:

1. Attributes
   - Description of the scheme
   - Country
   - Year of launching the scheme
   - The organization in charge (actual people working on the scheme)
   - The rate of diffusion (proposed indicator is the number of producers/products/participants certified to measure diffusion)
   - Target products, services, facilities, systems
   - Cost (fee) to introduce the scheme
   - Types of voluntariness or flexibilities

2. Transparency and accountability
   - Use of indicators
   - Existence of auditing
   - Monitoring
   - Reporting
   - Agent (actors) involvement

3. Evaluation (external)
   - Evaluation of effectiveness by a third party
   - Recognition of the scheme

4. Sustainability criteria: links to SDGs issues
   - Overview of the links to other SDGs issues (both positive and negative implications to other SDGs issues)

These attributes have been found to be relevant in identifying possible patterns for effective environmental voluntary schemes. Khanna and Brouhle, for example, have proposed a list of key attributes that have implications for environmental outcomes, and divided it in general characteristics (goals, principles), regulatory environment (threat of regulation, assistance), market incentives, and monitoring/ enforcement (transparency and accountability) (Khanna & Brouhle, 2009).

Other researchers such as Braathen and Johnstone have also mentioned some of the implementation issues that have an impact on the effectiveness of environmental voluntary schemes including monitoring
and reporting (self-monitoring or third-party audit), sanctions for non-compliance and evaluation of the environmental voluntary schemes (Braathen & Johnstone, 2003).

Table 1 demonstrates the environmental voluntary schemes that this paper addresses including energy efficiency labels, fuel economy labels, green labels, and award schemes. As seen in Table 1, several schemes are extensively selected for analysis in the Asia-Pacific region. The Appendices describes the details of each scheme:

Table 1: Environmental voluntary schemes addressed in this paper

<table>
<thead>
<tr>
<th>Country</th>
<th>Energy efficiency labels</th>
<th>Fuel economy labels</th>
<th>Green label (Eco-Label)</th>
<th>Award schemes</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Cambodia</td>
<td>*UD</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>East Timor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Laos</td>
<td>*UD</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1</td>
<td>*UD</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Thailand</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vietnam</td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*UD: Under Development

Table 2 is an image of the matrix being developed to evaluate the effectiveness of environmental voluntary schemes based on the selected key attributes.

Table 2: Image of the matrix generated for the analysis
The information on environmental voluntary schemes gathered and filled in this matrix for comparisons among them and evaluations of the effectiveness of voluntary schemes.

3 Tentative results and research progress

This section describes tentative results and research progress. As indicated above, the target schemes of analysis are energy efficiency labels, fuel economy labels, green labels, and award schemes in several countries in the Asia-Pacific region.

3.1 Energy efficiency labels

Energy efficiency schemes are relatively recent. With the exceptions of Thailand and the Philippines that pioneered with energy efficiency labels in 1992, most of the countries developed local schemes since 2006. Also, all the schemes are promoted (and enforced) by the government. It is the only scheme analyzed in this paper regardless of its non-voluntary nature.

Most of these schemes work in a similar way, in which a list of target products (electric appliances) is decided and the Minimum Energy Performance Standards (MEPS) are established for each product (in other words, the lowest energy performance that a product must comply to. A label is attached to the product, and based on its performance the product is evaluated within a rating scheme that goes (usually) from 1 star (low efficiency) to 5 stars (high efficiency). However, every country has established different MEPS and different methods to calculate it.

As for the rate of diffusion, the proposed methods to measure the rate of diffusion include the number of appliances (enforced) that the label covers and the number of certified models/suppliers. Table 3 shows a summary of the diffusion of energy efficiency labels (models certified) in the Southeast Asia region:

Table 3: Diffusion of energy efficiency labels in the Southeast Asia region

<table>
<thead>
<tr>
<th></th>
<th>Brunei</th>
<th>Indonesia</th>
<th>Malaysia</th>
<th>Philippines</th>
<th>Singapore</th>
<th>Thailand</th>
<th>Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air conditioner</td>
<td>Enforced*</td>
<td>Enforced*</td>
<td>394</td>
<td>1010</td>
<td>389</td>
<td>Enforced*</td>
<td>56</td>
</tr>
<tr>
<td>Fan</td>
<td>NS</td>
<td>NS</td>
<td>569</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>NS</td>
<td>Enforced*</td>
<td>218</td>
<td>454</td>
<td>507</td>
<td>Enforced*</td>
<td>59</td>
</tr>
<tr>
<td>TV</td>
<td>NS</td>
<td>NS</td>
<td>394</td>
<td>490</td>
<td>1088</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Lighting (LED, CFL)</td>
<td>NS</td>
<td>8 (CFL)**</td>
<td>625</td>
<td>475</td>
<td>628</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Clothes dryer</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>100</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Washing machine</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>29</td>
</tr>
</tbody>
</table>

NS=Not specified
*Label has been enforced for the appliance, however detailed data of certified models is not provided.
**Number of manufacturers complying with the label

Overall, Malaysia and Singapore’s energy efficiency label have the highest rate of diffusion, considering the number of appliances that it covers (5) and the amount of models certified. With respect to the existence of auditing and monitoring, the producers are not subject to an audit itself, instead, they must have the product tested in accredited laboratories against the MEPS previously established. In some cases, the institutions in charge of these schemes carry out an evaluation of the laboratory reports and market surveillance to make sure that the producers are properly attaching the labels.

3.2 Green labels (Eco-labels)
Green labels are probably one of the oldest environmental voluntary schemes in the Southeast Asia region, as they were established during early 1990s. Despite that, there is not a strong presence of these schemes with only five countries currently implementing them. Most of these schemes work in a similar way in which the product is tested against pre-established criteria, and if the product complies with it, a “Green Label” seal is granted. One particular characteristic of these labels is that the scope (i.e. target products) is wide. In fact, product criteria are being developed for electronic equipment, office utilities, and lighting, among others. Similar to the energy efficiency labels, the proposed method to measure the rate of diffusion includes the number of product criteria developed, and the number of certified models/companies. Table 4 indicates the diffusion of green labels in the Southeast Asia region:

Table 4: Diffusion of green labels in the Southeast Asia region

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Malaysia</th>
<th>Philippines</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Criteria</td>
<td>37</td>
<td>NS</td>
<td>39</td>
<td>52</td>
</tr>
<tr>
<td>Models</td>
<td>NS</td>
<td>231</td>
<td>36</td>
<td>3000</td>
</tr>
<tr>
<td>Companies</td>
<td>40</td>
<td>71</td>
<td>28</td>
<td>65</td>
</tr>
<tr>
<td>NS=Not specified</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In terms of product criteria, SIRM QAS Eco-label, Green Choice Philippines and Green Label Singapore have the highest rate of diffusion. However, if the number of certified models is taken as reference, the leading schemes are Green Label Singapore and Green Label Thailand. The requirements for auditing and monitoring are summarized in Table 5:

Table 5: Requirements for auditing and monitoring among green label schemes

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Malaysia</th>
<th>Philippines</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditing*</td>
<td>YES</td>
<td>YES</td>
<td>NO**</td>
<td>YES</td>
</tr>
<tr>
<td>Monitoring</td>
<td>YES</td>
<td>NS</td>
<td>NO***</td>
<td>YES</td>
</tr>
<tr>
<td>NS=Not specified</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Initial audit to verify the information submitted
**Not audit based, but the product must be tested in accredited laboratories
***Only paperwork for renewal of the license

With the exception of Green Label Singapore, most of the green labels seem to have at least an initial audit to verify the information submitted, as well as a frequent monitoring process. In most of the cases, the initial audit is accompanied by a verification from accredited laboratories that test the product against the product criteria.

3.3 Awarding schemes

Awarding schemes in the energy sector have existed for a long time. For example, the Philippines introduced the Don Emilio Abello Energy Efficiency Awards in 1982. Also, the ASEAN Centre for Energy (ACE) developed a regional awarding scheme in 2000. Both schemes have as main objective to promote energy efficiency on a local (the Philippines) and regional (ASEAN) scale. In 2016, Vietnam introduced an awarding scheme that focuses more on materials sustainability but also dedicates some sections of its criteria to energy efficiency. The indicators used to evaluate the applicants vary from scheme to scheme and have been summarized in Table 6:

Table 6: Indicators used to evaluate the applicants among awarding schemes
The Don Emilio Abello Energy Efficiency Awards uses the LOE as its main indicator to evaluate the applicants. The LOE is based on the energy consumption reduction that is subsequently transformed in liters of oil. As for the ASEAN Energy Awards and Greening Vietnam Green Product Awards, the criteria are more subjective, thus the indicators are also more subjective. The rate of diffusion of awarding schemes can be measured through the region they cover, the target public of the award, the number of awards (types of wards) and the number of categories within the awarding scheme as in Table 7:

Table 7: Diffusion of awarding schemes in the Southeast Asia region

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Don Emilio Abello Energy Efficiency Awards</th>
<th>ASEAN Energy Awards</th>
<th>Greening Vietnam Green Product Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOE (liters of oil equivalent)</td>
<td>Energy efficiency, renewable energy, water efficiency, environmental sustainability (materials), indoor environmental quality, among others.</td>
<td>Awareness of brand, sustainability, health and environmental protection, innovation and energy efficiency</td>
<td></td>
</tr>
</tbody>
</table>

The ASEAN Energy Awards is the only regional scheme with a wide scope of target public that includes any kind of building or industry that has been engaging in energy reduction activities or other green initiatives. The Don Emilio Abello Energy Efficiency Awards, on the other hand, are focused exclusively on companies or establishments from the Philippines. In terms of region covered and target public, one could say that the Greening Vietnam Green Products Awards is the less diffused since it focuses particularly in manufacturers and distribution companies in the construction field in Vietnam.

The ASEAN Energy Awards requires as part of the application documents a certification and covering note from consultants, meaning that the information submitted has been previously verified by an external party. The Don Emilio Abello Energy Efficiency Awards also mentions an evaluation of the data submitted by the companies. The Greening Vietnam Green Product Awards is the only scheme that is based on a survey and on the general perception of the products.

3.4 Fuel economy labels

In contrast to energy efficiency labels and green labels, fuel economy labels are less common and have been just recently introduced in Southeast Asia and in many cases are still under development. Some of the relevant indicators for these schemes can be identified from the information prioritized and displayed in the labels as seen in Table 8:

Table 8: Indicators used among fuel economy labels
As Table 8 indicates, the scheme in Singapore includes fuel consumption, CO2 emissions, a relative comparison (how the car is compared overall to other cars in terms of fuel efficiency and emissions), and the amount of rebates the car is eligible for. On the other hand, the scheme in Thailand contains fuel consumption (on different driving conditions), CO2 emissions, a relative comparison (in terms of fuel efficiency), emissions and safety standards. The scheme in Vietnam includes fuel consumption only (on different driving conditions). It may be said that Vietnam’s label is the most basic “fuel economy” label since it only describes how efficient is the car in terms of fuel consumption. The rest of the schemes have gone beyond and include information regarding CO2 emissions, safety standards and relative comparisons among others. In fact, Singapore and Thailand’s labels are quite similar, with the exception that Thailand’s label includes information on safety standards.

3.5 Other schemes

This study examines other voluntary schemes including carbon footprint labeling and quality assurance schemes in the Asia-Pacific region. Following describes some of the schemes under research.

3.5.1 Carbon Label & Carbon Footprint for Organization

In Thailand, a carbon footprint labeling scheme was introduced in 2008, where the product’s CO2 emissions are measured based on a “life cycle assessment.” The scheme contains two types of labels, including the Carbon Reduction Label (measures reduction of CO2 in comparison with a previous period) and the Carbon Footprint Label (measures CO2 emissions). While this scheme itself does not promote energy efficiency, it is known that CO2 emissions are closely related to energy production, thus it was included under the energy sector.

3.5.2 Good Solar Initiative

In Cambodia, with the support of international organizations, a certification scheme for solar-powered products was introduced in 2014. The “Good Solar Initiative” aims to improve the quality of solar products and services and promote the use of solar energy in the rural area. The indicators employed under this scheme are based on the requirements (technical specifications) of the solar products and the services offered. These can be found in the quality charter of the Good Solar Initiative. Both on-site technical audits and monitoring through documentation review, customer satisfaction surveys, and mystery shoppers are carried out under the scheme.

3.5.3 Project: Eco Shop

In Singapore, a scheme to improve the shops and stores’ sustainability was established under the name of Project: Eco Shop. The scheme promotes a series of recommendations to improve the stores’ environmental performance in energy consumption, indoor air quality, and waste management, among others. However, it is encouraged for stores to establish their own targets and subsequently, their own indicators to monitor them. By 2016, there was a total of 83 certified stores. No external audit is required, instead, self-audit and self-monitor of goals’ progress is encouraged.

3.5.4 Myanmar Platform for Dialogue on Green Growth
The Myanmar Platform for Dialogue on Green Growth is a multi-stakeholder initiative developed by the French Think-and-Do-Tank Green Lotus. It worked on developing a National Action Plan based on three main pillars including investing in natural capital, investing in renewables energies, and investing in resource efficiency and sustainable cities. While no explicit indicators are used in the National Action Plan, the platform gathered members from the civil society, the private sector, political parties and institutions. Currently it has 26 partners. The platform aims at keeping monitoring the main areas identified by implementing pilot-projects, following the recommendations of the National Action Plan.

4 Conclusion

This paper illustrated tentative results of the comparisons among environmental voluntary schemes. The target schemes of analysis included energy efficiency labels, fuel economy labels, green labels, and award schemes in several countries in the Asia-Pacific region. The high rate of diffusion of some of these schemes show to some extent the effectiveness of the acceptance, however, environmental effectiveness cannot be concluded without further analysis in a business as usual (BAU) scenario. Despite that, the existence of transparent indicators and external audit and monitoring have been found to be useful to improve the schemes effectiveness. In this matter, the environmental voluntary schemes analyzed in this paper are subject to frequent audits and monitoring, which suggests that they are being employed effectively. The results of the comparisons among the schemes also indicate that there are similarities and differences among them. With respect to the differences, they are related to the level of the development of economies among the countries in this region. The level of regulatory and policy support for the introductions of such schemes as well as social interests and expectations toward them would be also contributing to the different levels of the initiatives.

This paper suggests two directions to enhance the effectiveness of environmental voluntary schemes in the Asia-Pacific region. One is the efforts for policy coordination or harmonization among the schemes. As this paper indicates, there are similarities among the analyzed schemes and further room for harmonization. Considering the fact that many of the products analyzed in this study are being traded across countries in the Asia-Pacific region, harmonization of the schemes would help to provide better information to consumers and increase the effectiveness of the schemes. The second direction is to consider linkages to other sustainability or SDGs issues. While the existing schemes tend to focus on one specific issues or criteria such as energy efficiency performance in the labeling certification, for example, they may have both positive and negative implications to other SDGs issues. Since the national implementations of SDGs are under way in the Asia-Pacific region, the designs of the environmental voluntary schemes can be considered in the broader framework in order to increase its effectiveness for the future.

Acknowledgement

This research being conducted with the financial support from the Global Environmental Research Fund of Ministry of the Environment Japan (S-16). In the process of the development of the matrix, useful comments and suggestions were provided by Norichika Kanie, Andrew Cock, Robert Lindner, and other project members as well as advisory members in S-16. The authors wish to thank for those support.

References


Appendices

Appendix 1: List of labeling, certification, membership, award schemes and systems analyzed in this study

**Brunei’s Energy Efficiency Label:**
Labelling scheme and one of the government’s EE&C’s (Energy Efficiency and Conservation) initiatives launched in 2008 that consists in a label that evaluates the energy efficiency of electric appliances with a rating scheme that goes from 1 star (low) to 5 stars (excellent).\(^1\) Voluntary scheme that focuses on air conditioners, to be extended to other appliances in the future like refrigerators and water heaters, among others.\(^2\)

**Indonesia’s Energy Efficiency Label:**
Government labelling scheme developed in 2008 as part of the Energy Conservation Policy and Regulation\(^3\), to raise awareness and encourage manufacturers to improve the energy efficiency of electric appliances. It is based in a rating scheme “More star, more efficient” with a maximum of 4 stars. It was proposed to start as voluntary, but progressively will become mandatory for some products like CFL, refrigerator and air conditioner.\(^4\)

**Malaysian Energy Efficiency Label:**
Labelling scheme created as part of the Electricity Regulations 2013, that enforced Minimum Energy Performance Standards (MEPS) for 5 domestic electrical equipment (refrigerator, air-conditioner, television, domestic fans and lighting) and made it mandatory for these products to be affixed with an energy rating label based on a rating scheme (from 1 to 5 stars). It is planned to extend the scope of appliances to rice cookers, water heaters and irons, among others.\(^5\)

**Philippines Energy Label:**
Labelling scheme based on a joint Initiative of the Department of Energy and the Department of Trade and Industry that was developed in 1992\(^6\) under the National Energy Efficiency and Conservation Program (NEECP)\(^7\), and aims to educate consumers and allow them to choose what gives them more value for their money, and empowering them to help in the global efforts of mitigating the adverse effects of wasteful use of energy.\(^8\) Target products include air conditioners, refrigerators and freezers, clothes washers, televisions, CFLs, and LFLs, among others.\(^9\)

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2. Energy Efficiency Standards and Labeling in Asia p.3
3. Energy Efficiency Standard and Labeling Policy in Indonesia pp.8,15
4. Energy Efficiency and Conservation Policy in Indonesia p.23
5. Minimum Energy Performance Standards in Malaysia pp.5,28,30
6. The Philippine Energy Standards and Labelling Program pp.2,3
9. The Philippine Energy Standards and Labelling Program pp.11-31
**Singapore Energy Label:**
Energy labelling scheme of Singapore introduced in 2008 under the Energy Conservation Act\textsuperscript{10} that has been enforced for 5 products: Air conditioner, Clothes Dryer, Refrigerator, Television, and Lamp.\textsuperscript{11} The label is based on a rating scheme that goes from Low (1) to Excellent (5)\textsuperscript{12}, based on certain specific criteria for each product (including Minimum Energy Performance Standards).

**Thailand Energy Efficiency Label:**
Energy Efficiency Labelling scheme of Thailand introduced in 1992 under the Energy Conservation Promotion Act that is divided in two main initiatives (mandatory or voluntary): MEPS (Minimum Energy Performance Standard) and HEPS (High Energy Performance Standard), for electric and non-electric appliances. Target products include air conditioners, refrigerators, lamps, electric fans and rice cookers, among others.\textsuperscript{13} Also the label is based in a rating system that goes from 1 (low efficiency) to 5 (top efficiency).

**Vietnam Energy Efficiency Labels:**
Energy labelling scheme from Vietnam introduced in 2006\textsuperscript{14} that is based on two types of labels: A confirmative label that shows the energy saving symbol (known as Viet Energy Star), meaning that the product complies with the High Energy Performance standard. Also the Comparative label, for appliances with different levels of efficiency that has a rating scheme that goes from 1 to 5 stars.\textsuperscript{15} The target products include washing machine, electric rice cooker, fluorescent lamp, air conditioner, refrigerator, electric fan and fluorescent tube.\textsuperscript{16}

**Singapore Fuel Economy Labelling Scheme:**
Fuel Economy Labelling scheme from Singapore developed in 2005, reestablished in 2012 and administered by the Singapore Environmental Council (with the support of the National Environment Agency)\textsuperscript{17} that aims to promote more efficient cars in the country, through informing buyers about the emissions and economic benefits of their purchase, and also through economic incentives (rebates) when purchasing fuel efficient cars and subcharges (additional fees) when purchasing less efficient cars.\textsuperscript{18}

**SIRIM QAS Eco-label:**
Ecolabelling scheme introduced in 2004 by SIRIM QAS that allows companies to position their products as environmentally-friendly, thus giving them a competitive edge over other similar products. Its target products include fluorescent lamps,

\textsuperscript{10} http://www.nea.gov.sg/energy-waste/energy-efficiency/household-sector/about-mandatory-energy-labelling
\textsuperscript{11} http://www.nea.gov.sg/energy-waste/energy-efficiency/household-sector/registrable-goods
\textsuperscript{12} http://www.nea.gov.sg/energy-waste/energy-efficiency/household-sector/the-energy-label
\textsuperscript{13} EE Standards and Labelling Programs in Thailand pp.6,7,13
\textsuperscript{14} Energy Efficiency Standards and Labeling in Vietnam p.7
\textsuperscript{15} http://nhannangluong.com/introduce
\textsuperscript{16} http://nhannangluong.com/standard
\textsuperscript{17} http://transportpolicy.net/index.php?title=Global_Comparison:_Fuel_Efficiency_Labeling#Singapore
\textsuperscript{18} https://www.lta.gov.sg/apps/news/page.aspx?c=2&id=be0a5125-3c43-4749-b10c-35bc43328b09
luminaries and light source for interior lighting, and energy saving electronic ballasts, among others.\textsuperscript{19} It’s a member of the Global Ecolabelling Network (GEN), to enhance its credibility.\textsuperscript{20}

\textbf{MyHIJAU:}
Labelling scheme launched in 2014 by GreenTech Malaysia\textsuperscript{21} that consists of two parts: a logo whose main objective is to allow consumers to identify "green" products and services (undertaken stringent tests by third-party verification), and an online directory that allows producers to promote their green products.\textsuperscript{22} Products must demonstrate that minimize degradation of the environment, promote health and make efficient use of resources to be certified. Also, the scheme has a recognition system of other labels (SIRIM Eco-label, Singapore Green Label, Eco Mark Japan, Global Ecolabelling Network labels, among others).\textsuperscript{23}

\textbf{Green Choice Philippines:}
National ecolabelling program introduced in 2000 and administered by the Philippine Center for Environmental Protection and Sustainable Development, Inc. (non-profit NGO)\textsuperscript{24} that is used as the seal of approval for products and services that meet predetermined criteria, to guide the Philippine society in choosing which of the products and services being produced and distributed in the country pose the minimum risks to environmental health and welfare.\textsuperscript{25} Target products include computers, fluorescent lamps, light emitting diode, and electronic ballasts, among others.\textsuperscript{26} Also, the scheme is member of the Global Ecolabelling Network (GEN).\textsuperscript{27}

\textbf{GreenLabel Singapore:}
Labelling scheme established in 1992 and administered by the Singapore Environment Council (SEC) to endorse environmentally friendly products and prevent the abuse of green-washing.\textsuperscript{28} The scheme is part of the Global Ecolabelling Network\textsuperscript{29} that enhances its credibility. The target products include compact fluorescent lamps, led lights, dishwashers and solar powered products, among others.\textsuperscript{30}

\textbf{Green Label Thailand:}
Green Label of Thailand that was initiated by the Thailand Business Council for Sustainable Development (TBCSD) and formally launched in 1994 by the Thailand Environment Institute (TEI) in association with the Ministry of Industry. It is awarded to products who have less impact to the environment in comparison with products of the same function.\textsuperscript{31} The product criteria includes 117 products (electric appliances and construction materials, among others). It is not limited to products, services can also be certified.\textsuperscript{32} The scheme is also part of the Global Ecolabelling Network\textsuperscript{33}, allowing mutual recognition

\textsuperscript{19} S&Q Standards & Quality News pp.18,19
\textsuperscript{21} https://www.myhijau.my/business/about/
\textsuperscript{22} https://www.myhijau.my/business/about/how-it-works/
\textsuperscript{23} http://www.greendirectory.my/for-producers-providers/
\textsuperscript{24} Green Choice Philippines Scheme p.1
\textsuperscript{25} National Ecolabelling Programme- Green Choice Philippines – an ISO 14024 application p.1
\textsuperscript{26} http://www.pcepsdi.org.ph/downloads.html
\textsuperscript{27} https://www.globalecolabelling.net/gen-members/green-companies-members-list/
\textsuperscript{28} https://sgls.sec.org.sg/cms.php?cms_id=3
\textsuperscript{29} https://www.globalecolabelling.net/gen-members/green-companies-members-list/
\textsuperscript{30} https://www.sgls.sec.org.sg/sgls-standard.php
\textsuperscript{31} http://www.tei.or.th/greenlabel/aboutstructure.html
\textsuperscript{32} List of Thai Green Label Update July, 2016 p.2
\textsuperscript{33} https://www.globalecolabelling.net/gen-members/green-companies-members-list/
with similar schemes.

**Carbon Label & Carbon Footprint for Organization:**
Carbon footprint labelling scheme from Thailand introduced in 2008 (Carbon Label) and 2009 (Carbon Footprint) and run by the Thailand Greenhouse Gas Management Organization\(^{34}\) that consists of two labels: The Carbon Footprint label that takes into account the emissions during the life-cycle of the product.\(^{35}\) And the Carbon Footprint Reduction label, that is based on the same principles, but must show a reduction of at least 2% in comparison to previous year.\(^{36}\) Target products are listed in Product Category Rules and some pioneering products were dried strawberries, vegetable oil, cement, tiles and condoms (for the Carbon Reduction Label).\(^{37}\)

**Good Solar Initiative:**
Certification scheme launched in 2014 by the Agence Française de Développement (AFD) with funding from the European Union\(^{38}\) and administered by the SNV Netherlands Development Organization\(^{39}\) that promotes quality control and customer satisfaction in solar companies and their products. It is aimed to develop solar energy and make it accessible and affordable for people in the rural area. Target products are solar products and associated customer services.\(^{40}\)

**Project Eco Shop:**
Certification scheme developed in 2013\(^{41}\) as a joint initiative between Singapore Environment Council (SEC) and SMRT Corporation Ltd. It is aimed at guiding and encouraging shop owners to adopt eco-friendly habits and implement green practices in their daily operations.\(^{42}\) It is aimed for shops and retailers.

**Myanmar Platform for Dialogue on Green Growth:**
Platform created in 2014 by Green Lotus (French think-and-do tank) with the support of the British Embassy, the Regional Council of Ile-de-France, and the French Parliament\(^{43}\) to promote a dialogue between key stakeholders in the country, and develop a National Action Plan for Green Growth (that involves sustainable development).\(^{44}\) Stakeholders were divided in three committees to share and discuss ideas about different topics: Investing in natural capital, Investing in renewable energies and climate change adaptation and Investing in resource efficiency and sustainable cities.\(^{45}\)

\(^{34}\) Thailand Develops Carbon Labels p.1
\(^{35}\) http://thaicarbonlabel.tgo.or.th/products_is/products_is.pnc
\(^{36}\) http://thaicarbonlabel.tgo.or.th/reduction_is/reduction_is.pnc
\(^{37}\) Thailand Develops Carbon Labels p.1
\(^{39}\) http://www.snv.org/update/largest-solar-market-development-programme-launched-cambodia
\(^{40}\) Good Solar Initiative Quality Charter p.2,4
\(^{41}\) PROJECT: ECO-SHOP Getting the Green Light on Green Accreditation p.1
\(^{42}\) http://www.sec.org.sg/ecoshop/index.php
\(^{43}\) Environmental stakes in Myanmar p.6
\(^{44}\) http://www.greengrowthdialogue.org/en/about-us
\(^{45}\) http://www.greengrowthdialogue.org/en/committees
**ASEAN Energy Awards:**
Awarding scheme for the excellence in the field of energy, launched in 2000 and organized by the ASEAN Centre for Energy (ACE) that is divided in two awards: “ASEAN Energy Efficiency and Conservation (EE&C) best practices competition for Energy Efficient Buildings” and “ASEAN best practices competition for Energy Management in buildings and industries” (launched in 2006). The scope includes buildings and industries from the ASEAN region (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippine, Singapore, Thailand, and Vietnam), that can apply based on a pre-established criteria and categories.  

**Greening Vietnam: Green Product Awards:**
Awarding scheme launched in 2016 by the Vietnam Urban Forum (VUF) in collaboration with BCI Asia to recognize green construction products. It is focused on manufacturers and distribution companies of four major construction product categories: Architecture, Civil and Structure, Mechanics and Electricity. Experts of the construction field evaluate the products based on different criteria.

**Don Emilio Abello Energy Efficiency Awards:**
Awarding scheme established in 1982 and run by the Department of Energy that is given to companies who have engaged in energy efficiency activities and have accomplished significant savings in energy consumption. The Award is granted during the National Energy Consciousness Month Celebration every December. It is targeted for companies or establishments from the industrial, transport, commercial and building sectors.

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46 ASEAN Energy Awards 2016 p.1,2  
50 https://www.doe.gov.ph/energy-efficiency  
51 http://unido.olbaid.dk/ProjectDetails.aspx?PID=220