

Final Report (Year 2) - Thailand

Asia Pacific Green Public Procurement Partnership Project

2019. 02

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Many others contributed to the Study, including the members of the Advisory Committee, focal points of each partner country that participated actively through all the consulting items. Government officials and experts also provided their opinions on the Legal recommendations and GPP criteria.

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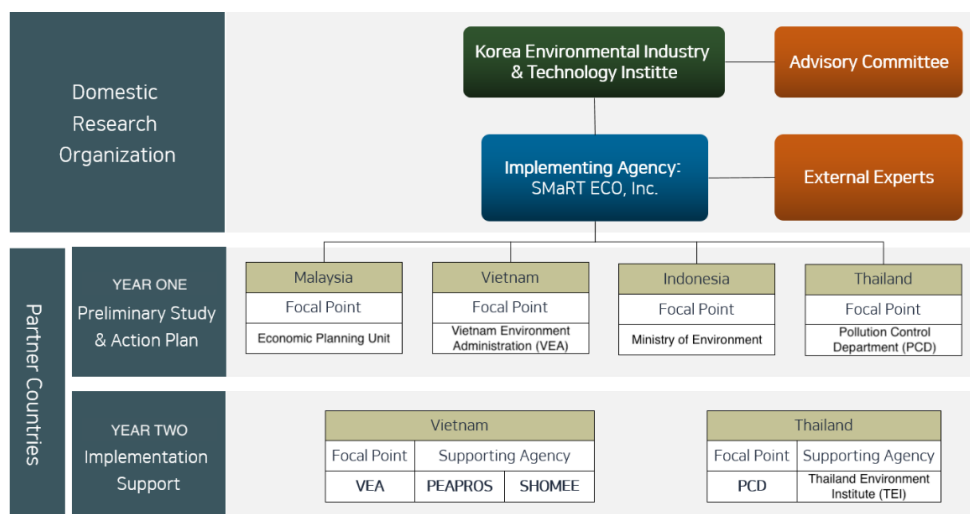
Executive Summary

I Introduction

(Purpose) The Asia-Pacific Green Public Procurement Partnership Project aims to establish the foundation for Green Public Procurement (GPP) and promote its implementation by strengthening the capacities of partner countries and providing support for the creation of a market for environmentally-friendly products and services by transferring the experience of Korea in operating GPP and eco-labeling scheme.

(Project Partners) Figure 1 shows the organizations involved in the project.

- ▼ Korea Environmental Industry & Technology Institute took overall leadership for the project, providing funds for the operation of the project and coordinating with the partner countries. As the Operating Agency of GPP and eco-labeling program in Korea, KEITI provided consultation on experience and expertise of Korea, and supported direction setting in project implementation.
- ▼ Focal Points, the appointed lead government agencies of the partner countries, provided necessary cooperation for the project activities.
- ▼ SMaRT ECO, Inc. carried out the key activities of the project as the Implementing Agency, and sought validation by external experts for some of the technical elements of this process.
- ▼ For some of the consulting items, local research institutions or consulting companies were employed as Supporting Agencies. Certain tasks were assigned to Supporting Agencies capitalizing on their local and institutional knowledge, networks and language capabilities.
- ▼ An Advisory Committee composed of Economy Division and Asia-Pacific Regional Office of UN Environment, European Office of ICLEI, and KEITI provided advice on project direction and methodologies.



[Figure 1] Project implementing mechanism

(Main Activities of Year One) The following summarizes the first year of the project's implementation in 2017.

- ▼ The Implementing Agency assessed the current status of, and future plans for GPP and eco-labeling schemes in Vietnam, Malaysia, Thailand, and Indonesia through literature review and interviews. The Implementing Agency then prepared a preliminary study report, which integrated a SWOT analysis and reflected the demand for technical support expressed by the countries.
- ▼ The project Advisory Committee selected Thailand and Vietnam as partner countries for Year Two of the project based on the results of the preliminary study. Selection criteria included: the willingness to participate in the project, political willingness to implement GPP, the need for consulting support, and the possibility of advancement of GPP in the country.
- ▼ As the first step to establish the Action Plans, the Implementing Agency identified potential consulting items that could be provided to these countries, considering the relevant expertise in Korea, and shared them with Focal Points.
- ▼ For the potential consulting items sent to the partner countries, the Focal Points of the partner countries have notified their priorities to the items that the supports from Korea are most needed. Partner countries and the Implementing Agency reached final agreement on the consulting items and subsequently prepared draft Action Plans.
- ▼ The Implementing Agency shared draft Action Plans with the Focal Points and relevant line ministries for each country. The Implementing Agency revised the Action Plans following the discussions made at the Interim Meeting (early November 2017), and finalized the Action Plans during workshops held in each partner country in late November 2017.
- ▼ In addition, a knowledge-sharing workshop for the Focal Points and related ministry officials was held in Korea in connection with the meeting held in early November 2017.

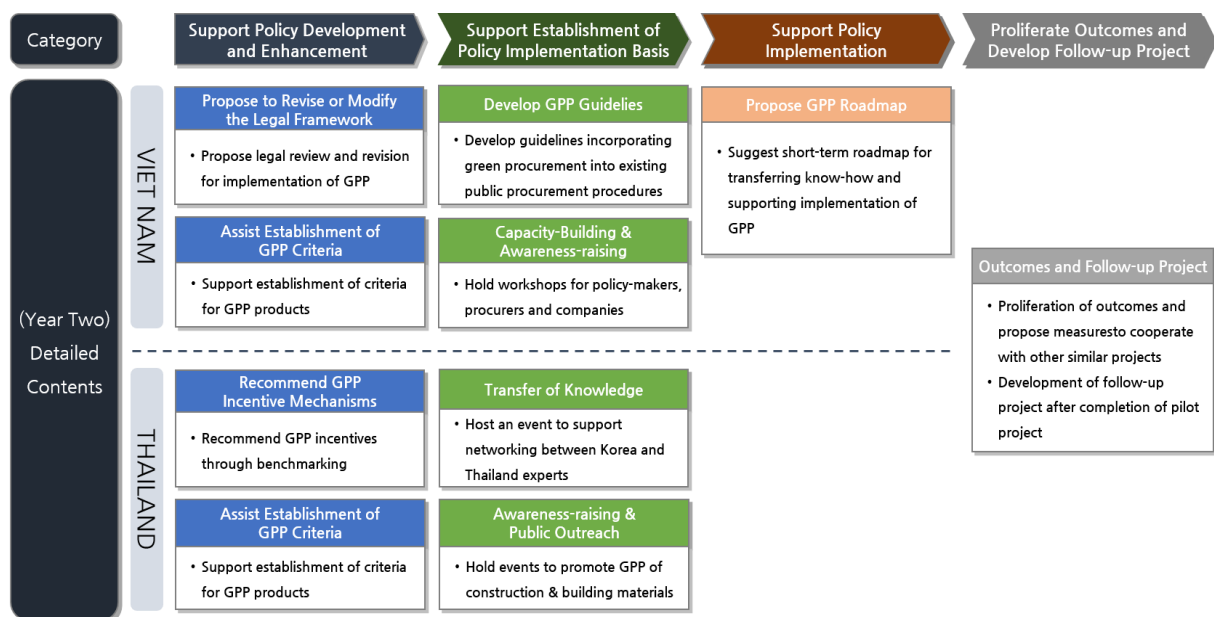
(Detailed Goals) The following detailed goals have been established for the implementation of the Action Plans, which is the main activity of Year Two, and for the presentation of follow-up projects.

- ▼ Customize implementation of the Action Plan established for the partner countries.
- ▼ Establish a foundation to help establish project within the region.
- ▼ Share and present the outcomes achieved in comparison to the goals set.
- ▼ Propose follow-up projects upon completion of the project.

(Consulting Items) In Year Two, the Implementing Agency focused on implementing the Action Plans established for the partner countries. The following consulting items were agreed for the project.

- ▼ For Vietnam, the following series of activities were planned to establish a basis for GPP implementation:

- (1) GPP-related laws of Vietnam will be reviewed in order to modify the legal basis for GPP. Then, recommendations for the enactment and revision of these legal documents will be proposed by benchmarking the Vietnamese legal system with that of Korea.
 - (2) Develop criteria to support the selection of environmentally-friendly products in the market during the public procurement process.
 - (3) Provide a methodology for GPP and develop guidelines for strengthening the capacities of government procurers.
 - (4) Propose a short-term roadmap to support the pilot implementation of GPP by transferring the institutional knowledge of Korea.
 - (5) Support capacity-building and awareness-raising for GPP stakeholders, including policy-makers, procurers, and manufacturers.
- ▼ For Thailand, promotion of GPP for construction and building materials was selected as one of the new priority areas for support:
- (1) Establish a foundation for GPP by developing criteria for construction and building materials.
 - (2) Present recommendations for incentives that promote GPP in a manner appropriate to Thailand by benchmarking other countries' systems, including Korea.
 - (3) Transfer Korean institutional knowledge through the establishment and activation of green building expert networks between Korea and Thailand.
 - (4) Support activities to raise awareness around and promote GPP in the construction sector for a diverse range of stakeholders, including procurers, experts, and manufacturers.

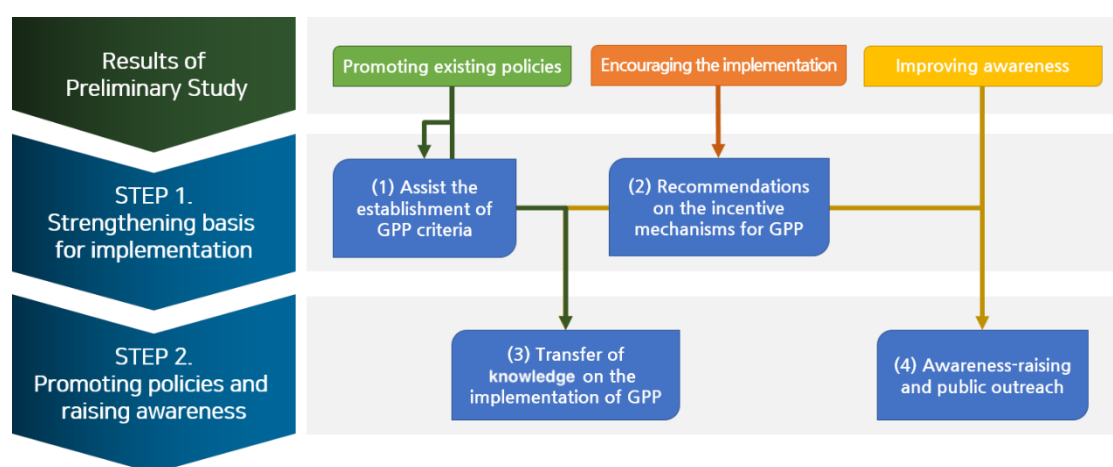


[Figure 2] Consulting Items for Partner Countries

I Consulting Items for Thailand

(Overview) Thailand has led the implementation of Green Public Procurement within the region, accumulating experience over the last decade.

- ▼ To expand this work, the system needs to be stabilized and a foundation established for a new priority sector.
- ▼ Therefore, the Implementing Agency proposed expanding the application of GPP for the construction sector. The Focal Point agreed with this proposal, taking into account plans within the department and domestic demand as well.
- ▼ The following diagram depicts the relationship among the consulting items in Thailand.



[Figure 3] Relationship among Consulting Items in Thailand

[Assist the Establishment of GPP Criteria] To expand the scope of implementation of GPP, the Implementing Agency supports the establishment of Green Cart criteria for three construction and building materials.

- ▼ **(Purpose)** This consulting item aimed to establish the foundation for selecting environmentally-friendly products by developing criteria for construction and building materials purchased frequently in the procurement market in Thailand.
- ▼ **(Selection of Prioritized Products)** Cement and steel bars, which are essential in producing reinforced concrete for general construction work, were selected by the Thai project participants. Thermal insulation was also included in the proposal, due to Korea's experience with the Eco-mark certification for a large number of products.
 - At the request of Thai stakeholders, the name of the criteria for steel bar was changed to 'Construction Steel Products' to include other hot-rolled steel products in the future.
- ▼ **(Literature Review and Market Readiness Study)** Implementing Agency conducted a literature review on Thailand Green Cart criteria, Green Label criteria, and eco-labeling criteria of other countries such as Korea to identify the environmental requirements of the three product groups.

Then, Thailand Environment Institute (TEI) conducted a market readiness survey to assess the possibility of satisfaction by the Thai manufacturers with respect to the derived environmental requirements.

- ▼ **(Review by Stakeholders)** By collecting local manufacturer's opinions, the draft criteria were reviewed in writing and meetings. Implementing Agency was invited to participate in the focus group meetings held by the Focal Point and the Federation of Thai Industries (FTI). Reflecting the various opinions gathered, the Implementing Agency has revised the draft criteria.
- ▼ **(Main Contents)** Green Cart criteria for thermal insulation and cement are based on the existing Green Label criteria of Thailand, and the criteria for thermal insulation includes some of the Korean Eco Mark criteria on product quality. Green Cart criteria for construction steel products is adjusted to reflect the production status of Thai manufacturers after compiling the eco-labeling criteria of New Zealand, Brazil and Malaysia.
- ▼ **(Results and Utilization)** The Implementing Agency has developed final draft criteria for the three prioritized products through the process above. Works under this consulting item will enable the Technical Sub-committee responsible for establishing criteria to examine drafts without significant revision.
- ▼ **(Expected Benefits)** Substantial portion of the basic materials infused into construction and building works will be substituted with environmentally-friendly products, if there is sufficient cooperation among the relevant ministries. There would be enormous positive environmental impact arising from such implementation. In addition, on the basis of the procedures and methods utilized in this project, it is anticipated that the Focal Point could more efficiently establish the criteria.

[Recommendation on the Incentive Mechanisms for GPP] This consulting item aims to examine the incentive mechanisms designed to promote the implementation of GPP in Korea and certain countries in the Asian region, and also to propose measures to accelerate adoption of GPP in Thailand, which the Thai government may wish to take into consideration.

- ▼ **(Purpose)** Providing incentive mechanisms to procurers and companies that voluntarily carry out GPP can be effective in promoting GPP. While there are some existing incentive programs in Thailand, additional incentive programs may advance GPP.
- ▼ **(Benchmarking of Korea and Other Countries)** Implementing Agency thoroughly investigated information on GPP incentive mechanisms in Korea and identified measures that are being implemented to promote GPP in countries, such as Japan, China and Malaysia.
- ▼ **(Analysis of Current Incentives for GPP in Thailand)** Measures that could be adopted in Thailand were to be recommended. Therefore, the Implementing Agency analyzed the GPP incentive mechanisms that are currently being implemented in Thailand. Tax breaks and

subsidies provided to purchase electric vehicles and the “Best Procurement Award” awarded by the relevant Minister were identified as incentive mechanisms for GPP in Thailand.

- ▼ **(Review by Stakeholders)** The draft recommendation report has been reviewed by the Focal Point and the line ministries, who requested the Implementing Agency to proactively propose incentive mechanisms for Thailand based on Korea’s experience. Thailand’s performance evaluation system and green building certification scheme for the public sector can be major targets for GPP integration.
- ▼ **(Main Recommendations)** In Thailand, where there are no laws or regulations surrounding GPP, and it would take a long time to establish a new law or policy. Therefore, the Implementing Agency recommends first integrating GPP within existing policies and programs.
- ▼ **(Results and Utilization)** Focal Point clarified that the recommendation report is intended to be utilized as a reference for planning and introducing measures to promote the implementation GPP in Thailand. It can be used appropriately in the process of discussing and supporting the Cabinet and the Ministry of Finance to make relevant decisions in the near future.
- ▼ **(Expected Benefits)** Implementing Agency strived to present more realistic recommendations through analyzing the GPP system in Thailand and meeting with relevant ministries. Focal Point is expected to be able to design an effective incentive mechanism based on the contents described in this report in accordance with the domestic policy development trends.

[Knowledge Transfer and Awareness-raising on GPP] The objectives were to promote interaction between the experts of Thailand and Korea; to share Korea’s experience in promoting GPP implementation in the construction sector; and to bring awareness about the use of GPP in the construction and building sectors to stakeholders, including relevant ministries, government procurers, and companies.

- ▼ **(Main Activities)** As agreed and documented in the Action Plan, the first awareness-raising workshop and the knowledge transfer networking session were held as one combined event. The first workshop was held in May, and the second in November, with both events held in Bangkok, Thailand.
- ▼ **(Implications)** Participants displayed interest in Korea’s experience with GPP implementation, especially in the construction sector and in the Green Building certification scheme. Participants were also interested in benchmarking Thailand’s scheme with that of Korea. Besides, from the survey results, the private sector is still not well aware of GPP, but is willing to participate actively and is waiting for the government to give a clearer direction.
- ▼ The Implementing Agency presented the progress of the project to date, and collected opinions of the participants on GPP implementation. The results have been reflected in the process of supplementing the project outcomes.

- ▼ **(Expected Benefits)** The events provided an opportunity for mutual learning. Their participation shed light on what is needed to support GPP implementation in the public and private sectors. It is expected that the direction and the focus of future improvement and capacity building is considered by the Focal Point with the feedback received.

(Consulting Performance and Limitations) The project in year two was implemented following the agreed-upon Action Plan. All of the scheduled consulting items were successfully completed within the project period with the cooperation of the Focal Point and local partners.

- ▼ The project was implemented through close discussion between the Implementing Agency and the Focal Point, and there was no delay in coordinating with the Focal Point in Thailand. Communications and cooperation were actively managed to ensure that the Action Plan was implemented.
- ▼ Although the Implementing Agency sought to solve some limitations faced in implementing the project in Thailand, the voluntary efforts of the Focal Point or the next stage of the project will be needed to overcome limitations.

I Proposal for Follow-up Project

(Proposal) Follow-up project should focus on strengthening the capacity of the government officials and experts and enabling them to participate in the design of GPP policy and program directly. This focus would replace that of quantifiable outcomes from the project such as developing documents to help to establish the legal and institutional basis - for which the Implementing Agency has no direct control.

- ▼ The focus should be placed on providing support for the following two areas: the cultivation of experts through training, and support for eco-labeling certification for local companies. Each is described below.
- ▼ First, the cultivation of experts and the strengthening of their capacities to design the system themselves may be preferable and more feasible in the time frame allowed. In the future, trained experts would take a leading role in carrying out education and training for the general public, government officials, and companies/industrial associations.
- ▼ Second, providing support for eco-labeling and/or GPP certification for local companies will help to increase the number of environmentally-friendly products in the local market.

Table of Contents

1. Introduction	1
1.1 Background	2
1.2 Project Partners and Organization.....	3
1.3 Project Activities in Year One	4
1.4 Project Activities in Year Two	5
2. Consulting Items for Thailand	8
2.1 Assist the Establishment of GPP Criteria.....	9
2.1.1 Literature Review	10
2.1.2 Market Readiness Study	24
2.1.3 Drafting the Criteria	42
2.1.4 Review by Stakeholders	43
2.1.5 Revision of the Criteria	49
2.2 Recommendation for GPP Incentive Mechanisms	50
2.2.1 Benchmarking Incentives of Korea and Other Countries	50
2.2.2 Analysis of Current Incentives for GPP in Thailand.....	94
2.2.3 Draft Recommendation Report.....	100
2.2.4 Review by Stakeholders	101
2.2.5 Revision of the Recommendation Report.....	103
2.3 Knowledge Transfer and Awareness-Raising on GPP	109
2.3.1 First Awareness-raising Workshop and Networking Session	110
2.3.2 The Second Awareness-Raising Workshop	114
2.3.3 Results and Implications.....	117
3. Consulting Outcomes and Future Plans	119
3.1 Consulting Outcomes and Limitations	119
3.2 Future Plans for GPP in Thailand	123
3.3 Proposal for Follow-up Projects.....	124
 Annex 1. Comparison Results of Thailand Green Label and Green Cart.....	 128
Annex 2. Comparison Result of the Steel Bar-Related Eco-labeling Criteria	138
Annex 3. Final Draft Green Cart Criteria	141

Abbreviations

ASTM	American Society for Testing Material
B.E.	Buddhist Era
CO	Carbon Oxide
CO₂	Carbon Dioxide
CO₂eq	Carbon Dioxide Equivalent
EPS	Expanded Polystyrene
FTI	Federation of Thai Industries
GDP	Gross Domestic Product
GEN	Global Ecolabelling Network
GITA	Green Investment Tax Allowance (Malaysia)
GIZ	German Federal Enterprise for International Cooperation
GPN	Green Purchasing Network
GPP	Green Public Procurement
GWP	Global Warming Potential
HBOD	Hexabromocyclododecane
HCFC	Hydro Chloro Fluoro Carbon
HFC	Hydro Fluoro Carbon
ISO	International Organization for Standardization
KEITI	Korea Environmental Industry & Technology Institute
KICT	Korea Institute of Civil Engineering and Building Technology
KS	Korean Industrial Standard
LEED	U.S. Leadership in Energy and Environmental Design

MIDA	Malaysian Investment Development Authority
MGTC	Malaysia Green Technology Corporation
MOIn	Ministry of Interior
MONRE	Ministry of Natural Resources and Environment
NOx	Nitrogen Oxide
ODP	Ozone Depletion Potential
OECD	Organization for Economic Cooperation and Development
OPDC	Office of the Public Sector Development Commission
PCD	Pollution Control Department
PPS	Public Procurement Service
SCG	Siam Cement Group
SCP	Sustainable Consumption and Production
SDGs	Sustainable Development Goals
SME	Small and Medium Enterprise
SOx	Sulfur Oxide
SPP	Sustainable Public Procurement
TEI	Thailand Environment Institute
TIS	Thai Industrial Standard
TISI	Thai Industrial Standards Institute
TREES	Thailand Energy & Environmental Assessment Method
UNEP	UN Environment
VOCs	Volatile Organic Compounds
10YFP	10-Year Framework of Programmes on SCP (UNEP)

1. Introduction

The Asia Pacific Green Public Procurement Partnership Project (henceforth “the project”) provided customized support for the governments of select countries in the Asia-Pacific region in implementing Green Public Procurement (GPP). The overarching project goal was to strengthen capacity for introducing and implementing GPP, and to build the market for environmentally-friendly products and services within the partner countries. The project also aims to increase the capacity of partner countries to implement the UN Sustainable Development Goals (SDGs) Target 12.7 (“Sustainable Public Procurement (SPP) Implementation”).

This project is part of a larger effort to build capacity of national governments in the Asia-Pacific region in implementing GPP. It builds on the findings of the Asia Pacific Roadmap of Sustainable Consumption and Production (SCP),¹ and was implemented according to the work plan of the 10-Year Framework of Program (10YFP) on SPP (Work Area 1: “Provide Direct Support for SPP Implementation”). The project was guided by an Advisory Committee comprised of KEITI, UN Environment Asia-Pacific Regional Office, UN Environment Economy Division, and ICLEI Europe Office.²

The Implementing Agency for the project, Korean consulting group SMaRT ECO, Inc. provided policy consultation and technical assistance tailored to the needs of the two partner countries. Partner countries Vietnam and Thailand were selected for the project because they possessed the strong political willingness to introduce or implement GPP, the suitability to provide support based on Korea’s experience, and the possibility of sharing their experience to other countries in the future. In Year One of the project, the Implementing Agency developed Action Plans with each partner country. In Year Two, the Implementing Agency focused on implementing the consulting items with each partner country as established in the Action Plans.

In this report, the Implementing Agency explains the background and motivation for the project. Then for each of the partner countries, it provides an overview of the structure and organizations involved in project implementation, provides a summary of the project activities and consulting items undertaken (as planned in Year One), and provides the results and next steps for continuing to advance GPP and SCP in the partner countries and the region.

¹ UN Environment, n.d., “Asia Pacific Roadmap on Sustainable Consumption and Production Roadmap 2017-2018”, Retrieved 25 February, 2019, from <https://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/asia-pacific-roadmap>.

² One Planet Network, n.d., “Sustainable Public Procurement”, Retrieved 25 February, 2019, from <http://www.oneplanetnetwork.org/sustainable-public-procurement>.

1.1 Background

Concern over climate change, unsustainable patterns of consumption and production, and waste generation is increasing worldwide. To counter these trends, governments, industry and non-governmental organizations are focusing on finding and engaging key areas of leverage to change course and deliver more sustainable solutions.

One such lever is to increase the demand for environmentally-friendly products and services through institutional procurement or purchasing. This action has the effect of reducing the negative environmental impacts associated with the procurement, usage, and disposal of products and services throughout their life cycle.

Public procurers exercise enormous purchasing power. On average, OECD countries' annual public procurement is equivalent to approximately 12 percent of the country's GDP. In some developing countries, this can be as high as 30 percent.³ The procurement activities of government agencies play an essential role in the national economy, and can exercise enormous influence on other sectors.

Through Green Public Procurement, national governments can help to reduce the adverse environmental impacts of their procurement actions by procuring environmentally-friendly products and services, and by reducing waste. This can stimulate a "ripple effect" through the economy, encouraging a virtuous cycle of ever-improving products and services. By demanding and buying more environmentally-friendly products, large institutional procurement agencies help establish and grow the market. In turn, suppliers can increase the number and variety of environmentally-friendly products and services, and can scale-up production, which reduces costs and expands markets.

In recognition of the potential to enable more sustainable consumption and production systems, the United Nations has adopted and encouraged the concept of GPP. In 2012, the United Nations established the 10YFP at the United Nations Conference on Sustainable Development (UNCSD), held in Rio de Janeiro, Brazil. The 10YFP sought to promote the concept of SCP globally. Activities and initiatives launched at this conference led to the inclusion of SCP as a goal in the subsequent SDGs, adopted by the UN General Assembly in 2015. The SDG goal for sustainable consumption and production (SDG 12) includes a target for GPP to "*Promote public procurement practices that are sustainable, in accordance with national policies and priorities*" (Target 12.7).

Sustainable Public Procurement is defined by the United Nations as: "*the process whereby public organizations meet their needs for goods, services, works and utilities in a way that achieves value*

³ UNEP, 2017a, "Global Review of SPP 2017".

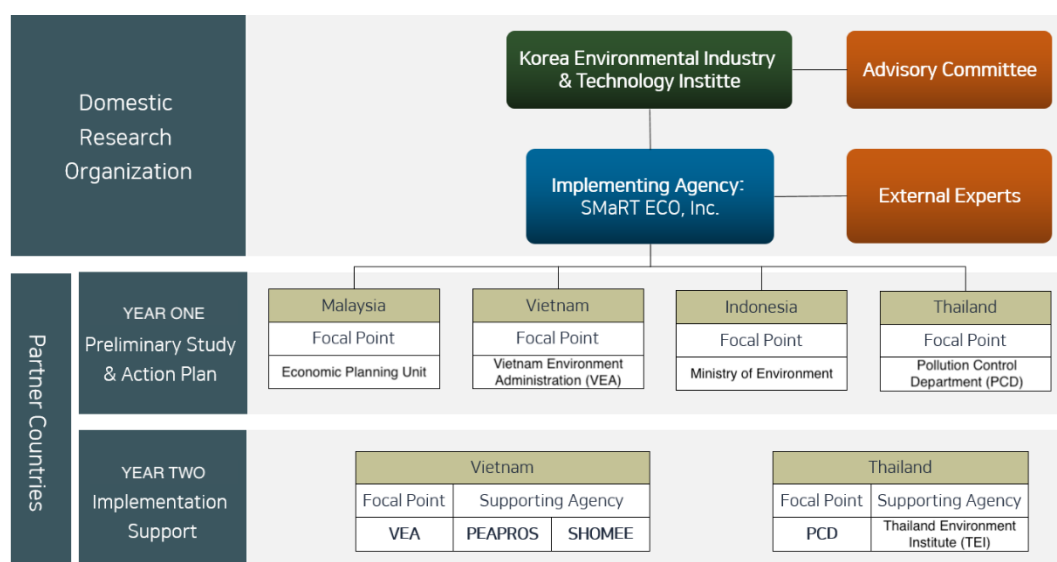
for money on a whole life-cycle basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst significantly reducing negative impacts on the environment.”⁴

Following the economic growth, and the worsening of environmental pollution it has engendered, more and more national governments in the Asia-Pacific region have adopted policies and programs on GPP. The Korea Environmental Industry & Technology Institute (KEITI), as the Coordination Desk of Sustainable Public Procurement Program under the 10YFP, established an expert network, named GPPEL, that shares knowledge, expertise, and best practices in GPP in the Asia-Pacific Region.

In addition to the GPPEL network, a number of countries requested that KEITI provide direct policy and technical support to them, using as a foundation Korea’s advanced experience in implementing GPP. The resulting Asia Pacific Green Public Procurement Partnership Project is aimed at strengthening government capacities for the implementation of GPP through the provision of direct customized policy and technical consultation to countries in Asia-Pacific region. By so doing, the project seeks to promote sustainable consumption and production, and grow the market for environmentally-friendly products and services.

1.2 Project Partners and Organization

Figure 1 shows the organizations involved in the project.



[Figure 1] Project implementing mechanism

⁴ Definition adopted by the Task Force on Sustainable Public Procurement. Ibid.

KEITI took overall leadership for the project, providing funds for the operation of the project and coordinating with the partner countries. As the Operating Agency of GPP and eco-labelling program in Korea, KEITI provided consultation on experience and expertise of Korea, and supported direction setting in project implementation. Focal Points, the appointed lead government agencies of the partner countries, provided necessary cooperation for the project activities.

SMaRT ECO carried out the key activities of the project as the Implementing Agency, and sought validation by external experts for some of the technical elements of this process. For some of the consulting items, mainly the task of establishing GPP criteria, local research institutions or consulting companies were employed as Supporting Agencies. Certain tasks, such as survey administration, were assigned to Supporting Agencies capitalizing on their local and institutional knowledge, networks and language capabilities.

An Advisory Committee composed of Economy Division and Asia-Pacific Regional Office of UN Environment, European Office of ICLEI, and KEITI provided advice on project direction and methodologies. The first and second meetings of the Committee in the second year were held in May and August of 2018, and concluded in agreement on the process and direction of the project. The third Advisory Committee held in Bangkok, Thailand in November 2018 included the representatives of the UN Environment Asia-Pacific Regional Office. At this meeting, the Implementing Agency shared project outcomes and discussed how the partner countries plan to use them in the future. The UN Environment Asia-Pacific Regional Office expects to develop case studies with the Focal Points of the partner countries after the project is completed, and will share them with stakeholders in the 2019 Asia-Pacific Regional Workshop.

1.3 Project Activities in Year One

The following summarizes the first year of the project's implementation in 2017.

The Implementing Agency assessed the current status of, and future plans for GPP and eco-labeling schemes in Vietnam, Malaysia, Thailand, and Indonesia. To do so, the Implementing Agency conducted a literature review and interviewed ministry representatives in these countries. The Implementing Agency then prepared a preliminary study report, which integrated a SWOT analysis and reflected the demand for technical support expressed by the countries.

The project Advisory Committee selected Thailand and Vietnam as partner countries for Year Two of the project based on the results of the preliminary study. Selection criteria included: the willingness to participate in the project, political willingness to implement GPP, the need for consulting support,

and the possibility of advancement of GPP in the country.

Tailored Action Plans were then developed for each partner country. As the first step to establish the Action Plans, the Implementing Agency identified potential consulting items that could be provided to these countries, considering the relevant expertise in Korea, and shared them with Focal Points. This process focused on devising items that were deemed necessary to improve the implementing system of GPP, including eco-labeling, based on the results of the preliminary study and the demand for technical support expressed by the Focal Points.⁵

For the potential consulting items sent to the partner countries, the Focal Points of the partner countries have notified their priorities to the items that the supports from Korea are most needed. The Implementing Agency made site visits, in September 2017, to the partner countries to further identify the current level and the desired goals regarding each consulting item. Partner countries and the Implementing Agency reached final agreement on the consulting items and subsequently prepared draft Action Plans.

The Implementing Agency shared draft Action Plans with the Focal Points and relevant line ministries for each country. The Action Plans were further discussed in a meeting held in Korea in November 2017. Discussion topics included a review of the detailed activities, expected roles of each participating organization and schedules for each consulting item, and proposed revisions of the draft Action Plans. The Implementing Agency revised the Action Plans accordingly, and finalized the Action Plans during workshops held in each partner country in November 2017.

In addition, a knowledge-sharing workshop for the Focal Points and related ministry officials was held in Korea in connection with the meeting held in November 2017. Relevant details were discussed in detail in the final report of Year One.

1.4 Project Activities in Year Two

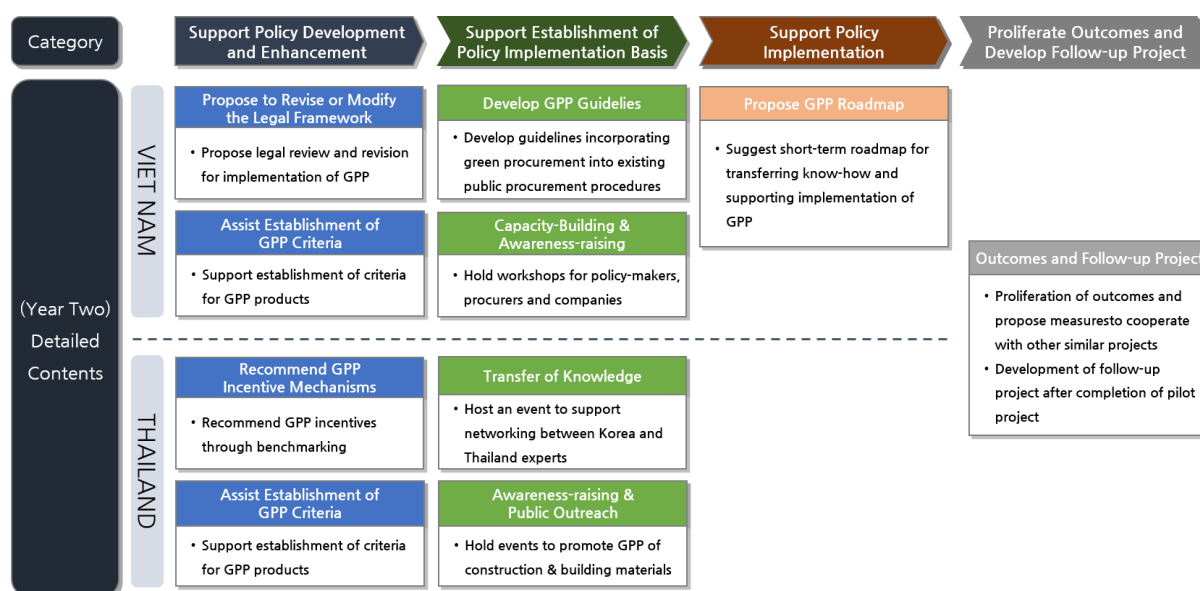
The project in 2018 also aimed to establish the foundation for GPP and promote its implementation by strengthening the capacities of partner countries and providing support for the creation of a market for environmentally-friendly products and services. Table 1 displays the Year Two project objectives.

⁵ All relevant information and results are detailed in the final report for each country of Year One.

Support Implementation
<ul style="list-style-type: none"> ▽ Customize implementation of the Action Plan established for the partner countries. ▽ Establish a foundation to help establish project within the region.
Present Outcomes and Propose Follow-up Projects
<ul style="list-style-type: none"> ▽ Share and present the outcomes achieved in comparison to the goals set. ▽ Propose follow-up projects upon completion of the project.

[Table 1] Objectives of the project in Year Two

The customized implementation of the Action Plan for each country included four-to-five specific consulting items, as shown in Figure 2.



[Figure 2] Consulting Items for Partner Countries

For Vietnam, the following series of activities were planned to establish a basis for GPP implementation:

- (1) GPP-related laws of Vietnam will be reviewed in order to modify the legal basis for GPP. Then, recommendations for the enactment and revision of these legal documents will be proposed by benchmarking the Vietnamese legal system with that of Korea.
- (2) Develop criteria to support the selection of environmentally-friendly products in the market during the public procurement process.
- (3) Provide a methodology for GPP and develop guidelines for strengthening the capacities of government procurers.
- (4) Propose a short-term roadmap to support the pilot implementation of GPP by transferring the institutional knowledge of Korea.

- (5) Support capacity-building and awareness-raising for GPP stakeholders, including policy-makers, procurers, and manufacturers.

For Thailand, promotion of GPP for construction and building materials was selected as one of the new priority areas for support. The following activities were agreed for the project:

- (1) Establish a foundation for GPP by developing criteria for construction and building materials.
- (2) Present recommendations for incentives that promote GPP in a manner appropriate to Thailand by benchmarking other countries' systems, including Korea.
- (3) Transfer Korean institutional knowledge through the establishment and activation of green building expert networks between Korea and Thailand.
- (4) Support activities to raise awareness around and promote GPP in the construction sector for a diverse range of stakeholders, including procurers, experts, and manufacturers.

Throughout the project, the Implementing Agency focused on communicating with the Focal Points about project implementation, using regular email communication and scheduled in person site visits. In addition, the Implementing Agency anticipated that risks could arise during the implementation of the project, and suggested incorporating risk management plans at the beginning of the project. The risk management plans are integrated into this report as relevant.

In each of the following chapters, the progress, results and outcomes of implementing the Actions Plans in Vietnam and Thailand are described in greater detail.

2. Consulting Items for Thailand

Thailand has led the implementation of Green Public Procurement within the region, accumulating experience over the last decade. To expand this work, the system needs to be stabilized and a foundation established for a new priority sector. Therefore, the Implementing Agency proposed expanding the application of GPP for the construction sector. The Focal Point agreed with this proposal, taking into account plans within the department and domestic demand as well.

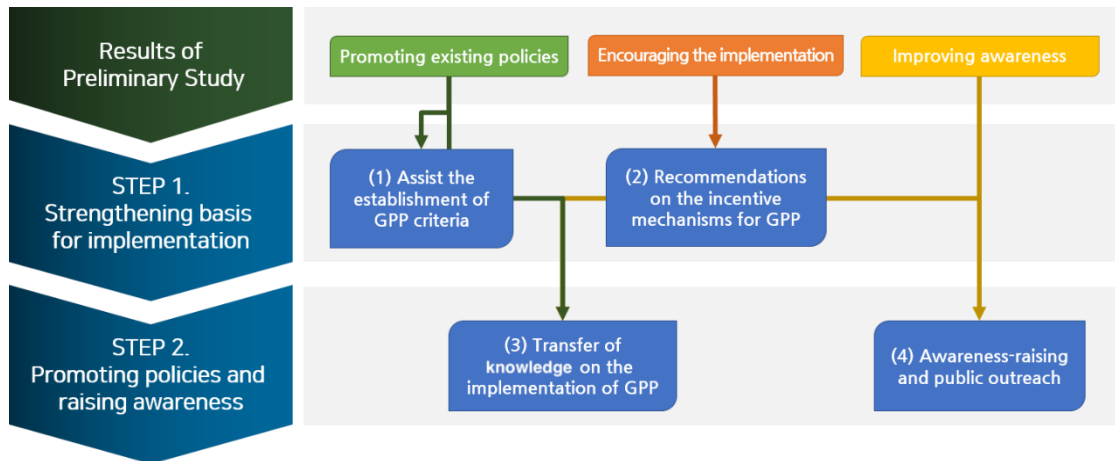
The Implementing Agency supported the establishment of GPP criteria (Green Cart) for three construction and building materials. After discussing potential product categories and selection criteria, the three categories selected were: thermal insulation, Portland and hydraulic cement, and construction steel products.

Korea possesses established procedures and methods that address the procurement of environmentally-friendly construction and building materials within the public sector, as well as the Korean Green Building certification scheme. Interaction among the experts from Korea, government officials of Thailand, and companies in Thailand helped to transfer this institutional know-how.

The Focal Point was interested in encouraging the implementation of GPP among the public sector, which currently is voluntary, and also in encouraging companies to produce more environmentally-friendly products. The Implementing Agency benchmarked GPP incentive mechanisms for countries in the region including Korea, and recommended measures that were appropriate for the circumstances in Thailand.

Activities to bring awareness to green procurement activities in the construction sector along with the existing GPP practices were required. Corresponding events were used to collect the opinions of stakeholders on the process and results of the Project. Therefore, the schedules for these awareness-raising events were determined in consideration of the progress of the other consulting items.

The following diagram, Figure 3, depicts the relationship among the consulting items in Thailand. Although there is no clear prior relationship between the consulting items, a series of stepwise measures are being taken to promote the implementation of GPP in Thailand.



[Figure 3] Relationship among Consulting Items in Thailand

2.1 Assist the Establishment of GPP Criteria

Prior to this Project, many public agencies were interested in implementing GPP in the construction sector in Thailand. The Focal Point will establish a Technical Sub-committee that will lead the establishment and examination of the Green Cart criteria - the GPP criteria of Thailand operated by the Pollution Control Department for construction and building materials. The Federation of Thailand Industries (FTI) and the Ministry of Interior (MOI) have also expressed demand for criteria regarding environmentally-friendly construction and building materials.

Therefore, this consulting item aimed to establish the foundation for selecting environmentally-friendly products by developing criteria for construction and building materials purchased frequently in the procurement market in Thailand.

The Implementing Agency developed criteria in association with the Focal Point and Supporting Agencies including FTI and Thailand Environmental Institute (TEI). Due to the possibility that the criteria development process of the Technical Sub-committee may exceed the project time period, the scope of the task was defined to be development of draft criteria. However, support for the deliberation of the draft criteria was included as one of the activities of this consulting item.

For the three product groups identified in the first year, cement and steel bars, which are essential in producing reinforced concrete for general construction work, were selected by the Thai project participants. In addition, thermal insulation was also included in the proposal, due to Korea's experience with the Eco-mark certification for a large number of products.

At the request of Thai stakeholders, the name of the criteria for steel bar was changed to 'Construction Steel Products' to include other hot-rolled steel products in the future. In this report, we use the term

“steel bar” and “construction steel products” in turn, in accordance with the actual development process.

To establish the criteria, reference to the existing Green Cart criteria of Thailand (refer to 2.1.1) along with the Eco-mark criteria of Korea was made.⁶ The main activities and schedules for developing the draft GPP criteria are shown in Table 2.

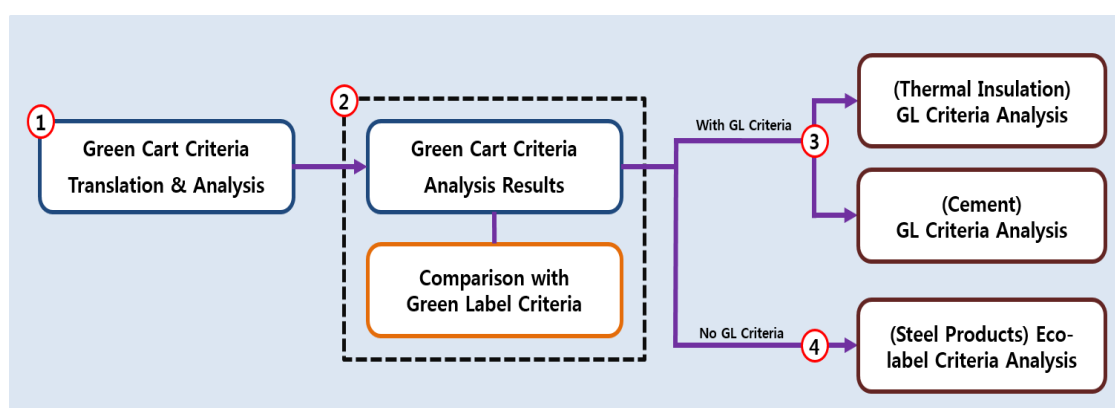
Implementation Steps	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1. Literature Review										
2. Market Readiness Study										
3. Draft Criteria										
4. Review by Stakeholders										
5. Revise Criteria										

[Table 2] Schedule for the Establishment of Draft GPP Criteria

2.1.1 Literature Review

The Implementing Agency supports the establishment of separate criteria for GPP rather than eco-labeling criteria. Accordingly, the existing Green Label criteria can be referred to for two products: thermal insulation and cement. It was necessary to confirm the extent to which the Green Label criteria can be referenced for the Green Cart criteria of Thailand.

A literature review for the establishment of Green Cart criteria was carried out using the procedure shown in Figure 4 below.



[Figure 4] Procedure for Literature Review

⁶ Korea Eco-Mark, n.d., “Proposal of New Products”, in Korean, Retrieved 25 February, 2019, from <http://el.keiti.re.kr/service/page.do?mMenu=2&sMenu=2>.

Since there is no English translation of Green Cart criteria, some of the selected criteria were translated for the project. After checking the translation with the Focal Point, it was compared with Green Label criteria, and the differences were analyzed. The resulting environmental requirements of Green Cart were found to be established on the basis of those of Green Label. The level of each requirement may be adjusted if there is a need to increase the number of companies that can participate in the procurement process.

On the basis of these findings, the Implementing Agency prepared draft criteria for thermal insulation and cement products for which Green Label criteria exist. In the case of steel bars, for which Green Label criteria does not exist, the relevant eco-labeling criteria of other countries were benchmarked and compared with the situations of the relevant industries of Thailand through the market readiness study.

1) Translation and Analysis of Green Cart Criteria

An analysis of the existing Green Cart criteria was carried out to identify their general contents. There were a total of 29 Green Cart criteria currently being implemented as of April 2018.⁷ Among these, criteria for four products (paint, steel furniture, fluorescent lamps, and toner cartridges) were selected and translated and used as a reference.

<p style="text-align: center;">TGC-C-010.01-5/58</p> <p style="text-align: center;">เกณฑ์ข้อกำหนดสินค้าและบริการที่เป็นมิตรกับสิ่งแวดล้อม ตลับหมึก</p> <p>1. ขอบเขตและคำอธิบาย ตลับหมึกหรืออุปกรณ์หมึก/ตลับหมึก (Toner cartridge) ที่ใช้กับเครื่องพิมพ์หรือเครื่องถ่ายเอกสาร</p> <p>ตลับหมึก หมายถึง ตลับหมึกชนิดผง (Toner cartridge) ซึ่งบรรจุผงหมึกที่ใช้กับเครื่องพิมพ์ (Printer) และชุดสร้างภาพ (Developing Unit) ใช้สำหรับเครื่องพิมพ์เลเซอร์ (Laser Printer) เครื่องพิมพ์สำหรับใช้งานร่วมกับคอมพิวเตอร์ (Computer Printer) และเครื่องถ่ายเอกสาร (Photocopier) และเครื่องถ่ายเอกสารแบบปรุสแตค (Multifunction Copier)</p> <p>2. ผลกระทบต่อสิ่งแวดล้อม ตลับหมึกเป็นวัสดุเคมีสังเคราะห์ที่นำมาใช้งานเพื่อการพิมพ์หรือถ่ายเอกสารอย่างกว้างขวาง โดยส่วนประกอบของตลับหมึกผลิตจากวัสดุประเภทพลาสติก โลหะ และผงหมึก ซึ่งเมื่อมีการใช้งานหรือหมดอายุการใช้งาน การแตกหักของตลับหมึกที่มีอยู่หรือประกอบของตลับหมึกที่ชำรุดเสียหาย อาจก่อให้เกิดมลพิษทางอากาศ น้ำเสีย และดินได้</p> <p>3. เกณฑ์ข้อกำหนด 3.1 เป็นผลิตภัณฑ์ที่ได้รับการรับรองจากหน่วยงานที่เกี่ยวข้อง</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>เอกสารหลักฐานประกอบการพิจารณา ผู้ยื่นคำขอต้องแสดงหลักฐานการพิจารณาจากผู้ผลิตหรือตัวแทนจำหน่าย</p> </div> <p>3.2 หากผลิตภัณฑ์ไม่ได้รับการรับรองจากหน่วยงานที่เกี่ยวข้อง ผู้ยื่นคำขอต้องแสดงหลักฐานการพิจารณาจากผู้ผลิตหรือตัวแทนจำหน่าย</p> <p>3.2.1 ข้อกำหนดทั่วไป</p> <p>1) ตลับหมึกต้องไม่ก่อให้เกิดมลพิษทางอากาศ น้ำเสีย และดิน</p> <p>ISO/IEC 19752 หรือ ISO/IEC 19798</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>เอกสารหลักฐานประกอบการพิจารณา ผู้ยื่นคำขอต้องแสดงหลักฐานการพิจารณาจากผู้ผลิตหรือตัวแทนจำหน่าย</p> </div> <p>ISO/IEC 19752 หรือ ISO/IEC 19798 ที่ออกโดยผู้ผลิตตลับหมึก</p>	<p style="text-align: center;">TGC-C-010.01-5 / 58</p> <p style="text-align: center;">Environmentally friendly products and services Toner cartridges</p> <p>1. Scope and Description Toner cartridge covers toner cartridge used with printer or copier. Toner cartridge refers to toner cartridge that contains toner with or without a drum and a developing unit for laser printer, computer printer, photocopiers and multifunction printer.</p> <p>2. Effects on the environment Toner cartridges are computer materials that are used for printing or copying large amounts of documents. The components of the cartridge are made of plastic, metal and toner materials, which, while being used or removed, may cause the spread of toner containing certain hazardous substances. When contact with skin or ingested, it may cause irritation to the respiratory system and other serious medical conditions. These cartridges will become hazardous waste if dumped as community waste, due to the heavy metals such as mercury, lead, chromium, cadmium and carcinogens. If not collected and disposed properly, it may cause the spread of harmful substances into the environment.</p> <p>3. Criteria 3.1 The product is a green labeled product. <u>Documents/evidence for the examination</u> Applicant must show Green Label certification or license to use green label.</p> <p>3.2 If the product is not labeled green, observe the following guidelines to be the environmentally-friendly toner cartridges.</p> <p>3.2.1 General Provision 1) The cartridges must be of the quality and quantity specified by the manufacturer. Tested in accordance with ISO/IEC 19752¹⁾ or ISO/IEC 19798²⁾.</p> <p><u>Documents/evidence for the examination</u> Applicants must show proof of compliance with the test results of the cartridge manufacturer in accordance with ISO/IEC 19752 or ISO/IEC 19798 issued by the cartridge manufacturer.</p> <p><small>1) Information technology -- Office equipment -- Method for the determination of toner cartridge yield for monochrome electrophotographic printers and multi-function devices that contain printer components 2) Information technology -- Office equipment -- Method for the determination of toner cartridge yield for colour printers and multi-function devices that contain printer components</small></p>
<p style="text-align: center;">Thai Green Cart Criteria (Toner Cartridge)</p>	<p style="text-align: center;">Translated Green Cart Criteria (Toner Cartridge)</p>

[Figure 5] Translation of Green Cart Criteria (Example)

⁷ There are 22 criteria for products, 6 for services, and 1 label.

In order to guarantee the accuracy of the Green Cart criteria translation, the translation referenced the contents of the corresponding Green Label criteria. In addition, the Focal Point requested the Implementing Agency to compose the table of contents for the criteria using steel furniture and toner cartridge as a reference, since there had been adjustments to how Green Label criteria are presented for these two categories.

The resulting Table of Contents for Green Cart criteria are shown in Table 3 below. The “General Provisions” contain regulations on the quality standards of the products while the “Specific Requirements” stipulate their environmental requirements.

Table of Contents
1. Scope and Description
2. Effects on the Environment
3. Criteria
3.1 Product certified with the Green Label
3.2 Product not certified with the Green Label
3.2.1 General Provisions
3.2.2 Specific Requirements
Note: Testing and Laboratory Requirements

[Table 3] Table of Contents of Green Cart Criteria

In general, products with the Green Label certification are automatically deemed to have satisfied Green Cart if there are corresponding Green Label criteria. However, if a product has not acquired Green Label certification, it should satisfy the requirements presented under the Green Cart criteria.

The procedures used to establish Green Cart criteria were investigated to prevent procedural problems. According to the comparative analysis report on GPP of four countries published by UNEP, the Pollution Control Department established Green Cart criteria by undergoing the following four steps:⁸

- a) **Product selection:** To select the designated products, a list of top 20 highly purchased products was prepared with regard to the following aspects:
- Technical aspects (processing with lower environmental impacts);
 - Environmental aspects (based on life cycle considerations); and

⁸ UNEP, 2017b, “Comparative Analysis of Green Public Procurement and Ecolabelling Programmes in China, Japan, Thailand and the Republic of Korea: Lessons Learned and Common Success Factors”.

- Economic aspects (availability of alternative products/services in markets, high amount of purchase).

The designated products were selected based on a scoring system developed by the Pollution Control Department that assesses environmental impacts, availability of products and procurement quantity.

b) **Literature review:** Staff from Environmental Quality and Laboratory Division at the Pollution Control Department conducted a literature review to collect information regarding national and international eco-labeling criteria. These criteria were further used to develop the GPP criteria.

c) **Drafting product/service criteria for GPP:** Draft criteria were proposed to the Technical Sub-committees comprised of representatives from the Ministry of Natural Resources and Environment, Ministry of Industry, Thai Federation of Industry, Thai Chamber of Commerce, and Thailand Research Fund after the preliminary selection of product categories and a review of eco-labeling criteria.

d) **Formulating criteria for GPP:** The working group formulated GPP criteria for a designated product category as per the review of draft criteria.

Although Thailand selected the product groups by utilizing the scoring system developed by the PCD, the Focal Point confirmed that there were no procedural problems in this activity since it was used only at the time of implementation of the First GPP Promotion Plan. Additionally, the product groups for the Project were selected in consideration of the demands of other stakeholders.

2) Comparison of Green Label and Green Cart Criteria

As the result of the analysis of the Green Cart criteria, the Implementing Agency identified that those products that satisfy the Green Label criteria automatically satisfy the Green Cart criteria as well. Besides, since a substantial portion of the Green Cart criteria were prepared on the basis of the contents of Green Label, it was necessary to discern the specific similarity between two types of criteria. This distinction was important to the process of preparing Green Cart criteria for products that already held the Green Label criteria, namely thermal insulation and cement.

As translations were already made for the aforementioned four products, Green Cart criteria and Green Label criteria were compared. A summary of this comparison is shown in Figure 6 below, and the full results provided in Annex 1.

Criteria	Green Label (TGL-4-R4-14)	Green Cart (TGC-O-011.00-6/51)	Note
Volatile Organic Compounds	Quantities of volatile organic compounds permitted at point of use are shown in the table below and subject to the following related conditions. <i>(Detailed numbers are omitted)</i> a. For construction purposes b. For automobile repairs c. For painting traffic signs d. Others (Should the product fall into more than one of the above groups, the stricter requirement shall apply in considering the product for Green Label)	Quantities of volatile organic compounds shall not exceed the following criteria: (1) For emulsion paints, the VOC content shall not exceed 50 g/l. (2) For other paints, enamels, and lacquers that are water-based, the VOC content shall not exceed 100 g/l. (3) For paints, enamels, and lacquers that are solvent-based, the VOC content shall not exceed 380 g/l.	Difference in Level
Ingredients	Ingredients containing heavy metals (lead, mercury and cadmium) due to impurities or traces deriving from raw materials shall not exceed 0.01% (100 mg/kg) by weight; for chromium (+6) 0.1% (1000 mg/kg) by weight; and the sum of all 4 metals shall not exceed 0.1% (1000 mg/kg) by weight. Arsenic and antimony are prohibited as paint ingredients.	Heavy metals, including lead, cadmium, chromium hexavalent, arsenic, antimony and their compounds are prohibited as paint ingredients. Note: The total volume of heavy metals (lead, mercury, cadmium and chromium hexavalent) due to impurities or traces deriving from raw materials shall not exceed 0.1% (1000 mg/kg) by weight.	Difference in Level
	Triphenyl tins (TPT) and tributyl tins (TBT) shall not be used as ingredient.	Triphenyl tins (TPT) and tributyl tins (TBT) shall not be used as ingredient.	Identical

[Figure 6] Comparison between Green Label and Green Cart Criteria for Paint (Abridged)

As seen in the results of comparison, for the product groups with existing Green Label criteria, there were significant similarities between these two types of criteria. Green Label criteria were generally being used as the basis for Green Cart criteria. Although there were several cases in which the specific requirements of Green Label criteria were omitted in the Green Cart criteria, there were almost no cases of the reverse situation.

If a large number of companies can satisfy requirements that are stricter than those of Green Label criteria, it is possible to prepare the draft criteria by sufficiently considering such capacities. For example, regarding the standards for mercury in fluorescent lamps, those of Green Cart criteria are stricter than those of the Green Label. The standards were set at a higher level due to the improvement of companies' manufacturing capacities over time since the initial preparation of the Green Label criteria for fluorescent lamps, and/or because multiple numbers of suppliers can satisfy such standards due to evolving international regulations.

3) Analysis of Green Label Criteria for Thermal Insulation and Cement

Existing Green Label criteria were analyzed and used to generate the draft Green Cart criteria for thermal insulation and cement. Requirements stipulated under the Green Label criteria for each of the products and the ensuing testing methods were also identified and shared with the Focal Point.

According to Green Label criteria for thermal insulation, the products that are subject to certification include glass wool thermal insulation and foam plastic thermal insulation used in office, residential,

commercial, and industrial buildings. More detailed definitions and requirements of Green Label criteria for each category can be seen in Tables 4 and 5 below.

Glass wool insulation refers to a product produced from melted glass into fiber through one or more of the blast method, centrifugal method, rod method, or pot method. A binding agent is added to the fibers to form glass wool board, glass wool pipe, or other shapes. Finally, additives may be applied to the surface to finish production.

Criteria	Detailed Contents	Testing Methods
Raw Materials	Use of glass cutlets retrieved from post-consumer waste and/or post industrial waste in at least 80% of total glass wool weight, not including waste generated from the factory.	Declare the formula for glass wool insulation, amount of bought and sold glass cutlets as raw materials, and calculation methods for percentage of glass cutlets weight as compared to finished product.
Chemical Substances	Formaldehyde of no more than 0.05 ppm at 168 hours (7 days)	Declare a test report: Formaldehyde: ASTM D 5116 TVOCs: ASTM D 5116
	Total volatile organic compounds (TVOCs) from C6-C12 of no more than 0.5 milligram per cubic meter at 168 hours (7 days)	
Hazardous Properties	Shall not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.	Submit a declaration letter
Packaging	Plastic packaging shall be symbolized to indicate the type of plastic according to TIS for recycled plastics under TIS 1310, ISO 1043, or ISO 11469.	Submit a declaration letter
	Paper used for linerboard shall be Green Label certified paper or passed the product environmental requirements for paper used as linerboard.	Shall be certified with Green Label for paper or passed the product environmental requirements
	Paper used for corrugated medium shall be Green Label certified paper or passed the product environmental requirements for paper used as corrugated medium.	Shall be certified with Green Label for paper or passed the product environmental requirements

	Ink, pigments, or additives used for printing the labels or on the packaging shall not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.	Declare a test report: Lead: ISO 3856-1 or ASTM D3335 Cadmium: ISO 3856-4 or ASTM D3335 Chromium (VI): ISO 3856-5 Mercury: ISO 3856-7 or ASTM D3624
Instructions	Existence of product manuals or recommendations for appropriate handling and use of product as follows: 1) Product information 2) Transportation and storage 3) Product installation 4) Safe and efficient handling 5) Disposal	Declare a manual or labels

[Table 4] Summary of Green Label Criteria for Glass Wool Thermal Insulation

Foam plastic insulation refers to a product containing mainly polymers of polystyrene, polyurethane foam, or polyethylene foam characterized by a pipe or board shape structure. The closed-cell foam structure can prevent heat transfer and act as a water vapor barrier.

Criteria	Detailed Contents	Testing Methods
Raw Materials	The percentage of post-consumer waste and/or post industrial waste shall be at least 80% by weight of the finished product. However, waste generated from the factory is not included.	Declare the percentage of post-consumer/post-industrial foam plastic used in producing foam plastic insulation compared to the finished product including calculation methods
Prohibited Substances	Use of CFCs, HCFCs, and HFCs are prohibited in production process.	Submit the production formula as well as provide list of chemical substances used in replacement
	No presence of carcinogens in group 1 (carcinogenic to humans) and group 2A (probably carcinogenic to humans) as classified by the International Agency for Research on Cancer (IARC).	Submit a declaration letter

	<p>Mixture of toxic substances in the product is prohibited. The following are prohibited toxic substances:</p> <ul style="list-style-type: none"> - R45 - R46 - R48 - R61 - R63 - R68 - polybrominated biphenyls (PBB) - polybrominated diphenyl ethers (PBDE) - polyurethane composed of halogenated organic compounds partially or completely according to RAL-UZ30a and hazardous substances list according to Annex I of Directive 67/548/EEC 	Submit a declaration letter
ODP & GWP	<p>Foaming agent or blowing agent for production shall have ODP value equal to 0 and Global Warming Potential (GWP) value of no more than 140 kilograms CO₂ over 100 years.</p>	Submit a declaration letter
Hazardous Properties	<p>Shall not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.</p>	Submit a declaration letter
Plastics	<p>Plastic shall be symbolized by type on the product according to Thailand Industrial Standard TIS 1310 for recycling plastic or ISO 1043 or 11469.</p>	Provide a sample of foam plastic insulation together with a declaration letter
Packaging	<p>Plastic packaging shall be symbolized to indicate the type of plastic according to TIS for recycled plastics under TIS 1310, ISO 1043, or ISO 11469.</p>	Submit a declaration letter
	<p>Paper used for linerboard shall be Green Label certified paper or passed the product environmental requirements for paper used as linerboard.</p>	Shall be certified with Green Label for paper or passed the product environmental requirements
	<p>Paper used for corrugated medium shall be Green Label certified paper or passed the product environmental requirements for paper used as corrugated medium.</p>	Shall be certified with Green Label for paper or passed the product environmental requirements

	Ink, pigments, or additives used for printing the labels or on the packaging shall not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.	Declare a test report: Lead: ISO 3856-1 or ASTM D3335 Cadmium: ISO 3856-4 or ASTM D3335 Chromium (VI): ISO 3856-5 Mercury: ISO 3856-7 or ASTM D3624
Instructions	Existence of product manuals or recommendations for appropriate handling and use of product as follows: 1) Product information 2) Transportation and storage 3) Product installation 4) Safe and efficient handling 5) Disposal	Declare a manual or labels

[Table 5] Summary of Green Label Criteria for Foam Plastic Thermal Insulation

In the case of cement, Green Label criteria include Portland cement stipulated under TIS 15, part 1, and hydraulic cement stipulated under TIS 2594, which are the industrial standards of Thailand.

Portland cement refers to a product made from grinding clinker with calcium sulfate into a powder.

Hydraulic cement refers to cement that sets and hardens after it has been mixed with water or when it is underwater. A Summary of the Green Label criteria for cement can be seen in Table 6 below.

Criteria	Detailed Contents	Testing Methods
GHG Emissions	The greenhouse gas emission during manufacturing process shall not exceed 800kg CO ₂ e per tonnes of product.	Submit following documents: 1. A third-party certified results of greenhouse gas emission value calculation, or 2. Certification of Carbon Reduction Label or Carbon Footprint Reduction.
Instructions	Instructions for paper and plastic recycling and disposal shall be displayed on the packaging or invoice.	Submit a declaration letter
Packaging	Ink, pigments, or additives used for printing the labels or on the packaging shall not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.	Declare a test report: Lead: ISO 3856-1 or ASTM D3335 Cadmium: ISO 3856-4 or ASTM D3335 Chromium (VI): ISO 3856-5 Mercury: ISO 3856-7 or ASTM D3624

[Table 6] Summary of Green Label Criteria for Cement

The environmental requirements from the Green Label criteria for each of the three product categories were shared with the Focal Point, who agreed that the draft criteria will be prepared on the basis of the contents. In addition, the Focal Point requested that the relevant environmental requirements of Eco-mark criteria of Korea be proposed for possible integration. The integration of the differences between the Korea Eco-mark and Green Label criteria will be considered through the Technical Sub-Committee and engagement with Thai manufacturers.

Among the Korea Eco-mark criteria for thermal insulation and cement, the contents that do not coincide with the Green Label criteria are summarized in Table 7 below. Upon the request of the Focal Point, the Implementing Agency sought advice from KEITI on the background and rationales for the establishment of such requirements, and included the findings in the draft Green Cart criteria.

Criteria	Detailed Contents	Background and Rationale
Thermal Insulation (EL243. Thermal Insulation Materials)		
Raw Material	The molded product shall contain thermal insulation materials more than 50 weight % or 70 volume % out of the constituent materials.	If combining the materials with thermal insulation affects other materials, this requirement can prevent products with a low use of thermal insulation from acquiring certification. This requirement stipulates the minimum contents and proportion of thermal insulation materials.
Flame Retardant	It shall not use PBBs, PBDEs, TBBPA and HBCD as flame retardants. However, this criterion is considered to be complied with if the sum of all PBBs PBDEs, TBBPA and HBCD is below 100 mg/kg, or if the total bromine content (Br) is below 30 mg/kg.	This criterion prohibits the use of key bromine-range fire retardants that have eco-toxicity and non-degradability that are regulated under the RoHS Directive and Stockholm Convention. 100mg/kg or 30mg/kg are not the levels required for the protection of environment and human health, but rather, the values that confirm the intentional use of bromine-range fire retardants.
Thermal Insulating Effect	Thermal insulating effect of the product shall comply with the following criteria. a) Products of which standards on the thermal insulation capacities (thermal conductivity, thermal resistance, and resistance of heat transmission) are prescribed in Korean Industrial Standard shall comply with relevant criteria specified in the corresponding Korean Industrial Standard. b) For the products for which thermal insulation performance is not specified in the Korean Industrial Standard, the thermal conductivity shall be 44 mW/mK or less.	Korea Industrial Standards (KS) stipulate the thermal insulation or sound absorption performances for each of the product types. As such, requirements are established to satisfy these standards. In the case of products for which the KS does not stipulate their thermal insulation performances, the criteria set 44 mW/mK as the thermal insulation requirement, which is the mid-level value of thermal conductivity for different grades of thermal insulation stipulated under the "Standards for designs for energy savings of structures".

Sound Absorption Performance	Products which are marked with the sound absorption performance shall verify that its sound absorption performance is excellent.	
Cement [Portland Fly-ash Cement] (EL743. Recycled Construction Materials)		
Raw Material	Fly ash shall be used by more than 5 weight% in cement as a waste material.	<p>After establishing draft criteria by analyzing the following issues, KEITI collected the opinions of stakeholders (manufacturers) and reported them to the Criteria Committee before making a final decision to the members of Committee.</p> <ul style="list-style-type: none"> - Laws on wastes and recycling - Criteria of overseas institutions operating eco-labeling - Technical levels of the manufacturers of recycled products, and maximum rate of use of waste materials that can secure an equivalent or better level of quality when compared with products that use 100% virgin materials - Current status of supply of and demand for recycled raw materials.
Harmful Substances	Harmful substances, including heavy metals, in the products made of the designated waste materials as recycling materials shall conform to the following criteria.	Legal standards stipulated under the "Waste Control Act" to categorize the wastes containing harmful substances as designated wastes in order to strictly control them. In order for a product manufactured with designated waste to acquire certification, the quantity of the harmful substance must be lower than that indicated in the standards for classification of designated waste.
Cement [Portland Blast Furnace Slag Cement] (EL744. Recycled Slag Products)		
Raw Material	It shall be used within the range of (35~65) weight % based on blast furnace slag, more than 40 weight % on annual average.	Same as the requirement for the rate of use of waste material of 'EL743. Recycled Construction Materials'.

[Table 7] Korea Eco-Mark Criteria for Thermal Insulation and Cement

The eco-labeling criteria for thermal insulation manufactured by both Thailand and Korea are similar in significant portions regarding their use of waste materials and prevention of the release of hazardous substances. In contrast, in the case of cement, there are clear differences in the environmental aspects between Thai and Korean criteria. While Thailand focused on the reduction of greenhouse gases generated in the manufacturing process, Korea focused their criteria around the improvement of circulation of material resources.

4) Analysis of Criteria from Other Countries Related to Steel Bars

In the case of steel bars, Thailand has no existing Green Label criteria. Given this, criteria of other GEN (Global Eco-labeling Network) member countries for the relevant product group were examined to identify the environmental requirements for steel bars.

FTI requested the establishment of steel bar criteria to PCD and the Implementing Agency and proposed the scope of application for the criteria. They proposed that it would include a “round or deformed steel bar used in reinforced concrete and steel wire used in pre-stressed concrete.” As the relevant Thailand Industrial Standard (TIS) stipulates that the above products need to acquire obligatory certification, it was possible to reference to the detailed definitions. Relevant standards are shown in Table 8 below.

No.	TIS No.	Title
1	TIS 20-2559 (2016)	Steel bars for reinforced concrete: round bars
2	TIS 24-2559 (2016)	Steel bars for reinforced concrete: deformed bars
3	TIS 95-2540 (1997)	Steel wires for prestressed concrete
4	TIS 420-2540 (1997)	Steel wires strands for prestressed concrete

[Table 8] Steel Bar-Related Thai Industrial Standards

There are currently three countries among the GEN member countries that have established eco-label criteria for steel bars. These criteria broadly regulate steel products, including steel bars. The Focal Point and the Implementing Agency determined that it would be possible to add other steel products in the process of establishing or revising the criteria for steel bars in the future.

[illegible]

[Figure 7] Steel Bar-Related Eco-labeling Criteria

Due to the absence of eco-labeling criteria in Thailand for steel bars, the proposed environmental criteria were first identified through a comparative analysis of the three standards to enable inclusion of all relevant environmental criteria for the products, as shown in Figure 8, and Annex 2. For the proposed requirements, the possibility of satisfaction by the Thai companies for each item was assessed through collecting stakeholder opinion (as described in Section 2.1.4 below). From this process, adjustments could be made in order to more accurately reflect the current status of production.

Category	NEW ZEALAND	MALAYSIA	BRAZIL	PROPOSED CRITERIA
Raw materials	Manufacturers using post-consumer scrap must implement procedures to exclude feedstocks containing undesirable materials, including: (1) Radioactive materials (2) Polychlorinated Biphenyls (PCBs)	The steel scrap substitutes and recycled feedstock shall not contain radioactive materials .	The company shall have procedures to identify and ensure the non-use of hazardous substances prohibited by law, as well as ascarell (PCBs) and radioactive materials .	The steel scrap substitutes and recycled feedstock shall not contain radioactive materials and polychlorinated biphenyls (PCBs)
		For steel products used in construction using Electric Arc Furnace, the ferrous feedstock shall contain a minimum of 88% steel scrap .		For steel products used in construction using Electric Arc Furnace, the ferrous feedstock shall contain a minimum of 88% steel scrap .
		For steel products for Basic Oxygen Furnace, the ferrous feedstock shall contain a minimum of 70% steel scrap .		For steel products for Basic Oxygen Furnace, the ferrous feedstock shall contain a minimum of 70% steel scrap .
			If using charcoal within its production process (as well as for the production of pig iron and other raw materials), the manufacturer shall ensure that the origin of the forest to be planted or legally authorized forests.	If using charcoal within its production process (as well as for the production of pig iron and other raw materials), the manufacturer shall ensure that the origin of the forest to be planted or legally authorized forests.

[Figure 8] Analysis of Steel Bar-Related Eco-labeling Criteria (Abridged)

In the case of criteria of New Zealand and Brazil, provisions have been established for items that address environmental impacts in the manufacturing process, not only those directly related to the products. The Green Label and Green Cart criteria of Thailand generally restrict the environmental requirements to the product unit, and do not consider, for example factory conditions. After having checked the applicability under the Factory Act of 1992, only the relevant issues were excerpted and summarized into proposed environmental requirements, as shown in Table 9 below.

Criteria	Detailed Contents	Testing Methods
Raw Material	The steel scrap substitutes and recycled feedstock shall not contain radioactive materials and polychlorinated biphenyls (PCBs)	Submit a declaration letter
	For steel products used in construction using Electric Arc Furnace, the ferrous feedstock shall contain a minimum of 88% steel scrap.	Submit formula including calculation method

	For steel products for Basic Oxygen Furnace, the ferrous feedstock shall contain a minimum of 70% steel scrap.	Submit formula including calculation method
	If using charcoal within its production process (as well as for the production of pig iron and other raw materials), the manufacturer shall ensure that the origin of the forest to be planted or legally authorized forests.	Submit a declaration letter
Recyclability	Steel products must not be impregnated, labelled, coated or otherwise treated in a manner which would prevent recycling.	Submit a declaration letter
Energy Management	Electricity consumption in the EAF must not exceed 500 kWh/tonne of liquid steel, based on a rolling 12-month average.	Submit a declaration letter
	The manufacturer shall have an energy efficiency management program of its production process and annually conduct the CO ₂ emissions inventory.	Submit a declaration letter
Harmful Substances	The limit of hazardous substances in long steel products shall comply the following requirements: Lead: 1000 ppm or 0.1% Mercury: 1000 ppm or 0.1% Cadmium: 100 ppm or 0.01% Hexavalent chromium: 1000 ppm or 0.1%	Submit a test report
	The steel products shall not be treated with: ➤ Compounds containing mercury, lead, cadmium, hexavalent chromium, arsenic or their compounds ➤ Halogenated organic compounds ➤ Any chemicals that are included in the IARC lists for proven (Group 1) or probably (Group 2A) carcinogens ➤ Slushing oil	Submit a declaration letter
Packaging	The materials used in packaging, labels and accessories should be recycled. Woods used in the packaging or products shall be proven legal origin.	Submit a declaration letter

[Table 9] Proposed Environmental Requirements for Steel Bars

The Focal Point requested to present the draft criteria for steel bars as comprehensively as possible at this stage to subsequently determine their applicability in Thailand. Accordingly, confirmation on whether to include certain requirements in the Green Cart criteria was occurred at later stages in the project, through the market readiness study and by collecting opinions of companies.

2.1.2 Market Readiness Study

A market readiness study was conducted to assess whether Thai companies' could satisfy the environmental requirements of the draft criteria for each product group. In anticipation of difficulties in contacting the local companies and obtaining relevant data in Thailand from Korea, the Implementing Agency decided to carry out the analysis of environmentally-friendly products within the market by using a local Supporting Agency.

The Implementing Agency selected the Thailand Environment Institute (TEI) to be the Supporting Agency, as it possesses specialized knowledge and partnerships with relevant companies through its work on the Thailand Green Label Certification. The Supporting Agency (TEI) conducted the market readiness study from April 23 to June 23 and submitted the final study report to the Implementing Agency on June 25, 2018.

To conduct the study, the Supporting Agency surveyed product characteristics, general production processes, key manufacturers and products in the Thai market, and the life-cycle environmental impact of the three product groups in accordance with a Terms of Reference. In particular, information on the issues that were considered and included (and more importantly, that were not included) in the criteria were obtained from data utilized for the establishment of the Green Label criteria, where available.

To determine the applicability of the presented environmental requirements, the Supporting Agency made primary contact with a group of manufacturers in Thailand and collected data and opinions through interviews and surveys. The surveys were distributed to Green Label certified companies, and with assistance from FTI and Thailand Industrial Standard Institute (TISI). Companies that replied to the survey are shown in Table 10.

No.	Steel Bar	Thermal Insulation	Cement
1	Siam Steel Syndicate	Microfiber Industries	Siam Cement (Bag)
2	Millcon Steel	Tokuwa Industrial	Siam Cement (Bulk)
3	Siam Iron and Steel	Vandapac	Thai Pride Cement
4	Siam Construction Steel	M-PE Insulation	Asia Cement
5	N.T.S. Steel Group	Aeroflex	-

[Table 10] Companies Responded to the Survey

In addition to their responses, the companies' contact information acquired through the survey was deemed to be important information that can be utilized by the Focal Point in the process of collecting their opinions on criteria.

Although the rate of reply to the questionnaire survey was lower than targeted, the anticipated sample size was not large to begin with, due to the small number of the companies with factories large enough to manufacture steel bars and cement in Thailand. In the case of thermal insulation, it was not easy to get in contact with the companies, even through FTI, due to the absence of an active industry association for this product group within Thailand. Instead, the Supporting Agency distributed the survey through the database on the Green Label Certified products.

The majority of companies that replied to the questions on thermal insulation and cement stated that they were able to satisfy the existing Green Label criteria without much difficulty, with the exception of some specific requirements. As such, the study confirmed that there was no need for substantial revision to draft the Green Cart criteria. Therefore, draft criteria were to be established first on the basis of Green Label criteria, and further adjusted through the process of stakeholder input.

In the case of steel bars, as mentioned above, there were no domestic eco-labeling criteria to base the draft criteria on. In addition, the awareness of the manufacturers and other stakeholders on this issue was low overall. Although some of the companies replied to the survey, it was not possible to obtain complete data that would enable systematic analysis of the applicability of the presented requirements.

Nevertheless, steel companies' interest in GPP of environmentally-friendly products is increasing, as evidenced by multiple steel companies participating in and assertively stating opinions on technical exchanges during a networking session held by the Implementing Agency. Additionally, following the completion of the survey, one of the steel associations has held several internal meetings and conveyed their opinions to the Focal Point in order to weigh in on the establishment of criteria.

TEI THAILAND ENVIRONMENT INSTITUTE

Propose to Smart Eco Market Readiness Analysis

Thermal Insulation

Steel Bar

Cement

By
Thailand Environment Institute (TEI)
June 2018

3.5 Environmental Impact of Thermal Insulator

The extraction, manufacturing, use and disposal of thermal insulators can be potentially harmful due to their hazardous substances (e.g., formaldehyde, asbestos, bleach, etc.). There are a number of areas where insulation manufacturers and suppliers can reduce environmental impact during extraction, manufacturing, use and disposal of these products. Substituting recycled materials for virgin materials will reduce the amount of materials entering the waste stream and reduce total resource consumption.

Table 3-4 Environmental Impacts of glass wool and foam plastic insulations

Environmental Aspect	Raw Material	Phase of life cycle			
		Production	Transportation	Use	Disposal
Resources					
- Raw materials	● ^{1,2}	● ^{1,2}	○ ³	×	×
- Energy	○	●	×	×	×
- Water	○	●	×	×	×
Hazardous substances	×	● ^{1,3}	○ ³	×	×
Emission or release of pollutants					
- Air	○	● ^{1,4}	×	○ ³	○ ³
- Water	○	○ ³	×	×	○ ³
- Soil	○	○ ³	×	×	○ ³
Wastes	×	○	×	● ^{1,2}	● ¹
Other impacts	○	●	○ ³	×	×
Flammability					
- Flammability				×	×
Safety				●	

Note: The gray areas in the table are not considered in the specification

- 1 The impact shall be considered for criteria development
- 2 The impact is excluded for criteria development
- 3 No assessment
- 4 National law and regulation, e.g., Factory Act B.E. 2535, Notification of the Ministry of Industry and Commerce
- 5 Quality or safety standards, e.g., TIS, etc.
- 6 Chemicals used in manufacturing process and product, include hazardous substances
- 7 Natural resource utilization, e.g., raw material, energy and water
- 8 Effects of dust, fumes, and waste gases on pollution
- 9 Emissions of CO₂, CO, SO₂, and NO_x/O₃ leakage
- 10 Effects of plastic and paper packaging

3.5.1 Glass wool and foam plastic insulation

The raw materials used to produce thermal insulation are varied widely, ranging from the sand used in glass wool to the petrochemicals in foam plastic insulation and the old newspaper in cellulose insulation. Environmental concerns with raw material acquisition include, on the negative

Thermal Insulation 3-20

Appendix 3

Opinion on Criteria Improvement for Thermal Insulation (TGL-14-R1-11)

Questionnaire: Opinion on Criteria Improvement for Thermal Insulation (TGL-14-R1-11)

This questionnaire is used to survey and collect data regarding the improvement of criteria for Thermal Insulation (TGL-14-R1-11). Thailand Environment Institute (TEI) would like you to complete this survey. TEI hereby declares that your personal information would be none-disclosure individually, but as an overall presentation.

Thank you for taking the time to complete this survey.

Thailand Environment Institute

If there are no suggestions, please choose "appropriate". If the criteria should be improved, please choose "Should downgrade the standard" or "Should upgrade the standard".

Criteria	Appropriate	Should downgrade the standard	Should upgrade the standard
Part 1: Glass Wool Insulation			
General requirements			
4.1.1 The product shall be certified with Thai Industrial Standard TIS 498 for Glass Wool	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.1.2 The applicant shall declare the license issued for TIS 498	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.1.3 The product shall be certified with Thailand Industrial Standard, or passed the product quality specification test under the Thai Industrial Standard in Table 1 or be certified with standards equivalent to national standard or higher than Thailand Industrial Standards, or be certified with international standards/other acceptable national standards such as ASTM or JIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Table 1 List of related Thai Industrial Standards			
No.	Standard No.	Name of Standard	
1	498	Standard for Glass wool boards	
2	499	Standard for Glass wool pipe	
The applicant shall declare the license issued for each type of product or test report for product quality specifications according to Thai Industrial Standards in Table 1 or test report according to test methods under international standards or other acceptable national standards.			
4.1.3	Manufacturing, transportation, and post-industrial waste disposal shall comply with national laws and regulations such as the Pollution Act under the Ministry of Industry and Commerce	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 3-1

Market Readiness Report

Life-cycle Analysis Results

Questionnaire on Applicability

[Figure 9] Market Readiness Study Report

Regarding the applicability of environmental requirements, the Supporting Agency reasoned that it is not necessary to adjust Green Cart criteria downwards for the following reasons, along with the outcomes of the questionnaire survey. First, one of the principles for the establishment of the Green Label criteria is to ensure that a certain number of manufacturers are able to acquire certification, as in the case of Green Cart. In addition, since multiple companies are participating in the Green Label Technical Committee that examines the draft criteria of Green Label, the applicability of the requirements were already sufficiently considered.

In addition, the Supporting Agency argued that the testing methodology specified in the Green Label criteria of the cement and thermal insulation product groups can be sufficiently operated in the laboratories in Thailand due to their existing experience.

The Supporting Agency, which is the operating institution of Green Label criteria, agreed in principle with the Focal Point to not lower the Green Cart criteria to the level of the Green Label criteria with priority. This prevents the reduction in the number of cases of Green Label Certifications, and ensure the environmental characteristics of the products.

In order to proactively prevent the problems that may arise from a failure to comprehensively survey local manufacturers regarding market readiness, the Implementing Agency decided to more intensively communicate with companies via face-to-face meetings, getting input on the draft criteria developed through agreement with the Focal Point (as shown in Section 2.1.4).

Detailed contents of the market readiness study for each of the product groups are summarized as follows.

1) Market Readiness Study Summary: Thermal Insulation

(1) Characteristics and General Manufacturing Process of the Products

Similar to the results of the aforementioned analysis of Green Label criteria, this market readiness study was executed for two product types, namely glass wool and foam plastic thermal insulations. The characteristics and manufacturing processes of the two types of thermal insulation are as follows.

① Glass wool thermal insulation

Glass wool is a type of thermal insulation with unique characteristics. It is made of natural minerals including quartz sand, dolomite, feldspar, and limestone, which are melted into glass fluid using additives such as calcined soda and borax before being processed into very thin fiber by applying external force. The production line for glass wool is composed of a diverse range of equipment and

machines with special functions. After quartz sand has been transformed into glass wool through a series of processes, it is further processed into glass wool panels or felt. The glass wool production process is illustrated in Figure 10.



[Figure 10] Production Flow of Glass Wool⁹

The manufacturing process of glass wool includes the following key stages.

Stage 1 (melting): The glass wool sector uses oxygen-gas, electrical furnaces, or hot blast cupolas with cokes for its production. The processes and environmental issues following the melting stage are essentially identical throughout multiple facilities.

Stage 2 (forming): Melted product is infused into specially designed rotary centrifugal spinners. This forms a veil of fibers, which passes through a ring of binder spray that discharges binder solution and mineral oil. This is aimed at improving the integrity, resilience, durability, and handling quality of the final product.

Stage 3 (curing): The resin-coated fiber is drawn under suction onto a moving conveyor to form a mattress of fibers. This mattress passes through a gas-fired oven, which dries the product and cures the binder. The product is then air-cooled and cut into appropriate sizes before packaging.

⁹ Isover Saint-Gobain, n.d., "Production Process of Glass Wool", in *Korean*, Retrieved 25 February, 2019, from https://www.isover.co.kr/production_process.

② Foam plastic thermal insulation

A large number of new thermal insulation materials were introduced in the market since 1950. Some of these were manufactured with foam plastic (or plastic foam). Foam plastic is made by mixing the plastic material with a foaming agent prior to the molding process, which results in the uniform distribution of micro air bubbles throughout the product. A diverse range of foam plastics can be manufactured according to the plastic materials used. Generally, polystyrene, polyurethane and polyethylene are used in foam production.

The manufacturing process of expanded polystyrene (EPS), most commonly used as thermal insulation materials, is illustrated in Figure 11 below.



[Figure 11] Production Flow of Expanded Polystyrene¹⁰

Expanded Polystyrene is a lightweight, rigid, and closed-cell plastic foam insulation material produced from solid beads of polystyrene. During production, pentene gas dissolves into the polystyrene base material, expanding the product. The gas expands under the action of steam. The EPS beads are then molded into appropriate forms suited to their application.

(2) Key Manufacturers in Thailand for Thermal Insulation

Currently, there are numerous thermal insulation manufacturers of varying sizes in Thailand. Although the majority of these companies are members of the Federation of Thai Industries, there is no single industry association that represents the thermal insulation manufacturers. The list of major companies

¹⁰ Isover Saint-Gobain, n.d., "EPS Production Process: Foams", Retrieved 25 February, 2019, from <https://www.isover.com/foams>.

is provided in Table 11 below.

No.	Manufacturer	No.	Manufacturer
1	Siam Fiberglass Company Limited	7	SPI Group (Supreme Plastic Industry) Company Limited
2	Concrete Product and Aggregate Company Limited	8	Microfiber Industries Company Limited
3	SCG Cement-Building Materials Company Limited	9	ATEC Production Company Limited
4	Diamond Building Products Public Company Limited	10	3D Interproducts Company Limited
5	M-PE Insulation Company Limited	11	Miccell Company Limited
6	UNIPRO Manufacturing Company Limited	12	Thai Sekisui Foam Company Limited

[Table 11] List of Thermal Insulation Manufacturers in Thailand

Although the market readiness study report submitted by the Supporting Agency contains information such as brand, purpose of use, model, and price of the representative products being manufactured by each of the companies, this information was omitted due to its length.

(3) Evaluation of the Environmental Impact of Thermal Insulation

For the establishment of the Green Label criteria, the Supporting Agency evaluated the life-cycle environmental impact of the thermal insulation. When considering the lifespan of the product, the environmental impact of thermal insulation can be divided into five stages, namely: extraction of raw material (before production), production, transportation, use, and disposal.

Extraction of raw materials, manufacturing, and the use and disposal of thermal insulation can be potentially harmful due to the presence of hazardous substances, such as formaldehyde, asbestos, and bleach. Manufacturers and suppliers of thermal insulation have a diverse range of opportunities to reduce the negative environmental effects of the products throughout their life-cycle. For example, if recycled materials substitute for virgin material in the pre-production stage, it is possible to reduce the quantity of substances included in the waste flow and reduce the total consumption of resources.

Figure 12 below illustrates the results of the evaluation of the environmental impact of thermal insulation throughout its life-cycle. These contents were shared and agreed upon with local experts and manufacturers at the time of establishment of Green Label criteria.

Environmental Aspect	Phase of life cycle				
	Raw Material	Production	Transportation	Use	Disposal
Resources					
- Raw materials	● ^{*,**,1}	● ^{**,1,2}	○ [*]	×	×
- Energy	○ [*]	● [*]	×	×	×
- Water	○ [*]	● [*]	×	×	×
Hazardous substances	×	● ^{*,1,3}	○ [*]	×	×
Emission or release of pollutants					
- Air	○	● ^{*,4}	○ [*]	○ [*]	○ [*]
- Water	○	○ [*]	×	×	○ [*]
- Soil	○	○ [*]	×	×	○ [*]
Wastes	×	○	×	● ^{*,5}	● [*]
Other impacts	○	● [*]	○ ⁴	×	×
Fitness for use				● ^{**}	
Safety				● ^{**}	

Note the gray areas in the table are not considered in the specification

- The impact shall be considered for criteria development
- The impact is excluded for criteria development
- X No relevance
- * National laws and regulation, e.g., Factory Act B.E. 2535, Notification of the Ministry of Industry, etc.
- ** Quality or safety standards, e.g., TISI, etc.
- 1 Chemicals used in manufacturing process, residue hazardous substances
- 2 Natural resource utilization, e.g., raw material, energy and water
- 3 Effects of dust, fumes, and wastes causing air pollution
- 4 Emissions of CO₂, CO, SO_x and NO_x/Oil leakage
- 5 Effects of plastic and paper packaging

[Figure 12] Environmental impact of glass wool and foam plastic insulations

(Raw materials) Raw materials used in thermal insulation production are highly diversified, and include sands used for glass wool, petrochemical products used for foam plastic, and newspaper waste used for cellulose thermal insulation. The environmental impacts of the extraction of raw materials include the depletion of limited resources and contamination arising from mining. This can be mitigated through the recycling of various thermal insulation materials.

One of the advantages of glass wool is in the preparation of the raw material. If glass wool waste is reused as the raw material of glass wool thermal insulation, it is possible to reduce the quantity of waste discharged and thus reduce energy consumption. The main ingredients of glass wool include inorganic minerals (sand and rock) and low proportion of binders. Since glass wool production does not use hazardous chemical substances, it can provide a safe environment to users. Recycled glass is already being used broadly as a raw material for glass wool production.

→ In order to minimize the environmental impact of securing raw materials, Green Label criteria stipulate the ratio of the use of recycled materials for glass wool and foam plastic thermal insulations.

(Production) Air emissions of glass wool manufacturing can be divided into emissions from melting activities and emissions generated through the process of curing. Substances emitted from gas-fired ovens include volatile binder ingredients, disintegrated binder substances, and combustion by-products of oven burners. Such emissions can be minimized by using relevant technologies, and residue pollution levels can be handled with standard techniques.

Foam plastic thermal insulation is manufactured with a diverse range of plastics such as polystyrene and polyurethane. The production of foam plastic emits greenhouse gases that contribute to climate change. Additionally, some of the plastic production processes use chemical substances that can be toxic to the human body.

→ Domestic laws of Thailand and international standards strictly prohibit the use of chemical substances that can be toxic to the human body. In the case of foam plastic thermal insulation, the use of substances that destroy the ozone layer (CFCs, HCFCs, HFCs), which are currently not regulated under the Thailand Factory Act, are being restricted. Moreover, use of Global Warming Potential (GWP) is also regulated for blowing agents.

(Transportation) The outstanding compressibility of thermal insulation reduces the number of truck loads necessary to transport the products to construction sites. This reduction in itself reduces the fuel used and emission of exhaust gases.

→ There are limited environmental impacts of the product stemming from transportation. Since the transportation process is also beyond the scope of product's environmental impacts, it is not included in the criteria.

(Use) Outstanding product design can reduce waste in the installation process. Since thermal insulations can be purchased in different sizes and thicknesses, this flexibility can minimize the waste that can occur at the time of installation, and additional materials can be returned to the manufacturers for recycling. Thermal insulation must be developed to be appropriate for the highest level of health and safety standards for both the installers and users. In relation to the handling of the products, the manufacturers are concentrating on developing packaging and instructions, some utilizing pictures, and strive to ensure that there is no inconvenience to the installer.

→ Along with the prohibition of hazardous substances, the use of volatile organic compounds (VOCs) that can be generated from the products is also prohibited. Moreover, provisions were added to the criteria to reduce adverse effects on the human body and the environment in the stage of use by regulating the user manual or label for guidance on the appropriate use of the products.

(Disposal) Thermal insulation needs to be designed to consider its fate once the lifespan of the building expires. For example, it can be re-used as thermal insulation in new buildings, or recycled and used as material input for thermal insulation production. The goal is to minimize landfill waste and to maximize recycling of glass wool and foam plastic. In addition, environmental impacts are generated from the packaging material, and can be minimized and/or be made recyclable.

→ If plastic is used for thermal insulation, the Green Label criteria stipulate attachment of the relevant plastic symbol for recycling after disposal and include regulations to guarantee the environmental and recycling characteristics of both the plastic and paper packing materials.

(4) Manufacturer's Ability to Comply with Criteria

The Supporting Agency surveyed companies as to whether they would be able to satisfy the existing Green Label criteria. Companies replied that they were capable of manufacturing products that comply with the majority of the items in the currently implemented Green Label criteria.

When considering the overall possibility of satisfying the criteria, there is no need to immediately modify the Green Label criteria when establishing the draft Green Cart criteria. Regarding the testing methodology, the Supporting Agency asserted that all the methodologies stipulated under the Green Label criteria can be carried out in Thailand, and that there is no need to revise the Green Label criteria yet because of the regularly scheduled review by the Supporting Agency.

2) Market Readiness Study Summary: Cement

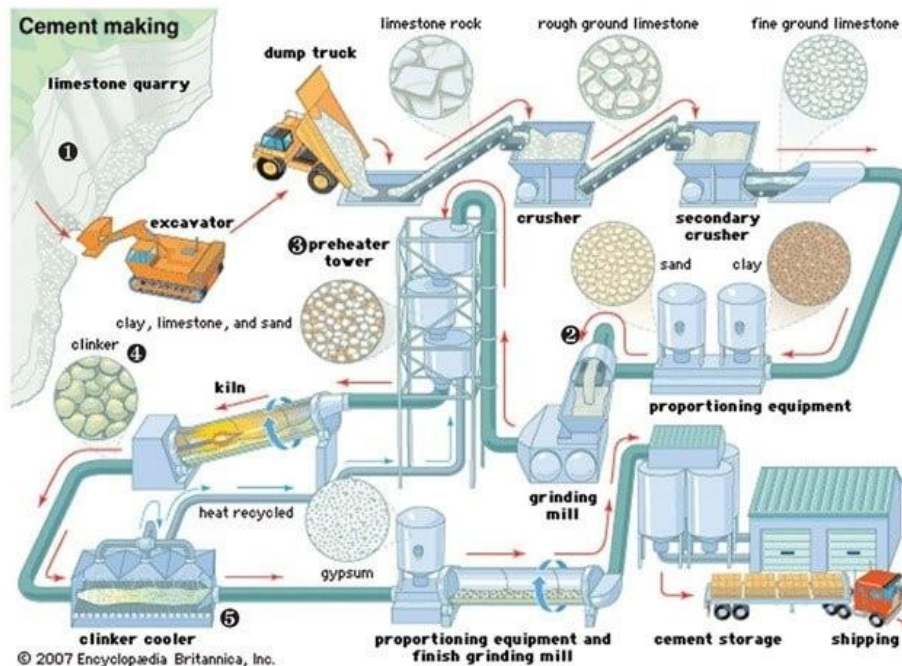
(1) Characteristics and General Manufacturing Processes of the Products

Concrete is a highly versatile material used in a diverse range of construction and building projects including playgrounds, bridges, and even nuclear power plants. Portland cement is used in many applications, since it can be poured into any shape after being mixed with water and aggregates (sand, rock and pebbles) and being fortified with steel or glass. Among the aforementioned ingredients, Portland cement plays the most important role. Such hydraulic cement provides concrete with its strength by forming hard chemical mineral structures upon reaction with water. Therefore, cement actually plays the role of an adhesive, and enables the concrete to stick together.

Portland cement is manufactured by heating the raw material with abundance of silicon, calcium, aluminum and ferrous oxides at temperatures of 1,200~1,400C°. Chemical reactions that occur within the partially melted substances enable formation of the main ingredient of the cement. The balance between the compounds formed and performance characteristics required of cement are parameters that can be controlled chemically. For this reason, a substantial effort is needed to confirm that

compounds with accurate proportions are being used as raw materials prior to inputting them into the kiln.

The general manufacturing process of cement is illustrated in Figure 13 below, which involves the following four stages.



[Figure 13] Production Flow of Cement¹¹

Stage 1 (quarrying): Limestone and 'cement rocks' such as clay or shale are quarried and brought to the cement factory. These rocks contain compounds such as lime (CaCO_3), silica (SiO_2), alumina (Al_2O_3) and ferrous oxide (Fe_2O_3).

Stage 2 (preparation of raw materials): In order to manufacture consistent products, it is essential to use the same mineral mixture every time. For this reason, an accurate composition of limestone and clay are determined at this point and, if needed, other ingredients are added. Rocks are then grounded into fine particles to increase the efficiency of the chemical reactions.

Stage 3 (clinkering): Raw materials are dried in this stage and heated prior to being fed into a rotating kiln. Here, the raw materials react at very high temperatures to form the main ingredients of cement, including tricalcium silicate ($3\text{CaO}\cdot\text{SiO}_2$), dicalcium silicate ($2\text{CaO}\cdot\text{SiO}_2$), tricalcium aluminate ($3\text{CaO}\cdot\text{Al}_2\text{O}_3$) and tetracalcium aluminoferrate ($4\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Fe}_2\text{O}_3$).

¹¹ Encyclopedia Britannica, n.d., "Cement", Retrieved 25 February, 2019, from <https://www.britannica.com/technology/cement-building-material>.

Stage 4 (cement milling): Although clinker produced materials like cement, it is made of particles with diameter of up to 3cm. Clinker is ground into fine powder in order to be converted into useful cement. Cement products manufactured in this manner are packaged for transportation to the destination.

(2) Key Cement Manufacturers in Thailand

The manufacturing of cement requires large-scale machines such as crushers, rotary kilns, and raw material silos. As such, cement is manufactured only by large companies. According to the survey carried out by the Supporting Agency, there currently are 35 Portland and hydraulic cement products under 12 brand names being distributed within the Thai market, with a total of 8 manufacturers. All these companies are manufacturing and distributing a diverse range of product lines, including by-products generated from the cement manufacturing processes.

The Thailand Fellowship of Cement Manufacturers (TFCM), established in 1977, was one of the 44 industrial organizations of FTI. Since then, the Thailand Cement Manufacturers Association was established with the same role and goals of the TFCM in 2006, and coordinates communication between Thai cement manufacturers, government agencies, and domestic and international non-government organizations. As shown in Table 12, seven Thai cement manufacturers with a total of 12 factories participate in the association as members.

No.	Manufacturer (Number of Factories)	Capacity (ton/year)
1	SCG Cement-Building Materials Company Limited (5)	23,705,000
2	TPI Polene Public Company (1)	13,000,000
3	Siam City Cement Public Company Limited (1)	14,784,000
4	Asia Cement Public Company Limited (1)	4,992,000
5	Jalaprathan Cement Public Company Limited (2)	2,342,400
6	Thai Pride Cement Company Limited (1)	960,000
7	Globe Cement Company Limited (1)	844,800
Total		60,628,200

[Table 12] Cement Manufacturers in Thailand

Although the Supporting Agency included information on cement production capacities, clinkering capacities, and brand names and prices of the products for each of the manufacturers in the submitted study report, this information was omitted due to its length.

(3) Evaluation of Environmental Impact of the Product

The environmental impacts of cement, in consideration of the life-cycle of the product, are displayed in Figure 14 below. Stages that were considered at the time of establishment of Green Label criteria include extraction of raw materials, production, transportation, use, and disposal.

Environmental aspect	Phase of life cycle				
	Raw material	Production	Transportation	Use	Disposal
Resources					
- Raw materials	○	● **, 2	X	X	
- Energy	○	○ ²	○ ²	X	
- Water	○	○ ²	X	○ ²	
Hazardous substances		● ¹		●	● ¹
Emission or release of pollutants					
- Air	○	● ^{*3}		● ³	○ ⁴
- Water	○	● [*]		X	● ^{5,6}
- Soil	○	● [*]		X	● ^{5,6}
Wastes		● ^{*3}		X	● ⁵
Other impacts	○			○	X
Fitness for use				● ^{**}	
Safety				● ^{**}	

Note the gray areas in the table are not considered in the specification

● The impact shall be considered for criteria development

○ The impact is excluded for criteria development

X No relevance

* National laws and regulation, e.g., Factory Act B.E. 2535, Notification of the Ministry of Industry, etc.

** Quality or safety standards, e.g., TISI, etc.

1 Chemicals used in manufacturing process, residue hazardous substances

2 Natural resource utilization, e.g., raw material, energy and water

3 Effects of dust, fumes, and wastes causing air pollution

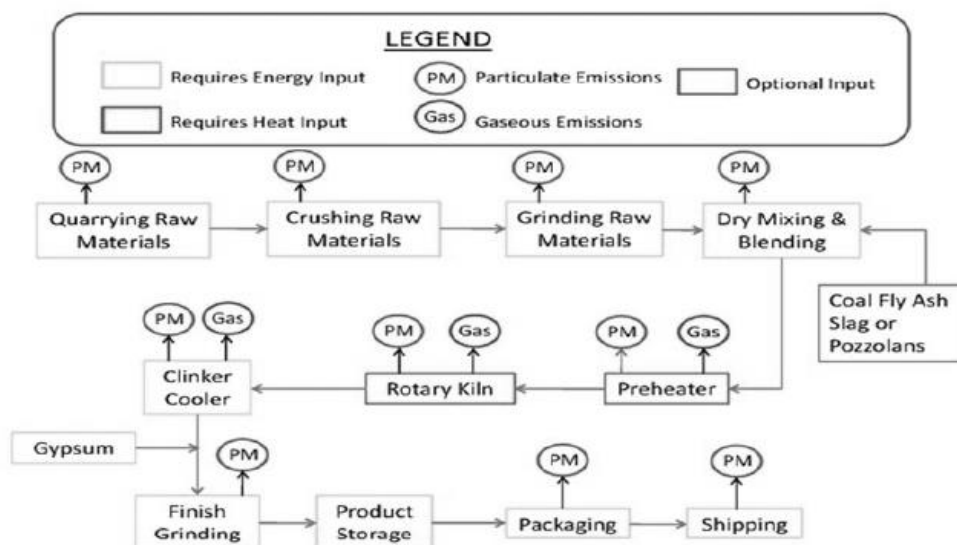
4 Emissions of CO₂, CO, SO_x and NO_x/Oil leakage

5 Effects of plastic and paper packaging

6 Effects of chemicals in packaging production

[Figure 14] Environmental Impacts of Cement

In addition, the following diagram, Figure 15, illustrates the cement manufacturing process, energy and heat needed in the process, and substances that are emitted into the atmosphere.



[Figure 15] Production Flow of Cement

(Raw materials) Through the meeting with stakeholders as well as literature reviews in the process of establishing Green Label criteria, the Supporting Agency identified that raw materials must be free of hazardous substances in order to ensure appropriate quality of cement products. Separate provisions were not added to the final criteria since majority of the companies satisfied this requirement in the current manufacturing process.

→ Accordingly, the Green Label criteria do not stipulate separate environmental requirements for the composition and characteristics of raw materials for cement.

(Production)

[Air and atmospheric emissions] A large amount of energy is consumed in the cement manufacturing process. Unless preventive measures are taken to decrease the environmental impact of this process, it can impart adverse effects on the environment. Since energy and heat usage are unavoidable in the process, key pollutants emitted into the atmosphere include dust, carbon oxides, nitrogen oxides, sulfur dioxide, PCDD/F, metallic substances, hydrogen chloride and oxygen fluoride. However, the specific types and quantity of emissions differ according to the raw materials and fuels used, and the processes applied.

Appropriate measures should be taken at facilities in accordance with the domestic laws of Thailand if any of the aforementioned pollutants are found to be toxic to the environment. However, in the case of greenhouse gas emissions, separate regulations are needed due to the international efforts to restrict their emissions.

[Discharge into water] Generally, cement production does not generate wastewater. In cement production that uses dried processing or semi-dried processing, water is used only in small quantities for purposes such as cleaning. Typically, such water is recycled within the process, and discharge into waterways does not occur.

[Discharge into soil] Discharge into soil can occur from the leakage of oil or water. However, based on the infrequent nature of such occurrences, these events have no significant effect on the environment.

[Noise] Noise occurs in all processes of cement manufacturing, including the preparation and treatment of raw materials, clinkering and combustion, storage of materials, and shipping and forwarding of final products. Moreover, heavy machines and large-sized fans used in various parts of the cement manufacturing processes can discharge noise and/or vibrations. However cement production facilities are generally situated at a substantial distance from residential areas and thus have minimal harmful noise impacts on nearby residents.

→ Issues on the cement manufacturing facilities that are already regulated by the Factory Act of Thailand and those with insignificant environmental impacts are excluded from Green Label criteria. Only requirements related to emission of greenhouse gases, one of the political priorities of the country, are included.

(Transportation) If manufacturers do not provide appropriate means of transportation management, high levels of energy consumption can occur at the transportation stage. Fuel combusted at the transportation stage generally emits atmospheric pollutants including dust, carbon oxides, nitrogen oxides and sulfur dioxide.

→ The corresponding issues are not requirements for the product itself and are generally not included in the eco-labeling criteria. Therefore, they are excluded from the final criteria.

(Use) Cement is manufactured in powder format, along with dust generated in the mixing process, can have adverse effects on workers and the environment. Therefore, measures taken for environmental safety and health are important.

→ Relevant issues are usually not considered in the eco-labeling criteria for products; impacts on the workers and working environment are regulated under other laws.

(Disposal) After the cement is used in the construction process, it has a very long lifespan in the environment. It is considered to have a very low environmental impact in the corresponding stage. Since atmospheric emissions are generated at the packaging stage, requirements for plastic or paper packaging management should be provided.

→ Requirements for recycling of and hazardous substances in plastic or paper packaging materials were added in the final Green Label criteria.

(4) Manufacturer's Ability to Comply with Criteria

The Supporting Agency surveyed companies on their ability to satisfy the Green Label criteria. In the case of Siam Cement Group (SCG), among the four companies who responded, two separate divisions are in charge of cement manufacturing according to the packaging methods of the cement. Therefore, the Supporting Agency collected two survey responses from SCG.

Companies that responded to the survey stated that they are equipped to manufacture products that comply with the currently implemented Green Label criteria. When considering the overall possibility of satisfying the criteria, it is determined that there is no need to immediately revise the Green Label criteria at this time. The Supporting Agency asserted that there are no requirements or testing methods that need urgent revision due to the regularly scheduled review of Green Label criteria.

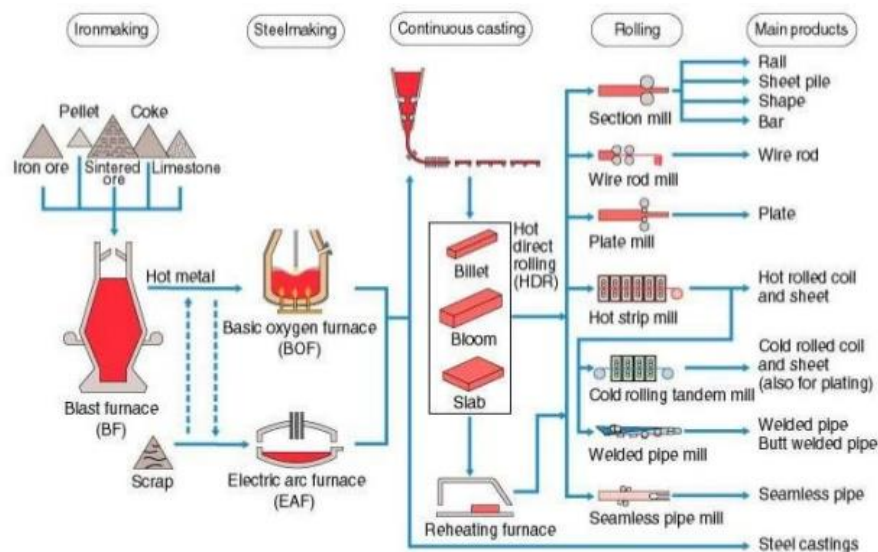
3) Market Readiness Study Summary: Steel Bars

(1) Characteristics and General Manufacturing Processes of the Product

Steel bars (or steel bars for reinforced concrete) are manufactured into two types including round bars and deformed bars. Specific applications of steel bars differ depending on the properties of the metal and structure of the buildings. Round bars with smooth surfaces can be used for general use or structures with reinforced concrete (such as office buildings), commercial and residential furniture, bridges, fences, roads, and so on. Deformed bars have rib-shaped deformations on the surface to minimize the slipping of concrete and enhance the binding between two materials. As such, deformed bars are necessary for large scale structures such as concrete bridges, dams and high-rise buildings.

Steel wires are used for a wide range of applications including tires, hoses, and zinc-plated steel wires and strands. Although the term steel wire is applied mostly to carbon steel wire, stainless steel and other alloys are also used in a wide range of applications. In the case of carbon steel wire, the tensile strength increases with increased carbon contents as the carbon provides additional strength to steel. On the other hand, ductility is degraded with an increase in carbon contents. Although this can induce substantial difficulties in bending or molding processing, thermal processing has been found to be helpful in solving such a problem.

Steel, which is the main material for steel bars and steel wire, is generally manufactured through the following four stages, and is shown in Figure 16 below. However, both products can be created by utilizing the semi-finished product manufactured in the third stage.



[Figure 16] Production of Steel Products¹²

¹² JFE 21st Century Foundation, n.d., "A Manufacturing Process for Iron and Steel", Retrieved 25 February, 2019, from http://www.jfe-21st-cf.or.jp/chapter_2/2a_1.html.

Stage 1 (iron making): Through this process, iron ore is transformed into iron with higher purity by removing impurities from the ore. Various types of the key materials such as pig iron and sponge iron for production of steel are produced.

Stage 2 (steel manufacturing): Pig iron, sponge iron and scrap iron are melted in a melting furnace. Oxygen is used to accelerate melting and improve the quality of molten steel to satisfy the standards. Then, molten steel is cast into a cooled mold to thinly solidify the steel. Numerous semi-finished products are manufactured through this process, including billet, slab, bloom, and beam.

Stage 3 (reheating): Billet undergoes thermal processing in the temperature range of approximately 1,100–1,250C° and a rolling process to achieve the desired rating and size. It is then passed through a cooling platform in order to lower the temperature of the product.

Stage 4 (processing): As the last process, steel bars and steel wire are cut into the desired length and packaged for distribution.

(2) Key Manufacturers in Thailand

According to the study, a total of 22 companies manufacture steel bars and steel wire with a wide range of specifications in Thailand, as shown in Table 13 below. However, specific steel bar manufacturing processes utilized by these companies were not identified. Information on the capacity of the production facilities and specific products of each of these companies surveyed by the Supporting Agency was omitted due to its length.

No.	Company	No.	Company
1	Millcon Steel Public Company Limited	12	Bangkok Steel Industry Public Company Limited
2	Paisan Steel Limited	13	Kasemsak K. Trading Company Limited
3	J.S. Steel Products Company Limited	14	Thai Steel Profile Public Company
4	Asia Metal Public Company Limited	15	Tata Steel (Thailand) Public Company Limited
5	Navasiam Company Limited	16	TICO Steel (Thailand) Company Limited
6	Siamchai Steel Company Limited	17	Namheng Steel Company Limited
7	Nova Steel Company Limited	18	Siam Steel Syndicate Public Company Limited
8	Siam Metal Product Company Limited	19	B.N.S. Steel Group Company Limited
9	S.Steel Center Company Limited	20	Bangsaphan Barmill Public Company Limited
10	Zubb Steel Company Limited	21	Ratchasima Steel Products Company Limited
11	The Bangkok Iron and Steel Work Company Limited	22	UMC Metal Limited

[Table 13] Steel Manufactures

There are currently six steel product-related associations under FTI as shown in Table 14 below.

No.	Association	No.	Association
1	Association of Thai Steel Industries (ATS)	4	Siam Metals Association
2	Iron and Steel Institute of Thailand	5	Thailand Structural Steel Society (TSSS)
3	Metal Tube and Cold-Forming Steel Association	6	Thai Coated and Painted Steel Association

[Table 14] Steel Associations in Thailand

(3) Evaluation of the Environmental Impact of the Product

The Supporting Agency assessed, through literature review and communication with the local manufacturers, that steel bar production in Thailand frequently utilizes only the reheating processes using semi-completed products rather than undergoing the processing of raw materials. Therefore, an evaluation of the environmental impact was carried out with a focus on the steel bar manufacturing process that does not dealt with iron and steel making. Contents of the detailed evaluation are summarized in Figure 17 below.

Environmental aspect	Phase of life cycle				
	Raw material	Production	Transportation	Use	Disposal
Resources					
- Raw materials	○*	●** 2	○ ³	X	
- Energy	○*	●	○ ²	○ ²	
- Water	○*	●	○ ²	X	
Hazardous substances		● ¹		●*	● ¹
Emission or release of pollutants					
- Air	○*	●*3,4		● ³	○ ⁴
- Water	○*	●*		X	● ^{5,6}
- Soil	○*	●*		X	● ^{5,6}
Wastes	○**	●*3		X	● ⁵
Other impacts				○	○
Fitness for use				●**	
Safety				●**	

Note the gray areas in the table are not considered in the specification

- The impact shall be considered for criteria development
- The impact is excluded for criteria development
- X No relevance
- * National laws and regulation, e.g., Factory Act B.E. 2535, Notification of the Ministry of Industry, etc.
- ** Quality or safety standards, e.g., TISI, etc.
- 1 Chemicals used in manufacturing process, residue hazardous substances
- 2 Natural resource utilization, e.g., raw material, energy and water
- 3 Effects of dust, fumes, and wastes causing air pollution
- 4 Emissions of CO₂, CO, SO_x and NO_x/Oil leakage
- 5 Effects of plastic and paper packaging
- 6 Effects of chemicals in packaging production

[Figure 17] Environmental Impacts of Steel Bars

(Manufacturing) The majority of the environmental impacts occur at the production stage. The impacts arise from the processing of raw materials including iron ore, coal, cokes, alloying elements, and chemical substances. Pollutants generated from the process may be discharged into the air, water, and soil. Therefore, appropriate pollution control tools must be selected for the given circumstances. Specific environmental impacts include:

- Global warming: Emission of greenhouse gases into the atmosphere;
- Human toxicity: Adverse effects including carcinogenicity in human beings due to discharge of toxic substances;
- Particulate matter: Adverse effects on climate, human health, and vegetation through emission of suspended particulate solid and liquid substances into the atmosphere;
- Toxicity to freshwater ecology: Adverse effects on freshwater system as the result of toxic substances discharge into air, water, and soil.

(Transportation) A high degree of energy is consumed to transport steel bar products. When fuel is burned in the transportation stage, a large quantity of atmospheric pollutants such as dust, carbon oxide, carbon dioxide, nitrogen oxide and sulfur dioxide will be emitted.

(Use) Steel bars and steel wire are used mostly in construction. Dust and hazardous substances generated from the process of cutting and welding steel materials can impart adverse effects on the health of workers and those in the vicinity of worksites.

(Disposal) Steel bars and steel wires have a long lifespan. They can be manufactured to enable recycling and reuse for other purposes after their initial use. Plastic and paper packaging associated with the products also generate waste, and can be designed for recycling or reuse.

The three sets of eco-labeling criteria analyzed for the project all considered the full life-cycle of steel products. The environmental requirements presented by the Implementing Agency were generated from a comprehensive review of existing eco-label criteria, but excluded those aspects already regulated under the domestic laws of Thailand.

(4) Manufacturer's Ability to Comply with Criteria

The Supporting Agency shared survey responses on the proposed environmental requirements. However, the levels of awareness and understanding of the manufacturers were identified as low overall, perhaps due to the absence of domestic type 1 and type 2 eco-labeling criteria. The responses provided to the survey were also incomplete, and were therefore, of limited help in developing the draft criteria.

Nonetheless, steel and iron manufacturing companies in Thailand displayed interest in the draft criteria developed. In particular, Sahaviriya Steel Industries, the largest steel company in Thailand and the leader of one of the associations of steel companies in Thailand, displayed great interest in the establishment of criteria. In July 2018, the company called a meeting of relevant companies to discuss the draft criteria, and come up with common response to the criteria. Through this channel the Supporting Agency was able to collect more input on the draft criteria.

The meeting was held on July 6, and the Focal Point and the Supporting Agency also attended. Companies stated that proposed environmental requirements could be applied not only to steel bars, but also potentially to other steel products, and that the scope of the criteria being developed could be expanded. Moreover, the participants expressed interest in being invited to future activities relating to the development of criteria. The scope of application on the products that the steel association proposed is as follows:

“Construction steels means finished and semi-finished steel products used for the construction of residential and commercial buildings and civil structures. These include concrete-reinforcing bars, hot-rolled structural steels, wire rods, and steel wires which are considered long products and other products fabricated from flat steel products such as roof and wall steel sheets and profiles.”¹³

The benchmarking of eco-label criteria for steel products used in other countries helped to companies to understand the potential to expand the scope of application in the draft criteria.

The Focal Point and FTI did not present objections to such changes. Therefore, the Implementing Agency agreed in the interim meeting to revise the draft criteria on steel bars to apply to construction steel products. Meeting participants also decided that discussions would be carried out with steel companies for the specific product groups to which the corresponding criteria would be applied.

2.1.3 Drafting the Criteria

Draft Green Cart criteria for the three product groups were prepared on the basis of the review of Green Label and eco-labeling criteria and the results of the market readiness study by using the format for Green Cart criteria identified earlier. Quality provisions for the construction steel products were prepared by making reference to those developed for cement.

¹³ The proposed definition was sent to the Supporting Agency, in the email from FTI on behalf the steel association on 9 July, 2018.

The detailed contents of the draft criteria were very similar to those identified following the literature review, and thus, omitted from the report.

Environmentally friendly products and services Thermal Insulation	Environmentally Friendly Products and Services Portland and Hydraulic Cement	Environmentally Friendly Products and Services Construction Steel Products
<p>1. Scope and Definition</p> <p>Thermal insulation includes glass wool and foam plastic insulation for use in office, residential, commercial, and industrial buildings.</p> <p>Thermal insulation refers to a material or product that acts as a medium to reduce heat transfer between places of differing temperature.</p> <p>2. Effects on the environment</p> <p>Installation of thermal insulation in buildings can help in energy conservation and minimize heat transfer. However, manufacturing of thermal insulation involves significant environmental impacts. For instance, these impacts include the utilization of natural resources and energy to transform sand into glass wool, use of CFCs as a foaming agent, and the generation of solid waste after use.</p> <p>3. Criteria</p> <p>3.1 The product is a green labeled product.</p> <p><u>Document/evidence for the examination</u> Applicant must show a Green Label certification or license to use the green label.</p> <p>3.2 If the product is not labeled green, observe the following guidelines to be the environmentally-friendly thermal insulation.</p> <p>A. Glass wool insulation</p> <p>3.2.1 General Provision</p> <p>1) The product shall be certified with This Industrial Standard TIS 496 for Glass Wool.</p> <p><u>Document/evidence for the examination</u> The applicant must submit the proof of license showing the industrial standard according to the type of product.</p> <p>2) The product shall be certified with This Industrial Standard in Table 1, or passed the product quality specification test under the same This Industrial Standard, or be certified with standards equivalent to the national standard or higher than This Industrial Standard, or be certified with</p>	<p>1. Scope and Definition</p> <p>The criteria cover Portland Cement under TIS 151, part 1, and Hydraulic Cement under TIS 2094.</p> <p>Portland cement refers to a product made from grinding clinker with calcium sulphate into a powder. Hydraulic cement refers to cement that sets and hardened after it has been mixed with water or when it is under water.</p> <p>2. Effects on the Environment</p> <p>Cement is important in the public utility and construction sector. Currently, it is mainly used as construction materials for buildings, houses, roads, bridges, and barrage. Cement is categorized according to its property and use. Proper environmental management of cement is needed in order to prevent environmental impacts.</p> <p>Therefore, in order to promote environmental management, the Green Cart criteria for Portland Cement and Hydraulic Cement are developed. The criteria focus on reducing environmental impacts and consumer safety by controlling emissions of greenhouse gases and other substances in the production process as well as limiting the use of heavy metals used in ink or pigments for packaging. Moreover, the criteria promote recyclable packaging and proper disposal of packaging.</p> <p>3. Criteria</p> <p>3.1 The product is a green labeled product.</p> <p><u>Document/evidence for the examination</u> Applicant must show a Green Label certification or license to use the green label.</p> <p>3.2 If the product is not labeled green, observe the following guidelines to be the environmentally-friendly thermal insulation.</p> <p>3.2.1 General Provision</p> <p>1) The product shall be certified with This Industrial Standard TIS 151, part 1 for Portland Cement or TIS 2094 for Hydraulic Cement.</p>	<p>1. Scope and Definition</p> <p>Construction Steel Products in this criteria refer to finished and semi-finished steel products used for the construction of residential and commercial buildings and civil structures. These include concrete-reinforcing steel bars, hot-rolled structural steels, wire rods, and steel wires, which are reinforcing products, and other products fabricated from flat steel products such as steel sheets and profiles to be utilized as materials for roof or wall.</p> <p>The scope of this criteria can be further expanded when the product that the applicant wishes to get certified satisfies all the requirements listed in this criteria.</p> <p>2. Effects on the Environment</p> <p>Considering the immense usage of steel products in nowadays construction, it is important to consider the impact of steel during the entire life cycle of products. The use of by-products, recycling and energy management are important basic steps. This is due to the amount of materials and energy involved in the production stage, and also the long lifespan of the product when built into the construction.</p> <p>This criteria strives to ensure the maximum utilization of available resources, including raw materials and energy input to the production processes, while also protecting environment and human health from harmful substances that may generate from the products during and after the usage stage.</p> <p>3. Criteria</p> <p>3.1 The product should observe the following guidelines to be the environmentally-friendly construction steel product.</p> <p>3.1.1 General Provision</p> <p>1) The product shall be certified with relevant This Industrial Standard or equivalent national or international quality standards.</p> <p><u>Document/evidence for the examination</u> The applicant shall comply to product category and submit the certificate accordingly. Examples of applicable mandatory TIS are listed in the Appendix A.</p>
Thermal Insulation	Cement	Construction Steel Products

[Figure 18] Draft Criteria

2.1.4 Review by Stakeholders

The draft criteria were shared with the Focal Point for the first time during the interim meeting held in June 2018. The Focal Point requested information on the rationale for the establishment of certain provisions of Korea Eco-mark, as well as background information on setting the specific values in the draft criteria. Accordingly, the Implementing Agency summarized the corresponding contents by seeking the advice of KEITI, and shared them with the Focal Point.

Focal Point also agreed on the need to hold separate seminar-type meetings to collect the opinions of the manufacturers regarding the draft criteria. It was further agreed that Focal Point and FTI will jointly hold such outreach meetings.

Opinions of the local manufacturers on the three product groups were gathered starting in mid-September, 2018. The Implementing Agency attended the focus group meeting for each product group held by FTI on October 2 and 3. During the meetings, the local manufacturers and the industry associations provided a diverse range of opinions on the draft criteria. Key issues discussed for each product group are as follows.

1) Thermal Insulation (October 2)

Five representatives from three companies participated in the meeting to establish the criteria for thermal insulation. A list of participants in the meeting is given in Table 15 below.

No.	Name	Organization
1	Mr. Jiradech Chuakul	Aeroflex Co.,Ltd.
2	Ms. Bunrat Juwatee	Aeroflex Co.,Ltd.
3	Ms. Priyaphat Sudsaard	P.U.Foam Insulation and Trading Co.,Ltd.
4	Ms. Hathairat Thambaramee	Siam Fiberglass Co.,Ltd.
5	Mr. Veerayuth Riabtavee	Siam Fiberglass Co.,Ltd.

[Table 15] Participants List (Thermal Insulation)

There were no particular objections to the requirements of the Green Label criteria for thermal insulation. As such, the discussion focused on the new requirements proposed on the basis of Korea Eco-mark. First, the manufacturers agreed to include the “contents of thermal insulation materials to be used for molded products” in the criteria, as these conditions can be achieved in the production process.

The stakeholders also agreed that there was a need to confirm whether the “thermal insulation effect” had already been stipulated in the existing Thai Industrial Standards. The Focal Point took on the responsibilities to search for the relevant data to answer this question.

Regarding various Korean Industrial Standards used in the Korea Eco-mark, it was agreed that the local manufacturers will search for the presence of corresponding ISO standards or other standards in and out of the country. The methodologies and resulting values will differ for the “noise absorption performances” depending on which international standards correspond to the test methods used in KS F 2805 (method of measuring noise absorption rate in reverberation room) presented in the Korea Eco-mark. The Focal Point asked whether there were such cases in the existing Green Label criteria.

Regarding the low number of participants in comparison to other product groups, manufacturers pointed to the absence of an Industry Association that supports communication between companies, unlike cement or steel products. In addition, some of the products being sold in the Thai market as “thermal insulation” are those manufactured with aluminum, which cannot satisfy the quality standards of thermal insulation.

The Focal Point and FTI also requested submission of additional opinions in writing and solicited the opinions of other companies that were absent in the meeting through official letters.



[Figure 19] Focus Group Meeting for Thermal Insulations

2) Cement (October 2)

Eight representatives of relevant companies and associations participated in the meeting to establish criteria for cement. A list of specific personnel who participated in the meeting is given in Table 16 below. Among the participants, the Thailand Cement Manufacturers Association is an organization comprised of seven local cement manufacturers; the Association was able to speak for these companies with accurate awareness of their technical levels.

No.	Name	Organization
1	Mr. Somwung Sintumongkolchai	SCG Cement Co.,Ltd.
2	Ms. Sirin Atsawapattananon	SCG Cement Co.,Ltd.
3	Mr. Pornwit Anansup	SCG Cement Co.,Ltd.
4	Mr. Yutthapon Jaidee	Thai Cement Manufacturers Association
5	Dr. Wonchalem Chalodhorn	Thai Cement Manufacturers Association
6	Ms. Phattharawan Sukkantharak	Thai Cement Manufacturers Association
7	Ms. Nipapan Chaiyaphan	Thai Cement Manufacturers Association
8	Mr. Anond Janyam	Thai Cement Manufacturers Association

[Table 16] Participants List (Cement)

Reviewing the requirements from the Green Label, local manufacturers noted that it was difficult to satisfy the regulations of CO₂ emissions not exceeding 800kg/t in the case of manufacturing Portland cement. The Focal Point pointed out that the corresponding value has been required under the Green Label since 2015, and requested that the companies submit data to prove that the requirements were indeed not possible to achieve.

The Thai Industrial Standard, which the Thai government requires when placing orders, stipulates

that material other than pure cement (such as fly ash or blast furnace slag) must not exceed 5% of the total weight. Accordingly, this regulation does not allow for the addition of contents that are required for fly-ash or blast furnace slag cement as requested in the Korea Eco-mark (which allows for more than 5% of non-pure cement materials). The Focal Point determined that it would not be possible to resolve this issue in the near-term, since it requires cooperation of the relevant government ministries to change the Thai Industrial Standard.

Therefore, in the case of criteria for cement, the Focal Point decided to proceed by utilizing only the Green Label criteria without integrating all of the criteria stipulated under the Korea Eco-mark.

At the meeting, participants were also requested to submit additional opinions on the criteria for cement in writing to inform the revision of the draft criteria.



[Figure 20] Focus Group Meeting for Cement

3) Construction Steel Products (October 2)

Twelve representatives from seven relevant companies and one association participated in the meeting for establishment of criteria for construction steel products. A list of specific personnel who participated in the meeting is given in Table 17 below.

No.	Name	Organizaiton
1	Mr. Narunart Attasumpun	COTCO-SV Eastern Steel Pipe, Ltd.
2	Mr. Noppon Jiratthanakul	Sahaviriya Steel Industries, PLC.
3	Mr. Noppapadon Uthaisri	Sahaviriya Steel Industries, PLC.
4	Ms. Cholanda Boonchoo	SCG Cement Co.,Ltd.
5	Ms. Pondpimon Thampairot	SCG Cement Co.,Ltd.
6	Mrs. Piyama Wongpaisarn	Siam Construction Steel Co.,Ltd.

7	Mr. Napat Tungtrakulchai	Siam Construction Steel Co.,Ltd.
8	Mr. Nachaphat Sudkanuang	Siam Yamato Steel Co.,Ltd.
9	Mr. Piboonsak Arthabowornpisan	Thai Wire Products PLC.
10	Mr. Surapong Tanapongpitaya	Thailand Iron and Steel Industry Club
11	Mr. Boonlert Klorvutisatian	BSI
12	Mr. Viphaya Hankitipongpaisarn	BSI

[Table 17] Participants List (Construction Steel Bar)

Since there is no existing Green Label for this category, the local manufacturers carried out discussions on the definition of products and the scope of application of draft criteria identified through a comparison of eco-labeling criteria of other countries for construction steel products. However, based on the situations in Thailand, they asserted that power consumption, carbon dioxide emissions, and energy needs differ depending on the manufacturing processes of the company. If the same values as the other countries were set as the requirement, this would serve as a deterrent for certain companies.

To address this issue, participants highlighted the criteria of New Zealand, which grants certificates for products including steel manufacturing processes with consideration of the detailed processes and technical levels of steel manufacturers of the country. However, in Thailand, many of the companies manufacture final products by using only semi-finished products (billet and ingot). Moreover, the assessment of the detailed information is highly challenging due to the difficulties in acquiring data on semi-finished products, since some companies procure these semi-finished products from more than ten sources in and out of the country.

In conclusion, the Thai manufacturers proposed that the melting process should not be considered. The Focal Point agreed to this proposal. The manufacturers also agreed to apply the criteria with a focus on the products that use the same semi-finished products, and the scope of the criteria was adjusted accordingly.

Some of the requirements considered inappropriate for the local situations of Thailand were removed, mainly the requirements on recycled contents and hazardous substances in raw materials. The participants agreed to supplement the draft criteria on the basis of the discussed contents. Additional opinions on the construction steel products were also collected through written comments until October 19, 2018.



[Figure 21] Focus Group Meeting for Construction Steel Products

The revised criteria derived from local stakeholders are summarized in the Table 18 below. The item included only the Focal Point's acceptance of the revisions after reviewing the request of the stakeholders.

Category	Detailed Contents	Results
Thermal Insulation		
Korea Eco-mark	(Content of Thermal Insulation Materials in Molded Product) Requirement added through discourse with local manufacturers.	Add Requirement
	(Flame Retardant) HBCD added as the only flame retardants not included in Green Label criteria compared with that of Korea Eco-mark.	Add Requirement
	(Thermal Insulating Effect) Addition not needed as thermal insulating effect is already regulated in the relevant Thai Industrial Standards.	Reserve
	(Sound Absorption Performance) ASTM testing methods available in Thailand added per request by the local manufacturers; these methods are the same as the Korean Industrial Standards used in Korea Eco-mark.	Add Testing Methods
Cement		
Korea Eco-mark	(Waste Material) Thai Industrial Standards (materials that are not pure cement compositions should not exceed 5%) contradict with the Korean Eco-mark (fly-ash and furnace slag should be used more than 5% and 40% respectively).	Reserve
Construction Steel Products		
Scope of Application	(Target Product) Various hot-rolled steel products for construction, including coils, strips, plates and sheets have been discussed, but only the round and deformed steel bars are included.	Modification or Exclusion

	(Production Process) At this stage, only the life-cycle from the processing of semi-finished products is considered. This is due to the general practices of local manufacturers, who purchase semi-finished products from a large number of factories and produce final products through simple processing. There were fundamental limitations in collecting environmental data of purchased semi-finished products.	
	(Environmental Criteria) Environmental criteria on hazardous substances and waste contents of the raw materials were excluded due to the modification on the production process considered in the criteria.	
Energy Consumption	(Energy Consumption) A new figure for specific energy consumption was included, which was deemed to be necessary to improve the environmental performance of production, in using the reheating furnace, rolling mill and other utilities in manufacturing steel bars by comparing data of various companies.	Propose New Quantitative Target

[Table 18] Revision of the Draft Criteria based on manufacturer input

In the case of construction steel products, manufacturers and associations had substantive discussions with the Focal Point on the steel products (such as steel sheets and steel plates) to be included in the criteria in addition to steel bars. They agreed to include only steel bars under the criteria at this stage, and modify the scope through further discussion and information collection and review in the future. For this reason, the name and definition of the criteria remain as construction steel products and the scope of the criteria is specified through an easily amendable annex.

2.1.5 Revision of the Criteria

The Implementing Agency presented the final proposal for Green Cart criteria, and reflected the opinions of the stakeholders and official opinions of the Focal Point on the draft (see Annex 3).

Although the Implementing Agency planned to directly provide support for the criteria deliberation process by participating in the Technical Sub-committee meetings as prescribed in the Action Plan, this did not occur due to a delay in the establishment of the Technical Committee. In order to support the process, the Implementing Agency will translate the final draft criteria into Thai.

The final draft criteria were shared with stakeholders in the second awareness-raising workshop, and feedback was gathered. The manufacturers were particularly interested in the detailed products that could further be included in the criteria for construction steel products. PCD emphasized the intent of continued cooperation in the future, and stated that all products that could reach stakeholder consensus could be included in the Green Cart criteria.

2.2 Recommendation for GPP Incentive Mechanisms

As Korea and other countries have found, providing incentive mechanisms to procurers and companies that voluntarily carry out GPP can be effective in promoting GPP. While there are some existing incentive programs in Thailand, including the “Best Procurement Award” given by the respective Minister, and government subsidies and tax benefits for electric vehicles, additional incentive programs may advance GPP.

As one of the consulting items, the Implementing Agency researched and recommended additional potential incentive measures to promote GPP in Thailand by benchmarking the supporting policies of Korea and other countries, including Japan, China and Malaysia. The schedule for these measures is displayed in Table 19 below.

The Implementing Agency presented the research and highlighted recommendations on incentives for GPP in a Recommendation Report. This report can be used to support presentations on establishing incentives for GPP to line ministries in the future. As such, the report includes information on the background, operating procedures, and performance of each GPP incentive mechanism. The recommended incentive mechanisms are integrated into this final report (see 2.2.5), and will also be made available as a separate document through the online platform.

Implementation Steps	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1. Benchmark GPP Incentives										
2. Analyze Thailand’s Incentive										
3. Draft Report										
4. Review by Stakeholders										
5. Revise Report										

[Table 19] Schedule for Developing Recommendations on GPP Incentive Mechanisms

2.2.1 Benchmarking Incentives of Korea and Other Countries

This consulting item aims to examine the incentive mechanisms designed to promote the implementation of GPP in Korea and certain countries in the Asian region, including Japan, China and Malaysia, and also to propose measures to accelerate adoption of GPP in Thailand, which the Thai government may wish to take into consideration.

International practices show us that many countries are implementing GPP as a mandatory or voluntary policy and are developing and operating various methods to encourage ‘green’ procurement activities

in the public sector and to enhance the production capacities of suppliers. In general, this encouragement involves ‘incentives’ for GPP implementation.

However, there is no clear and agreed definition of what comprises an incentive for GPP, either internationally or regionally. According to the definition from the English dictionary, an incentive means “something to encourage a person to do something.”¹⁴ In the case of public procurement, the decision to purchase or order a product or service is made, in essence, systemically within an organization. Consequently, this type of encouragement needs to be appropriate for a part of, or a whole organization, rather than for an individual.

In this report, incentives for GPP encompass all the mechanisms that are in place to encourage procurement officers, procurement agencies, producers and suppliers to consume and produce environmentally-friendly products and services. These mechanisms are limited to laws, policies and initiatives that are established by governments with a clear legal basis. Where the incentives are undertaken by the private sector, the Implementing Agency has tried to ensure that such measures have been provided consistently.

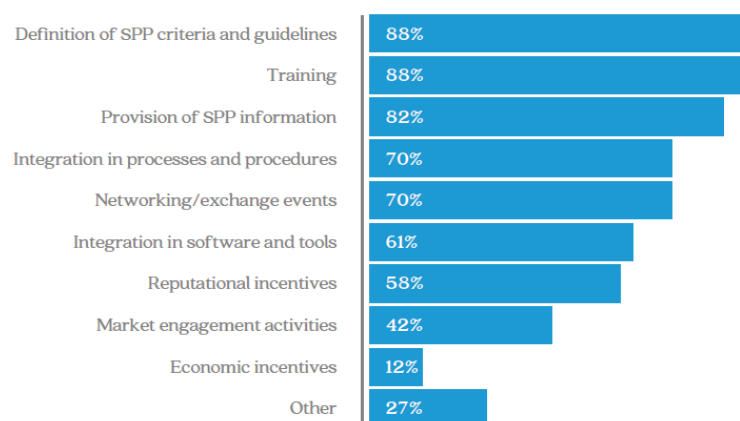
Given the difficulty of obtaining relevant data and gathering expert opinion, the main approach used is the benchmarking of the GPP policies and schemes of Korea. The official data and documents published by the governments of Japan, China, and Malaysia were used to the extent possible.

As the definition of the incentive mechanisms for GPP is still unclear, their boundaries and methods of classification are also ambiguous. Depending on their relationship with GPP, incentives can be categorized as either direct or indirect. Alternatively, depending on the target, incentives can be divided between measures for consumers (public sector) and measures for producers (companies).

The UN Environment’s 2017 Global Review of Sustainable Public Procurement¹⁵ provides valuable background information. According to this report, national governments are taking various measures to support the implementation of GPP, as shown in the chart below.

¹⁴ Cambridge Dictionary, n.d., “incentive”, Retrieved from 25 February, 2019, from <https://dictionary.cambridge.org/dictionary/english/incentive>.

¹⁵ UNEP, 2017a.



[Figure 22] Methods to support GPP implementation by the national governments¹⁶

It can be seen that the term “incentive” was used in the categories of “economic incentives” and “reputational incentives”. Also, as will be emphasized through several cases in the following sections, a series of actions (labelled as “integration in processes and procedures” in the chart above) can also facilitate or force (expressed as a disincentive) the implementation of GPP by procurement officers and agencies.

This report seeks to categorize the incentive mechanisms for GPP into three categories: economic¹⁷, regulatory, and reputational. Typical incentive mechanisms for each category are shown in the table below.

Classification	Representative Incentive Mechanisms
Economic	Tax break (reduction or exemption), subsidy, bonus
Regulatory	Mandatory purchase, corrective action, penalty
Reputational	Awards, performance evaluation, marketing support ¹⁸

[Table 20] Representative incentive mechanisms by classification

It should be noted that this classification system is not the only one available; the same or similar incentives can be classified in different ways depending on the institutional background of countries applying the measures. These variations could be the subject of future studies.

¹⁶ Ibid, p.18.

¹⁷ In some cases, the term ‘fiscal incentive’ is used instead of ‘economic incentive.’ This report did not differentiate between these two terms.

¹⁸ As will be further discussed in the incentive mechanisms of Korea and China, the government may support green products to be purchased ahead of other products through a regulation on procurement procedures. Some confusion may arise from regulatory incentives within the context of changing procedures or regulations; however, it is not a mandatory measure to obligate public institutions to purchase certain products. Thus, it is classified as reputational incentive since it is a measure related to promote the market expansion by ‘green’ manufacturers.

This study was bound by a number of limitations:

- Firstly, as mentioned above, interpreting the scope of incentive mechanisms for GPP can be somewhat subjective because of the lack of a clear definition. For the same reason, the list of incentive mechanisms described in this report cannot be assumed to be exhaustive.
- Secondly, it is almost impossible to separate out the effects of different incentive mechanisms in order to provide detailed assessments of their impact. Research aimed at measuring the overall environmental and economic impact of GPP itself is in the early stages, and measuring the influence of individual incentive mechanisms needs development of more effective methodologies. Most of the cases described in this report that include quantitative measurement are from those with indirect relationship with GPP, such as the purchase of eco-friendly vehicles or certification of green buildings.
- Lastly, as with the previous limitation, the negative impact of each incentive or potential conflicts or trade-offs with other policies or initiatives have not been systematically analyzed. This study used the data that is available from the various governments, but it proved difficult to acquire information and data from other sources to enable an objective analysis of each policy.

In light of these limitations, it must be emphasized that additional studies and international cooperation are required for the purpose of developing more complete lists of incentives, carrying out a systematic analysis of both the positive and negative impacts of each mechanism, and supporting governments in adopting these mechanisms.

1) Korea

The current model of GPP in Korea was introduced in 2005 by enforcing the mandatory purchase of environmentally-friendly products and services by public organizations¹⁹ – i.e. national and local governments and public institutions.

The Ministry of Environment conducts various activities in cooperation with the Korea Environmental Industry & Technology Institute (KEITI) and the Public Procurement Service (PPS) to ensure the successful implementation of GPP. In particular, these agencies have developed Green Product Purchase Guidelines and they provide information through the Green Product Information System (GPIS).

¹⁹ Various terms are used to refer to governmental ministries, agencies and institutes, such as Public Sector, State Agencies, Public Organizations and so on. For clarity reasons, only the terms 'Public Organizations' are used, which include central and local governments and (national and local) public institutions. 'Public Sector' is used when the emphasis is made as an opposite concept to the private sector.

Besides, certain laws and regulations stipulate that GPP should be carried out mandatorily and that certain amount of environmentally-friendly products must be purchased by the public organizations. Economic and reputational incentives are also defined in these laws and regulations. Thus, before introducing the various GPP incentive mechanisms used in Korea, the legal basis for providing these incentives will be presented in detail.

This report does not attempt to explain the whole GPP implementation system of Korea. For more details, please refer to the following documents.

Box 1. Reference for GPP in Korea

1. Korea Environmental Industry and Technology Institute, 2014, "Policy Handbook for Sustainable Consumption and Production of Korea".
2. UNEP, 2017, "Comparative Analysis of Green Public Procurement and Ecolabelling Programmes in China, Japan, Thailand and the Republic of Korea; Lessons Learned and Common Success Factors."

(1) Legal Framework for GPP in Korea

■ Timelines

GPP in Korea was introduced in tandem with the Type 1 Eco-label, the Korea Eco Mark, under the **Act on Development and Support of Environmental Technology** of 1994. Public organizations were advised to give preference to products that are less polluting or are more resource efficient than other products.

GPP took a more concrete form when the government introduced the **Act on Promotion of Purchase of Green Products** (hereinafter the "Green Purchasing Act") in 2005. Under the Act, public organizations are now obligated to purchase green products that include the Korea Eco Mark and Good Recycled (GR) Mark certified products. The Ministry of Environment has also been mandated to establish Basic Plans for promoting the purchase of green products for five-year periods.

The adoption of this Act of 2005 has been instrumental in stimulating public demand for products and services at the early stage of green market development. The total public expenditure on green purchases has increased more than 11-fold, from 254 billion KRW (around 254 million USD) in 2004, to 2.8 trillion KRW (around 2.8 billion USD) in 2016. In addition, the number of products certified with the Korea Eco Mark increased dramatically, from 1,540 to 65,680 over the same period.²⁰

²⁰ Green Product Information System, n.d., "Purchasing Records of Green Product", in *Korean*, Retrieved 25 February, 2019, from <http://www.greenproduct.go.kr/web/contents/deskContents.do?gubn=purObtRslt>.

Therefore, it is considered that the enactment of the Green Purchasing Act and the establishment of its detailed regulations have played an essential role in transforming Korea's GPP into an efficient and effective policy.²¹

■ Detailed Provisions

To analyze Korea's GPP scheme, some key provisions of the Green Purchasing Act are summarized below:²²

No.	Article	Contents
2-2	Scope of Application	The scope of green products governed by this Act shall be as follows: 1. Eco Mark Certified Products 2. GR Mark Certified Products
6	Public Institutions' Obligation to Purchase Green Products	When the heads of public institutions intend to purchase any product, they shall purchase a green product [unless the circumstances are not right, then they do not need to do so].
8	Implementation Plans for Purchasing Green Products	1. The heads of public institutions shall formulate and publicly announce implementation plans for purchasing green products for the relevant fiscal year within two months after each fiscal year begins. 2. [When] the heads of public institutions have formulated and publicly announced implementation plans, they shall submit such plans to the Minister of Environment without delay.
9	Purchase Records of Green Products	1. The heads of public institutions shall aggregate purchase records of green products pursuant to implementation plans and submit such purchase records to the Minister of Environment within three months after each fiscal year ends. (...) 4. The Minister of Environment shall aggregate the records of green products purchased by public institutions, and publicly announce such purchase records.
10	Request for Cooperation to Encourage Purchase of Green Products	If deemed necessary to encourage the purchase of green products, the Minister of Environment may request heads of the relevant public institutions to take necessary measures concerning the following matters. 1. Reporting of applicable provisions for the use of green products in construction specifications, etc. 2. Reporting of purchase records of green products in the item of performance assessment of central administrative agencies or local governments; 3. Other matters necessary for encouraging the purchase of green products.

²¹ KEITI, 2018, "Korea's Experience on Implementing GPP in Construction Sector", Awareness-raising Workshop and Networking Session for GPP of Construction Sector in Thailand, workshop materials.

²² The full text of this Act can be found in: https://elaw.klri.re.kr/kor_service/lawView.do?hseq=40308&lang=ENG.

11	Encouragement, etc. of Purchase of Green Products by Local Governments	1. If deemed necessary for encouraging the purchase of green products, each level of local government may prescribe [defined] matters by municipal ordinances and implement such municipal ordinances.
12	Roles of Administrator of Public Procurement Service	(...) 2. The Minister of Environment and the heads of the relevant central administrative agencies may request the Administrator of the Public Procurement Service to take measures necessary for encouraging the purchase of green products, such as expanding a foundation for the electronic procurement of green products, designating green products as exemplary procurement goods, etc.
15	Support, etc. for Encouragement of Purchase of Green Products	1. The Government may lend support to business operators and relevant organizations which contribute to encouraging the purchase of green products. 2. The Government may grant rewards to public institutions, business operators, relevant organizations, etc. which have excellent purchase records of green products or have contributed to encouraging the purchase of green products, as prescribed by Presidential Decree.
16	Preferential Subsidization, etc.	The Minister of Environment may grant or support environment-related subsidies under the Water Supply and Waterworks Installation Act, the Wastes Control Act, the Sewerage Act [and other relevant acts] to local governments which have excellent purchase records for green products, in preference to other local governments.

[Table 21] Provision from the *Green Purchasing Act* (Abridged)

Since the Green Purchasing Act provides direct and systematic regulation of green procurement by the public sector in Korea, the contents of its specific provisions are examined further in this section. The Decree and Enforcement Regulations have also been established to provide further guidance on each clause of the Act; where applicable, their provisions are included in the description as well.

Firstly, under **Article 6** of the Act, public organizations are obliged to purchase green products if there are green alternatives available in the market. This obligation does not, however, mean that the public sector must purchase green products unconditionally. There are some exceptions prescribed in the law, such as in cases where it is impossible to supply a green product reliably or when purchasing is difficult due to reduced quality or inability to meet urgent demands.

The “public organizations” referred to here are in accordance with **Article 2**, which includes national and local government agencies and public institutions (designated in accordance with the provisions of the **Act on the Operation of Public Institutions**).

According to the Green Product Purchasing Guidelines of 2018 published by the Ministry of Environment, 909 institutions are subject to mandatory purchasing. If affiliated institutions, such as public schools, are included, this number increases to about 30,000.

Classification	No.	Classification	No.
Central Government	51	Local Government	245
Market-type Public Corporations	14	Local Education Office	193
Quasi-market-type Public Corporations	21	Local Public Enterprises and Public Hospitals	74
Fund-management-type Quasi-governmental Institutions	16	Local Government-invested Research Institutes and Foundations	15
Commissioned-service-type Quasi-governmental Institutions	72	Other institutions	208
Total			909

[Table 22] Mandatory Purchase Organizations, 2018

In accordance with **Articles 8 and 9**, these agencies are required to report to the Minister of Environment annually about purchasing plans and the results of purchasing the Eco Mark and GR Mark certified products as stipulated in **Article 2-2**. Organizations are responsible for tracking, analyzing and evaluating their GPP performance each year and reflecting the results in their next GPP plan. This requirement became the basis for the effective implementation of GPP in Korea, even though there is no uniform numerical target set by national government for the various levels of organizations.

Also, **Article 11** stipulates that local governments should enact ordinances for green procurement; this resulted in the proliferation of GPP policy nationwide as local governments have independent authority in establishing related regulations. The Ministry of Environment developed and distributed the Green Procurement Standard Ordinance in 2006. By 2018, 241 out of 245 local governments had enacted relevant ordinances accordingly.

In **Articles 10, 12 and 13**, foundations have been laid to provide support by the government, including the Ministry of Environment and the Public Procurement Service, to facilitate the implementation of GPP. The related contents are classified as incentive mechanisms for the implementation of GPP and will be described in detail in the following sections.

Article 16 on financial subsidies is a GPP incentive mechanism stipulated directly in the Green Purchasing Act. In the process of distributing environment-related subsidies to local governments, their GPP records have to be taken into account. However, this provision is currently not being implemented and do not serve as an effective incentive for local governments, so this is not covered further in this

report.

■ Relevant Laws and Regulations

For sustainable development, ministries are operating various laws and regulations according to their respective jurisdictions. Some of these laws and regulations are designed to be synergistic with GPP in terms of encouraging green procurement by public organizations, and the associated incentive mechanisms are considered to be effective in promoting GPP at the same time. Therefore, the measures taken to encourage the implementation of GPP, although not specified in the Green Purchasing Act itself, are also covered in this report.

Examples of independent policies that encourage the procurement of “green products” as defined in the Green Purchasing Act, include the **Act on the Promotion of Recycling of Building Waste** and the **Act for Promotion of Green Building**. In line with these acts, construction projects commissioned by public organizations must purchase minimum levels of environmentally-friendly construction materials or satisfy related criteria. Such purchasing activities can be reported as GPP records.

In the case of the Green Building Certification Program, incentives such as tax breaks and the reduction of regulations on the floor area ratio can be obtained by receiving the certification. The proportion of green products that are purchased to meet certification criteria is not negligible, and so it is analyzed and reported on as an incentive for GPP.

The Ministry of Economy and Finance and the Ministry of Interior and Security evaluate the performance of public institutions, local governments and local public enterprises. In this process, the annual GPP records are assessed and linked with the provision of economic bonuses or corrective actions. The role of these evaluations as an incentive mechanism appears to be highly effective.

Lastly, although some products are not targeted for inclusion in procurement plans and records by the Green Purchasing Act, a series of laws and policies are included in this report on the basis that purchasing activities of these products are equivalent to GPP. A representative example is the **Purchasing Guidelines for Promoting Public Procurement of Green Products**, which was enacted to strengthen the role of the Public Procurement Service in this field. Another example is the mandatory procurement of low emission and environmentally-friendly vehicles, which was introduced to reduce air pollution and to support the green market. Both these regulations deal with product groups that cannot be certified with the Eco Mark or GR Mark criteria.

All the relevant laws and regulations have been analyzed, including their subordinating decrees, enforcement regulations and notifications, although these may not be specifically mentioned.

(2) Incentive Mechanisms for GPP of Korea

This section explains in detail the major incentive mechanisms of Korea.

A. Preferential Treatment for Procurement

- ◎ **Legal Basis:** Framework Act on Low Carbon, Green Growth, etc.
- ◎ **Category:** Regulatory, Reputational Incentive
- ◎ **Operating Agency:** Public Procurement Service (PPS)
- ◎ **Target:** Manufacturers and Suppliers of Environmentally-Friendly Products

■ The Role of the Public Procurement Service

Procurement in Korea can be divided into independent procurement made by each demand agency and central procurement through the Public Procurement Service (PPS). Of the total procurement of around 123 trillion KRW per annum, 31% of procurement is made through PPS. This volume rises to 72% when contracts that are made through the Korea Online E-Procurement System operated by PPS are added. With the benefits from mass procurement and the potential expansion of positive competitions, PPS plays a pivotal role. Besides, PPS is also capable of supporting GPP by expanding the markets for eco-friendly products through a series of measures that are introduced in this section.

Article 12 of the Green Purchasing Act stipulates that the Minister of Environment or other related ministers can request the Administrator of PPS to take appropriate measures, such as designating green products as preferred procurement items. PPS is indeed taking various measures to give preference to environmentally-friendly products in the procurement process, and thereby increase the number of eco-friendly products that can be purchased in the market.

The incentive mechanisms provided to companies to supply more eco-friendly products to the market in accordance with the relevant regulations of the PPS are explained below.

■ Relaxation of procurement market entry requirements

Companies producing green products are entitled to preferential treatment when being reviewed for their ability to fulfill contracts during the bidding procedures. When “qualification examination” is applied for a bidder selection, the bidder with the lowest price will be selected from those bidders who have passed the examination. This examination includes the bidder’s supply performance, business condition, technical level, and credit rating. Additional points are given to companies producing eco-friendly products under the credit rating category. The preferential provision granted to products certified

with Eco Mark was abolished in January 2017 in this examination, and currently additional points are given only to recycled products with the GR Mark certification.

Preferential treatment can also be obtained as part of the Multiple Award Schedule (MAS) process. The MAS is a contract system where two or more suppliers are made available to demand agencies to select products that are identical or similar in quality, performance and efficiency. When a bidding candidate has a green technology certificate, it can be exempted from certain qualification examination. Nevertheless, It should be noted that the product manufactured using green technology may not be a product certified with Eco Mark or GR Mark.

In order to encourage positive price and quality competition, when the value of request from a demand agency exceeds a certain threshold, a two-step competition among suppliers is required. When the “comprehensive evaluation” is in progress during this procedure, products certified with the Eco Mark or GR Mark may be awarded a full score on the category of “technical certification”.

Another incentive offered by PPS associated with mitigation of procurement procedures is a provision related to Excellent Procurement Goods. This is a scheme that supplies demand agencies with goods that demonstrate exceptional performance, technology or quality through the Korea Online E-Procurement System. These goods may be contracted preferentially via the optional contract or unit price contract methods so as to spur technological development of the goods to be procured. Preference will be given to suppliers that are small- and medium-sized enterprises and venture companies.

The examination procedure comprises two phases, and products with a certification of green technology are exempted from the first phase. The second phase requires at least two-thirds of the members of the PPS Screening Committee agree that the products concerned meet technical and quality requirements. Eco Mark and GR Mark certification will be considered in quality examination of the second phase and will earn extra points.

As can be seen, the procurement procedures overseen by PPS help companies which produce green products by mitigating entry barriers to public markets. The wider objective is to engage with them proactively to foster their technical development and contribute to development of the green market.

■ Minimum Green Standard

In line with Article 20 of the **Enforcement Decree of the Framework Act on Low Carbon, Green Growth**, the Administrator of PPS may designate items as necessary for facilitating public organizations' purchase of green products and prepare guidelines of procurement for such purchases. However, the

range of green products defined in the **Purchasing Guidelines for Promoting Public Procurement of Green Products**, which is published by PPS under the Framework Act, is different from the range specified through the Green Purchasing Act. This difference makes the regulation of PPS not entirely consistent with the GPP being operated in Korea.

Thus, although there is no direct connection with GPP as stipulated under the Green Purchasing Act, PPS is promoting the purchase of green products by public organizations by putting in independent measures required by the Framework Act. One of these measures is the minimum green standard. It is a system that reflects environmental factors in the product's specification and only allows those that satisfy this standard to enter the procurement market.

Currently, the minimum green standard is established for 120 product groups, and the minimum requirements (compulsory) are defined separately from the recommended requirements. Of these, 75 products are closely related to energy efficiency, such as computers, and standards often regulate the energy aspects of the product.

When PPS issues a unit price contract, including the Multiple Award Schedule, the minimum green standard for the product is reflected in the bidding notice, and any product that does not satisfy the standard will not be listed.²³ Therefore, the minimum green standard is a measure to ensure that products procured by the government do not have adverse environmental impacts, and it forces companies to produce products that meet the standard.

Products that meet the standards can be supplied to public organizations through the Online Shopping Mall of the Korea Online E-procurement System. Moreover, PPS is strengthening the standards over time, and is also differentiating the timing of application of their sub-criteria, such as the recommended requirements, by the size of supplier companies.

The purchasing value of products that meet the minimum green standard increased more than eight-fold, from 364.8 billion KRW when the standard was set in 2010, to 3,537.6 billion KRW in 2016.²⁴

²³ GPP Integrated Information Network, n.d., "Minimum Green Standard Products", in *Korean*, Retrieved 25 February, 2019, from http://green.pps.go.kr:8810/jsp/confirm/info_grn.grn.

²⁴ PPS, 2018, "Support for Green Growth through Public Procurement", in *Korean*, 2018 Green Procurement Promotion Workshop and Training for Public Organizations, seminar materials.

B. Performance Evaluation of Public Organizations

- ◎ **Legal Basis:** Act on the Management of Public Institutions, Framework Act on the Evaluation of Government Affairs, Local Public Enterprises Act
- ◎ **Type:** Economic, Regulatory, Reputational Incentive
- ◎ **Operating Agency:** Ministry of Economy and Finance, Ministry of Interior and Security
- ◎ **Target:** Public institutions, local governments, local public enterprises

With Article 10 of the Green Purchasing Act, a legal basis has been laid out so that the mandatory procurement of green products can be reflected in the performance evaluation of national government agencies²⁵ and local governments.

In this section, we first examine how GPP is considered in the performance evaluation of public institutions conducted by the Ministry of Economy and Finance and of local governments and local public enterprises by the Ministry of Interior and Security. We also explain a series of follow-up measures based on the evaluation results that can be seen as incentives.

■ Performance Evaluation of Public Institutions

In accordance with Article 48 of the **Act on the Management of Public Institutions**, the Ministry of Economy and Finance annually evaluates the performance of public enterprises and quasi-government agencies, which together comprise “Public Institutions”.

To establish criteria for evaluation, the Ministry of Economy and Finance is responsible for preparing and publishing the **Public Institutions Performance Evaluation Manual** before the beginning of each financial year. The latest edition of the **2018 Public Institutions Performance Evaluation Manual** covers 35 public enterprises and 88 quasi-government agencies.

The manual is divided into "performance management" indicators that can be applied collectively to all public institutions and "major task" indicators that are separately established according to the specific tasks of each organization. Among these indicators, GPP belongs to the “performance management” category and is selected as an index for realizing “social value.” Specifically, it is defined as the evaluation index for "safety and environment."

²⁵ Although specified in the Green Purchasing Act, national government agencies are currently not subjected to the evaluation.

Category	Detailed Contents
Definition of Criteria	Evaluate the performance of the institution for the safe working environment and environmental sustainability.
Target (Score)	Public enterprises and quasi-government agencies: 1 point.
Evaluation Criteria	<p>① The following items for safety and environment are set by the institution within each weighting range (Total: 1 point)</p> <ul style="list-style-type: none"> Greenhouse gas reduction and energy-saving achievement (0.2~0.8), GPP record (0.2~0.8)

[Table 23] GPP related criteria in the performance evaluation of 2018

The specific weight is set by the public institution autonomously, and it can be between 0.2 and 0.8. This evaluation criteria for GPP and its assigned weight have very recently changed in 2018. The manual for the previous five years (2013-2017) limited the weighting range from between 0.2 and 0.4 under the "government recommended policies."

The detailed evaluation of items under the "government recommended policies" up to 2017, as shown in the table below, was extensive, and so green products were in effect competing with many other elements. This year's modification not only concerns a rise in the upper limit of the weight for GPP, but it also focuses the evaluation on either green products or energy-saving.

Detailed Evaluation Criteria	Weighting Range
1. Employment of Unemployed Youth	0.9 ~ 1.7
2. Employment of Time-Selective Job Positions	0.5 ~ 0.9
3. Mandatory Employment of Disabled Personnel	0.3 ~ 0.5
4. Preferential Employment of Persons of Distinguished Service	0.3 ~ 0.5
5. Preferential Purchase of Products of SMEs, etc. [SME Product (0.4~1.0), Product Produced by Women Enterprise (0.2~0.4), Product Produced by Disabled Personnel (0.4~0.6), Green Product (0.2~0.4) , etc.]	1.8 ~ 3.6
6. Purchase of Vouchers to be used in Traditional Markets	0.3 ~ 0.5
7. Greenhouse Gas Mitigation and Energy Saving Performance (including dissemination of LED lamp)	0.2 ~ 0.6
8. Performance of Early Execution of Budget	0.3 ~ 0.5
9. Compliance with the Service Worker Protection Directive	0.2 ~ 0.4
Total	6.0 Points

[Table 24] Evaluation Criteria on the Government Recommended Policies of 2017

Previously, public institutions could reduce or leave out the weights for GPP when setting the total score of six points. However, in the newly established evaluation criteria, the proportion of green products has increased significantly, and the adjustment can only be made with greenhouse gas reduction and energy-saving achievements.

Although the proportion of GPP according to these scores may seem small, the influence that each indicator can have is significant, as the final rating can be determined by the decimal place. Therefore, public institutions are trying their best to achieve a good rating under all the indicators.

To evaluate the specific purchasing performance of green products, public institutions are being evaluated from two different aspects: purchasing ratio (fulfillment rate) of green products, and increase/decrease ratio (improvement rate) of GPP. The purchasing ratio, which accounts for 70% of total evaluation points, is calculated by the percentage of green products purchased from the total procurement value, where the highest score is awarded if the percentage is 80% or higher. For the remaining 30%, points are given based on the increase or decrease of the GPP ratios between the current and previous year.

The Korea Environmental Industry and Technology Institute (KEITI) operates GPP with the Ministry of Environment, and the promotion of GPP is included in its main business goals. Therefore, in addition to the above indicators, KEITI is further evaluated for "diffusion of environmentally-friendly products." This indicator acts as a catalyst to strengthen further the efforts of KEITI in promoting the GPP performance of the public sector.

(1) Supporting expansion of the eco-friendly market Evaluation method: Mid-to-long term goal assignment/goal assignment (deviation); Weight: 6 points	
Definition	Evaluate the achievement of expansion of eco-friendly market through supporting the production, distribution, and consumption of eco-friendly products by public and private sectors. (Upward indicator)
Reference Value	(Public Sector) 3rd Green Product Purchasing Promotion Basic Plan.
Goal	- (Proportion of purchasing eco-friendly products by the public sector) The proportion of purchasing eco-friendly products by public institutions (60% by 2020) according to the "Third Green Purchasing Promotion Basic Plan".

Measurement Formula and Variables	<p>1. Performance of supporting expansion of eco-friendly market = Purchasing ratio of eco-friendly products by the public sector (%) × 0.5 + Private Sector sale of eco-friendly products (billion KRW) × 0.5</p> <p>2. Purchasing ratio of eco-friendly products by the public sector = (Purchase value of eco-friendly products/total purchase amount) × 100</p> <p>- Based on the total purchase amount, and the purchase amount of eco-friendly products from January 1 to December 31 of the year.</p>
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[Table 25] Evaluation Criteria for the Major Tasks of KEITI of 2018 (abridged)

■ Follow-up Measures

The performance evaluation itself can promote GPP in public organizations, but follow-up measures also bring more attention to each evaluation item. Financial bonuses are provided according to the results of the evaluation. This measure is significant since it is the only economic incentive that can be paid to individuals, including procurement officers from public agencies. Also, according to the results of the performance evaluation, it is stipulated that an excellent institution can be commended by the Ministry of Economy and Finance.

On the other hand, organizations that do not perform well in the evaluation are required to submit a management improvement plan, and the director of such an organization may be asked to resign after consideration by the Management Committee of the Public Institution under the Ministry of Economy and Finance.

■ Performance evaluation of Local Governments and Local Public Enterprises

The evaluation of local governments and local public enterprises is carried out by the Ministry of Interior and Security. Joint evaluations are conducted in accordance with Article 21 of the **Framework Act on the Evaluation of Government Affairs** on specific tasks, such as the implementation status of the national policies. The performance evaluation of local public enterprises is conducted as per Article 78 of the **Local Public Enterprises Act**.

The Ministry of Interior and Security evaluates the works of local governments through a joint evaluation with other central ministries and announces the "**Joint Evaluation Plan of Local Governments**" annually and carries out evaluations accordingly. The evaluation targets 17 cities and provinces, but it includes results for subordinate cities, counties and districts, so it can be regarded as an evaluation of all local governments. The indicators have been developed by the government in collaboration with civilian experts. In 2018, 72 indicators and 212 detailed indicators were in operation for 11 sectors.

Among these indicators, GPP is set as the evaluation criterion for "promoting eco-friendly measures" in 11 areas, and thus local governments must submit their GPP record for the previous year as a ratio to the total purchase amount. However, submission of raw data is unnecessary, as the Ministry of Environment already collects it through its electronic system.

Category	Green Product Procurement Ratio (Unit: Thousand KRW, %)		
	Procurement Amount of Green Product (A)	Total Procurement Amount (B)	(A/B) × 100
Total (㉠+㉡)			
Regional Government ㉠			
Local Government ㉡			
○○ City (Si)			
△△ Country (Gun)			
□□ District (Gu)			
...			

[Table 26] Submission Sample of GPP Records of Local Governments

From 2018, the performance evaluation method will be changed; from the traditional relative evaluation method based on purchasing ratio of local governments, to an absolute evaluation method based on the level of achievement after a target purchasing ratio is given in advance. According to the modified evaluation method, a total of five different grades will be awarded by assigning S Grade to local governments achieving 100% of target purchasing ratio, A Grade to between 87.5% or higher and less than 100%, and the lowest D Grade to less than 62.5%.

The government establishes these indicators and evaluates local governments to ensure that national policies can be driven forward at the local level. This evaluation also provides follow-up actions based on the results; the superior local government provides a special grant tax, which is an economic incentive and it can also reward deserving individuals. Conferences are held, and case studies are published for sharing and disseminating best practice. On the other hand, measures are taken to provide targeted administrative consulting for local governments with poor results.

The performance evaluation of the local public enterprises is conducted by the Local Public Enterprises Evaluation Service under the Ministry of Interior and Security. Assessment criteria and follow-up actions are similar to those of public institutions and are not addressed further.

C. Mandatory Usage of Recycled Aggregate

- ◎ **Legal Basis:** Act on the Promotion of Recycling of Construction Waste
- ◎ **Type:** Regulatory incentive
- ◎ **Operating Agency:** Ministry of Environment, Ministry of Land, Infrastructure and Transport
- ◎ **Target:** Public Sector

■ Background

In order to contribute to economic development and the improvement of the environment, as well as the efficient use of natural resources, the **Act on the Promotion of Recycling of Construction Waste** (hereinafter referred to as the "Construction Waste Act") was enacted in 2003.

In 2003, there was a possibility that natural aggregate would be depleted within 20 years, and the need to develop alternative resources was urgent. The level of annual forest and natural environment deterioration (about 87,000m²) was also severe. The aim was to address these issues by promoting the recycling of construction waste. The amount of landfill waste was to be reduced to extend the life of landfill sites, and to prevent the environmental contamination from landfill waste at the same time.²⁶

However, recycled aggregate was only being used for embankment and soil covering purposes. Recycled aggregate with high added value, such as that for road strata, concrete, and product manufacturing, accounted for less than 10%. Therefore, the Ministry of Environment and the Ministry of Land, Infrastructure and Transport decided that public organizations should play a pioneering role through their construction works.

■ Definition of Recycled Aggregate

According to the Construction Waste Act, recycled aggregate refers to construction waste that has undergone physical or chemical treatment processes to meet the quality standards of recycled aggregate defined in Article 35 of the same Act. The Minister of Land, Infrastructure and Transport consults with the Minister of Environment to establish product quality standards, along with the design and construction methods when using the recycled aggregate, in order to promote the recycling of construction waste.

Currently, quality standards for recycled aggregate have been established for 13 applications.

²⁶ KORAS, n.d., "Value of Recycled Aggregate", in Korean, Retrieved 25 February, 2019, from <http://www.koras.org/05/value.jsp>.

Base Course of Road	Sub-base Course of Road	Concrete
Concrete Products	Installation of Sewer Pipe	Asphalt Concrete
Anti-Frost Layer	Subgrade	Road Bed
Back Filling	Banking	Soil Covering
Soil Covering of Landfill		

[Table 27] Quality Standards for Recycled Aggregate by Type

The Recycled Aggregate Product is a product made by using recycled aggregate as a raw material and is defined by the **Presidential Decree of the Construction Waste Act**. This includes asphalt concrete products (using 25% or more of recycled aggregate for asphalt concrete production), and concrete products (such as bricks, blocks, road borders, and utility holes using 50% or more of recycled aggregate for manufacturing concrete products).

■ Mandatory Usage of Recycled Aggregate

Following Article 38 of the Construction Waste Act, the owner (public sector) of the construction contract is obligated to require the construction contractor to use recycled aggregate for construction work of a specific nature and scale, or with a specific purpose.

The regulations related to GPP are the mandatory use of recycled aggregate products rather than the mandatory use of recycled aggregate itself. Recycled aggregate products subject to compulsory purchasing are restricted to products that have received Eco Mark or GR Mark certification in accordance with Article 17 of the Construction Waste Act. This initiative plays a vital role in achieving the green purchasing performance of public organizations considering the scale of general construction work.

For the following types of construction, recycled aggregate products must be used as mandatory. Products and their ratios to be used are also specified.

Type of Construction	Purpose	Mandatory Ratio
1. Construction of road	For Asphalt Concrete Surfaces	More than 40%
2. Industrial complex development project		
3. Construction of sewer, public sewage treatment facility		
4. Installation of public livestock manure treatment facility		

5. Installation of public wastewater treatment facility		
6. Housing site development project		
7. Construction of logistics terminal and complex		
8. Construction of roadside and outdoor parking lot		
9. Construction work corresponding to specific structure, scale, and purpose set by the ordinance of local governments	Decided by the Local Government's Ordinance	

[Table 28] Construction with Mandatory Usage (abridged)

Under the Construction Waste Act and related regulations, a series of measures is provided at each stage of construction to ensure the required usage ratio of the recycled aggregate is met. When ordering construction work from a public organization, the usage ratio of recycled aggregate should be reflected in the construction plan through the planning, survey and design stages.²⁷

During construction work, the designated construction manager guides and supervises the construction company to comply with the mandatory usage reflected in the construction plan. The amount of Eco Mark and GR Mark certified products used in construction is regularly reported as part of the "Status of Major Material Input" reporting.²⁸ Therefore, the amount of usage per product can be counted for each construction project.

In line with Article 39 of the Construction Waste Act, the Minister of Environment or the Minister of Land, Infrastructure and Transport can recommend or order corrective action if the owner of the construction work does not comply with the obligation to use recycled aggregate and recycled aggregate products.

■ Impact

When the Construction Waste Act was first enacted, the government set the recycled aggregate mandatory usage ratio at 10%. The Ministry of Environment expected that by providing more than one million tons of recycled aggregate for road construction, the social and economic benefits would be worth about 300 billion KRW. That said, an expert evaluation noted that benefits go beyond value for money alone, given the importance of conserving land and resources due to the substitution of natural aggregate.²⁹

²⁷ Allbaro (System for Legitimate Treatment of Wastes), n.d., "Recycled Aggregate Procedure", in *Korean*, Retrieved 25 February, 2019, from https://www.allbaro.or.kr/04_wsp/wsp_info_002.vm#quick1.

²⁸ This reporting is requested by the *Construction Technology Promotion Act*.

²⁹ Ministry of Environment, 2015, "Public works should use at least 10% of recycled aggregate as mandatory", in *Korean*, Retrieved 25 February, 2019, from <http://www.me.go.kr/home/web/board/read.do?menuId=286&boardMasterId=1&boardCategoryId=39&boardId=141224>.

At present, the mandatory usage ratio for recycled aggregate has increased from 10% to 40%, and the scope of construction subject to mandatory use has also been steadily expanded. In September 2017, the Ministry of Environment and the Ministry of Land, Infrastructure and Transport revised the notification to include anti-frost layers and barrier layers for mandatory use of recycled aggregate, which was previously prescribed only for roadside assistance layers. The government estimated that the annual demand for recycled aggregate would increase by about 382,000 tons as a result of the amendment, generating a social benefit of about 37.5 billion KRW.³⁰

For recycled aggregate products, which can be counted as GPP, the greatest proportion of public organization's spending (37%, about 1.2 trillion KRW in 2016) is for asphalt concrete.³¹ However, only 23% of the asphalt concrete purchased was green. Its reliability, product diversity and product quality have been found to be the barrier for purchasing.

(Unit: thousand KRW, %)	2012	2013	2014	2015	2016	2017
Total Purchase	1,406,721	1,374,678	1,268,405	1,167,000	1,264,167	1,323,994
Recycled Product	127,916	193,361	236,400	200,650	212,264	306,765
Ratio	9.1	14.1	18.6	17.2	16.8	23.2

[Table 29] Purchase Records of Recycled Asphalt Concrete by Public Organizations³²

³⁰ Ministry of Environment, 2017, "Expansion of use of recycled aggregate for public construction", in *Korean*, Retrieved 25 February, 2019, from <http://www.me.go.kr/home/web/board/read.do?pagerOffset=0&maxPageItems=10&maxIndexPages=10&searchKey=title&searchValue=%EC%88%9C%ED%99%98%EA%B3%A8%EC%9E%AC&menuId=286&orgCd=&boardId=816300&boardMasterId=1&boardCategoryId=&decorator=>.

³¹ KEITI, 2018, "Korea's Experience on Implementing GPP in Construction Sector", Awareness-raising Workshop and Networking Session for GPP of Construction Sector in Thailand, workshop materials.

³² KEITI, 2018, "Green Product Mandatory Purchase Policy", in *Korean*, 2018 Green Procurement Promotion Workshop and Training for Public Organizations, seminar materials.

D. Green Building Certification Program

- ◎ **Legal Basis:** Green Building Development Support Act
- ◎ **Type:** Economic, Regulatory Incentive
- ◎ **Operating Agency:** Ministry of Environment, Ministry of Land, Infrastructure and Transport, Korea Institute of Civil Engineering and Building Technology
- ◎ **Target:** Public and Private Sector

■ Background

There are ongoing discussions at the international level on measures to reduce energy use and CO₂ emission of buildings in the context of climate change. In Korea, where there are considerable construction activities on new and existing buildings due to overcrowding of big cities and the development of new cities, it is necessary to consider the environmentally-friendly factors related to construction.

Throughout the life-cycle of buildings, factors affecting the environment, such as saving energy and resources, reducing pollutant emissions, maintaining quality of life, and harmonizing with the surrounding environment, are important considerations. These factors include material production, design, construction, maintenance and demolition, and are reflected in the implementation of Green Building certification.

■ Green Building and Mandatory Certification by the Public Sector

Since January 2002, the Ministry of Land, Infrastructure and Transport and the Ministry of Environment have been certifying apartment buildings in the name of the “eco-friendly building certification scheme”. The certification target has been steadily expanded to include commercial buildings, school buildings, accommodation and sales facilities. In 2008, the **Rules for the Certification of Eco-friendly Buildings** and the **Standards for Eco-friendly Buildings** were revised and published in accordance with the Building Act of that year.

In 2012, the **Green Building Development Support Act** (hereinafter referred to as the "Green Building Act") was established following the Framework Act on Low Carbon, Green Growth. To reduce the redundancy between various certification programs on buildings, the Green Building Certification System (G-SEED) was officially launched and has been operating since.

The Ministry of Land, Infrastructure and Transport and the Ministry of Environment take turns every two years to host and operate the system and publish, through notifications, detailed evaluation criteria by type of building. Based on the evaluation criteria, certification bodies, comprising ten public and private agencies, award certifications by adding up the points under seven specialized categories (land use and transportation, energy and environmental pollution, materials and resources, water management, maintenance, ecological environment, and indoor environment). There are four different grades for the certification, which range from the general level (Grade 4) to the outstanding level (Grade 1).

Mandatory certification of public organizations was introduced in 2010. According to the **Guidelines for the Rationalization of Energy Use by Public Organizations** promulgated at the time, buildings of over 10,000m² in size constructed by public organizations are required to obtain the certification of eco-friendly buildings. Since the implementation of the Green Building Act in 2013, the standards have been significantly strengthened, and buildings that exceed 3,000m² of floor space built by public organizations must now acquire G-SEED certification.

Public buildings, such as government complexes or public affairs facilities, must obtain a certification of Grade 2 ('Good') or higher. Apartment buildings with 1,000 households or more also need to acquire a Green Building certificate with Grade 4 ('General') or higher. Seoul Metropolitan Government enacted an ordinance stipulating that public buildings are required to obtain a certificate of Grade 1 ('Outstanding'), and private buildings subject to submission of energy conservation plans are required to secure at least Grade 2 in order to qualify for a floor area ratio incentive.

■ Green Building and GPP

Among the seven areas of expertise mentioned above, the "materials and resources", "water management", and "indoor environment" categories assess items closely related to GPP. For example, newly-built non-residential buildings are evaluated as shown in the table below.

Category	Criteria	Score
Materials & Resources	3.1 Usage of EPD materials	4
	3.2 Usage of low carbon materials	2
	3.3 Usage of resource circulation materials	2
	3.4 Usage of harmful substance reduction materials	2
	3.5 Application ratio of green materials	4
	3.6 Establishment of storage facility for recyclable resources	1

Water Management	4.3 Usage of water-saving equipment	3
Indoor Environment	7.1 Application of low indoor air pollutant-emitting products	3

[Table 30] Certification Criteria for New Non-residential Buildings

Among these criteria, the “resource circulation materials” include Eco Mark and GR Mark certified products. Eco Mark certified products are also included under the “harmful substance reduction material”. The evaluation is performed according to the number of materials (types) used. In addition, the cost ratio of Environmental Product Declarations (EPD) products, low-carbon materials, resource circulation materials, and harmful substance reduction materials to total construction materials is evaluated.

The water-saving equipment in the category of “water management” includes water-saving faucet, showerhead, and water-saving toilet and urinal, and additional points can be earned when over 80% of all floors are equipped with products certified with the Eco Mark. Application of low indoor air pollutant-emitting products in the category of “indoor environment” evaluates the use of finishing materials, adhesives and interior materials certified with the Eco Mark to reduce emissions of formaldehyde and volatile organic compounds.

Therefore, in the process of construction by a public organization and acquisition of the Green Building certification, purchasing and using products certified by the Eco Mark and GR Mark will earn points for the relevant field and accumulate GPP results at the same time. Considering the general scale of construction work and the amount of materials consumed, it is clear why construction materials account for the most significant part of the green procurement results of public organizations.

Construction materials can be considered to be semi-permanently embedded in buildings except for products such as electric lamps. Therefore, the Green Building certification for existing buildings does not evaluate the use of environmentally-friendly materials, but instead the “operation of green product purchase manual” and “management of recyclable resources.”

■ Economic and Regulatory Incentives

According to the Green Building Act, national or local governments are allowed to subsidize or reduce taxes such as income tax, corporation tax, acquisition tax, property tax, and registration tax. Article 47-2 of the **Restriction of Local Tax Exemption Act** stipulates the acquisition tax and property tax reduction of Green Building certified buildings as shown in the table below, and the benefit will be provided only until December 31, 2018.

Reduction of Acquisition Tax	G-SEED Outstanding	G-SEED Good
Energy performance score of 90 points or more, or energy efficiency Grade 1 or higher	15%	10%
Energy performance score between 80 and 90 points, or energy efficiency Grade 2	10%	5%

[Table 31] Reduction of Acquisition Tax

Reduction of Property Tax	G-SEED Outstanding	G-SEED Good
Energy efficiency Grade 1 or higher	15%	10%
Energy efficiency Grade 2	10%	5%
Others	3%	-

[Table 32] Reduction of Property Tax

In the **Energy-saving design standards for buildings**, according to the Green Building certification grade and the energy efficiency grade, the building standard to be applied is deregulated (such as floor area ratio), as shown in the table below.

Deregulation of Building Standard	G-SEED Outstanding	G-SEED Good
Energy efficiency Grade 1 or higher	6~12%	4~8%
Energy efficiency Grade 2	4~8%	2~4%

[Table 33] Deregulation of Building Standards

Some incentives are not available at the moment, such as the benefits for tax on environmental improvements and the benefits for Green Building certification fee provided by the Seoul Metropolitan Government.

Besides, businesses may be eligible to get additional points in the preliminary screening for participation in procurement bidding, depending on their performance related to Green Building construction.

■ Impacts

The number of certified Green Building has increased by 25% annually since 2002 when the eco-friendly building certification system first started. As of 2017, 9,238 buildings were certified, which covers an area of 31,608m². This growth rate is estimated to have gained momentum through various

regulatory and economic incentives provided by the government.³³ In particular, with the introduction of the Green Building Act in 2013, the number of certifications has increased significantly every year as the range of buildings subject to mandatory certification expanded.

Although no statistics directly relate the number of Green Building certifications to the purchase of Eco Mark and GR Mark products, data on the purchase value of green construction materials by public organizations and the number of Green Building certifications is available. It can be assumed that the purchase value of green construction materials has increased considerably due to the expansion of mandatory certification targets.



[Figure 23] Number of Green Building Certifications³⁴



[Figure 24] Purchase Amount of Green Materials by the Public Sector³⁵

³³ KICT, 2018, "Korea's Experience on Promoting GPP: Green Building Program (G-SEED)", Awareness-raising Workshop and Networking Session for GPP of Construction Sector in Thailand, workshop materials.

³⁴ Ibid.

³⁵ KEITI, 2018, "Korea's Experience on Implementing GPP in Construction Sector", Awareness-raising Workshop and

This report does not examine the environmental and economic benefits arising from the introduction of the Green Building certification scheme. However, there is a study that estimated the reduction of energy use and greenhouse gas emissions that can be derived from application of eco-friendly building materials to new office buildings. When a four-story office unit with gross floor area of 2,500m² employs window profiles, insulation materials and lighting with the Eco Mark, it is forecasted to save 95,750kWh of energy and 11.68 million KRW of energy cost, and to reduce greenhouse gas emissions by 47,396kg CO₂ annually.

Assuming that approximately 15,000 units of office buildings will be newly-built between 2015 and 2019, and that eco-friendly building materials are applied to all those buildings, a reduction of around 3.54 million tons of greenhouse gases will be achieved. This figure corresponds to 15.3% of the greenhouse gas mitigation target from the commercial sector by 2020.³⁶

Networking Session for GPP of Construction Sector in Thailand, workshop materials.

³⁶ KEITI, 2018, "Green Building and Eco-Friendly Materials", *in Korean*, 2018 Green Procurement Promotion Workshop and Training for Public Organizations, seminar materials.

E. Mandatory Purchase and Promotion of Eco-Friendly Vehicles

- ◎ **Legal Basis:** Special Act on the Improvement of Air Quality in Seoul Metropolitan Area; Act on Promotion of Development and Distribution of Environment-Friendly Motor Vehicle
- ◎ **Type:** Economic, Regulatory Incentive
- ◎ **Operating Agency:** Ministry of Environment, Ministry of Trade, Industry and Energy
- ◎ **Target:** Consumer (including public sector)

■ Background

In light of the limitations of existing laws and regulations, the government decided to improve further the atmospheric environment in the Seoul metropolitan area by introducing measures to promote use of environmentally-friendly automobiles. Accordingly, the **Special Act on the Improvement of the Air Quality in the Seoul Metropolitan Area** (hereinafter referred to as the "Metropolitan Air Quality Act") and the **Act on Promotion of Development and Distribution of Environment-Friendly Motor Vehicles** (hereinafter referred to as the "Environmentally-friendly Vehicle Act") were established in December 2003 and October 2004 respectively.

Through these two laws, the government has continued to manage and improve existing vehicles in order to curb automobile emissions, which are the leading cause of air pollution. At the same time, for new vehicle fleets, low emission vehicles and environmentally-friendly vehicles are required to be purchased preferentially.

■ Scope of Low Emission Vehicles

According to the regulations of the Metropolitan Air Quality Act, low emission vehicles include electric vehicles, fuel cell vehicles, solar-powered vehicles, hybrid vehicles, and those that meet emission limits set by the Ministry of Environment.

Low emission vehicles are not included in GPP records of public organizations because they are not subject to Eco Mark or GR Mark certification. However, acquisition of these vehicles is in essence green public procurement since it centers on purchasing or leasing environmentally-friendly products.

■ Mandatory Purchase of Low Emission Vehicles

National government, local governments, and public institutions that have more vehicles than the threshold specified in the Presidential Decree³⁷ and located in the Air Quality Management Area in accordance with Article 24 of the Metropolitan Air Quality Act, have to purchase or lease low emission vehicles.

In addition, each agency must report its purchase plan for the following year along with the purchase record of such vehicles in the current year. Furthermore, if deemed necessary, the Minister of Environment may ask agencies to take measures to include the relevant indicator in its performance evaluation.

When the Metropolitan Air Quality Act was first introduced, the mandatory level for purchasing low emission vehicles was set at 20%, but after two adjustments, the percentage has been raised to 50%. The table below shows the mandatory purchase ratio of low emission vehicles as per the revised Enforcement Regulation issued in June 2018.

Period	Ratio
From June 20 th , 2018 to December 31 st , 2018	50%
From January 1 st , 2019 to December 31 st , 2020	70%
From January 1 st , 2021	80%

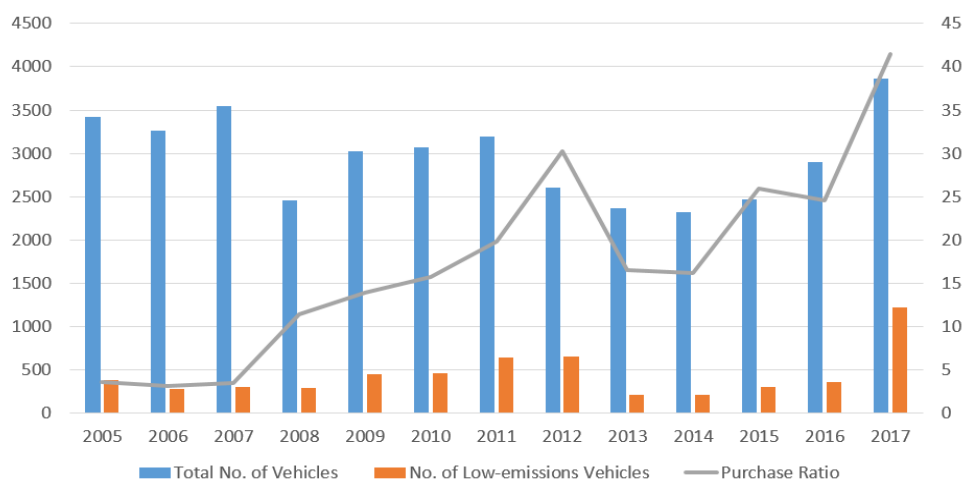
[Table 34] Mandatory Purchase Ratio of Low Emission Vehicles

According to the revised Metropolitan Air Quality Act which comes into effect in December 2018, local governments or public institutions that do not comply with the above purchase ratio will be charged a fine of up to 3 million KRW. As a result, it is expected that the volumes of purchase and lease of low emission vehicles will increase.

■ Achievements

The numbers and proportions of low emission vehicles are gradually increasing, although the mandatory purchase ratio is not being met. However, overall improvements are being made, and the ratio was already raised twice, in 2011 and 2017, to drive further improvements. As penalties are set to be imposed by the revised regulations, the public sector will need to strive to comply with the requirement.

³⁷ As of June 2018, the threshold is 10.



[Figure 25] Purchasing Records by the Public Sector

■ Mandatory Purchase of Environmentally-Friendly Vehicles

The Environment-Friendly Vehicle Act, which is operated by the Ministry of Industry, Trade and Energy, also imposes an obligation to purchase environmentally-friendly vehicles through its amendment in 2016. The vehicles recognized as environmentally-friendly by the Ministry are currently limited to hybrid vehicles, electric vehicles, plug-in hybrid vehicles, and fuel cell vehicles.

Starting from 2018, public institutions and local public enterprises nationwide are required to purchase at least 70% of their vehicles as environmentally-friendly vehicles and, of these, at least 80% must be electric or fuel cell vehicles. The Minister of Industry, Trade and Energy is required to announce the list of public institutions and local public enterprises that have not fulfilled this purchasing obligation.³⁸

The Ministry of Industry, Trade and Energy surveyed 1,205 public sector organizations' purchasing records in 2017, including those of national government agencies, local governments, and local public enterprises. It was found that only 49.6% (3,178 units) of 6,402 official vehicles purchased or leased were eco-friendly vehicles.³⁹

Purchases of electric and hydrogen vehicles by the public sector in 2017 totaled 2,251 units, about four times the number of 579 in 2016, resulting in the public sector being the main buyer of these vehicles. The Ministry of Industry, Trade and Energy plans to contribute to the creation of the initial market by expanding the scope of the obligation of public organizations from passenger cars to other commercial

³⁸ Nevertheless, there has not been a public announcement of the violation of this obligation to purchase since the provision was established in January 2016. Corrective actions such as sending official documents to the institutions and companies that violated them were also not carried out. (In-hye Son, 2018, "Ministry of Trade, Industry and Energy, 'Zero Corrective Action' for Mandatory Obligations for Eco-friendly Vehicle Purchase by Public Institutions...Ineffective Law", in *Korean, Aju Business Daily*, 11 January, 2018. Retrieved 25 February, 2019, from <http://www.ajunews.com/view/20180110175744923>.

³⁹ U-yeong Choe, 2018, "Public Sector to Purchase 2300 Electric and Hydrogen Vehicles This Year", in *Korean, Money Today*, 28 March, 2018. Retrieved 25 February, 2019, from <http://news.mt.co.kr/mtview.php?no=2018032809145029814>.

vehicles in accordance with the development of various eco-friendly vehicles such as buses and trucks.⁴⁰

■ Economic Incentives for the Purchase

Under the Metropolitan Air Quality Act and the Environmentally Friendly Vehicle Law, national and local governments can provide financial support to buyers and owners of low emission vehicles and environmentally-friendly vehicles. Currently, financial support for purchasing eco-friendly vehicles includes subsidies and tax breaks.

Subsidies will be provided for the difference in price between an eco-friendly vehicle and an ordinary vehicle. These benefits can also be applied to public institutions, local governments, and local public enterprises, except for national administrative agencies.

Subsidy	Electric Vehicle		Hybrid ⁴¹	Plug-in Hybrid	Hydrogen
	Low-Speed	High-Speed			
National Government	4.5 million KRW	Max 12 million KRW	0.5 million KRW	5 million KRW	27.5 million KRW
Local Government	Undecided	Max 11 million KRW	-	-	Max 27.5 million KRW

[Table 35] Subsidies for Eco-Friendly Vehicles⁴²

Also, taxes of up to 7.2 million KRW can be exempted (individual consumption tax, education tax, acquisition tax) when purchasing and registering a vehicle. Under the regulations of local governments, congestion tolls and parking fees for public parking lot can also be exempted or reduced.

⁴⁰ Ibid.

⁴¹ Subsidy for the hybrid vehicle will only be provided until 31 December, 2018.

⁴² Eco-friendly Vehicle Comprehensive Information Support System, n.d., "Purchase Benefits for Low-emission Vehicles", in *Korean*, Retrieved 25 February, 2019, from <https://www.hybridbonus.or.kr/EP020204000SF01.do>.

F. Other Reputational Incentives

- ◎ **Legal Basis:** Act on Promotion of Purchase of Green Products
- ◎ **Type:** Reputational incentive
- ◎ **Operating Agency:** Ministry of Environment, KEITI
- ◎ **Target:** Public and Private Sector

The final Korean GPP incentive mechanism to be considered concerns reputational incentives provided under the Green Purchasing Act. In accordance with Article 15 of the Act, the government is allowed to reward public organizations and related stakeholders that have been excellent in purchasing green products or contributed to the promotion of GPP, as prescribed by the Presidential Decree. The Presidential Decree specified the type of awards, such as the Green Product Grand Award, and the Excellence Award on Green Product Production, Distribution, and Purchasing.

The Ministry of Environment has to announce, by the end of February every year, the criteria for the award, selection method and procedure. According to the "Eco-Friendly Technology Promotion and Consumption Promotion Contest" announced in February 2018, the awards will be given under the name of the President, the Prime Minister, and the Minister of Environment.⁴³

Category		Eligibility for Application
Eco-friendly Technology & Product	Eco-friendly Technology	Companies and organizations that contributed to eco-friendly technology development and commercialization through environmental R&D technology development projects.
		Companies and organizations that contributed to environmental improvement through the practical use of environmental technologies by introducing product design techniques considering the environment.
	Eco-friendly Product	Companies and organizations that produced eco-friendly products, such as those certified by the environmental and carbon labeling criteria that reduce energy consumption and minimize the generation of pollutants.
Eco-friendly Consumption & Distribution	Public	Local governments or public institutions that promoted the purchase of green products through public outreach and education, and contributed to environmental conservation through the application of green products (Green Purchasing Support Center, etc.).

⁴³ Ministry of Environment, 2018, "2018 Guidance for Government Rewards on Promotion of Eco-friendly Technology and Consumption", in *Korean*, Retrieved 25 February, 2019, from <http://www.me.go.kr/home/web/board/read.do?pagerOffset=0&maxPageItems=10&maxIndexPages=10&searchKey=title&searchValue=%ED%8F%AC%EC%83%81&menuId=290&orgCd=&boardId=843120&boardMasterId=39&boardCategoryId=&decorator=>

	Private	Companies, stores, civil and social organizations that contributed to eco-friendly consumption and distribution (participation in green store program, etc.) and contributed to eco-friendly culture by promoting and applying eco-friendly products
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[Table 36] GPP Awards of 2018

The awards are given to private companies as well as to public organizations, and their contribution on the processes covering production, distribution and purchasing of green products is considered. The Ministry of Environment evaluates with KEITI the applications received, and the awards ceremony is held in conjunction with Eco-Expo Korea in September.⁴⁴

2) Japan

Japan has pioneered the introduction of GPP in the region. In 1989, the eco-labeling scheme named Eco Mark was launched, and with the establishment of the **Act on Promotion of Purchasing of Eco-Friendly Goods and Services by the State and Other Entities** (hereinafter the “Act on Promoting Green Purchasing”) in 2000, GPP was officially introduced.⁴⁵

Under Article 3 of the Act on Promoting Green Purchasing, the State and Incorporated Administrative Agencies must endeavor to select eco-friendly products in the procurement process. In this case, products and services satisfying the evaluation criteria stipulated in the **Basic Policy for Procurement of Environmental Goods** established by Article 6 have to be procured. These evaluation criteria for eco-friendly products are developed based on the corresponding Eco Mark criteria.⁴⁶ As of February 2018, a total of 275 products in 21 sectors had been included.

Public procurement in Japan is decentralized to each department and carried out independently. There is no single integrated procurement agency. However, companies can offset this difficulty by looking into the integrated information source and database that provide all the bidding documents put forward by the government.

The Ministry of Environment oversees GPP and also operates the monitoring system. In addition, the Green Purchasing Network (GPN), a non-profit organization, supports the implementation and promotion of GPP by focusing on training and awareness-raising activities for more than 2,400 members, comprising companies, local governments, and NGOs.

⁴⁴ Korea Eco-expo, 2018, “Overview”, in *Korean*, Retrieved 25 February 2019, from <http://www.k-eco.or.kr/kor/k-eco/summary.asp>.

⁴⁵ 国等による環境物品等の調達の推進等に関する法律, <https://www.env.go.jp/en/laws/policy/green/index.html>.

⁴⁶ The preamble of the Basic Policy encourages the practical use of eco-labeling information, including the Eco Mark. UNEP, 2017b.

(1) Reputational Incentive

There are several reputational incentives offered to companies producing environmentally-friendly products and services. It is difficult to assess the impact of reputational incentives qualitatively or quantitatively, and their effects on promoting GPP cannot be ascertained. Therefore, this section only introduces the details of the relevant incentive mechanisms.

Firstly, the GPN in Japan has been awarding the Green Purchasing Awards" since 1998 to spread best practices in green purchasing. The award has successfully propagated green purchasing to manufacturers and consumers, and promoted relevant activities.⁴⁷

The Green Purchasing Awards are divided into various categories according to the awarding agencies and evaluation contents as shown in the table below. It is stipulated that they can be applied by enterprises, private organizations, schools, and local governments. Past awards and other details can be found on the GPN website.⁴⁸

Category	Contents
Award by the Minister of Environment	A group that has particularly outstanding records for its green purchasing activity, or activities to promote green purchasing to the general consumers through environmental education and communication.
Award by the Minister of Economy, Trade and Industry	A group that is particularly active in expanding the green purchasing market through eco-friendly products and services.
Award by the Minister of Agriculture, Forestry and Fisheries	A group which has excellent green purchasing activities that contribute to the development of the domestic agriculture, forestry and fisheries industry, or activities to promote green purchasing to the general consumers.
Grand Award	A group that has excellent activities that have contributed to the expansion of the green market and the achievement of the SDGs.
Excellence Award	A group that conducts excellent activities related to sustainable procurement.
Special Award for Local Government	Local governments with the highest level of effort for green purchasing.

[Table 37] Types of Green Purchasing Award in 2018

Recognizing that local governments not only wield large purchasing power but are also responsible for propagating green procurement activities to producers and consumers, GPN has been giving the Green Procurement Special Award for Local Government for excellent green procurement activities since 2017.

⁴⁷ GPN, n.d., "About GPN", Retrieved 25 February, 2019, from <http://www.gpn.jp/english/index.html>.

⁴⁸ GPN, n.d., "History of Past Awards", in *Japanese*, Retrieved 25 February, 2019, from <http://www.gpn.jp/results/history.html>.

GPN selects the top candidates out of 1,788 local governments by referring to the "Green Purchasing Case Database" managed by the Ministry of the Environment and taking account of the procurement policy, organizational implementation status, and procurement situation of each local government. In 2017, when the award was first presented, five local governments were selected.

In addition, the Japan Environmental Management Association for Industry (JEMAI) has been awarding the Eco Products Award under the name of the Minister of Environment and other Ministers since 2004, with the aim of promoting the production and dissemination of eco-friendly products and services. The selection criteria consider whether the products and services are environmentally-friendly, practical, creative and socially acclaimed.⁴⁹

The Eco Products Award is generally given in the name of the Ministers of Environment; Finance; Economy, Trade and Industry; or Land, Infrastructure and Transport in line with their respective fields. The award is given to raise consumer awareness and promote production by various SMEs. From 2018, it will be renamed and presented as the Eco Pro Award. The awards ceremony will be held in conjunction with "EcoPro", an environmental exhibition held in Tokyo at the end of each year.⁵⁰

(2) Mandatory Purchase and Economic Incentives for Green Vehicles

Currently, vehicles are included in the list of items for which GPP has to be carried out according to the Basic Policy. Therefore, central government ministries and agencies must purchase or lease vehicles that use the new technology or meet the emission and fuel efficiency standards, resulting in lower environmental impact than ordinary vehicles.

In the Basic Policy published in February 2018, electric vehicles, natural gas vehicles, hybrid vehicles, plug-in hybrid vehicles, fuel cell vehicles, hydrogen vehicles, clean diesel vehicles and other vehicles that satisfy emission and fuel efficiency standards are included. Public organizations are required to submit plans and results of such purchases.








Also, there are two types of economic incentive offered to general consumers: tax breaks and subsidies. In May 2009, the Cabinet of Japan decided to approve the **Green Vehicle Purchasing Promotion Measure** and provide incentives for consumers to purchase eco-friendly vehicles.⁵¹ The acquisition tax and tonnage tax on eco-friendly vehicles were reduced or exempted. The level of tax breaks was determined according to the type of vehicle and its fuel economy. In the case of passenger cars and

⁴⁹ UNEP, 2017b.

⁵⁰ JEMAI, "1st Eco Pro Award", in Japanese, Retrieved 25 February, 2019, from http://www.jemai.or.jp/ris/1st_eco-pro_award.html.

⁵¹ This measure is not the first green vehicle incentive provided in Japan, and a full cycle of measures has already been taken from 1996 to 2003. The measure in 2009 aimed at revitalizing the Japanese automobile industry, which had been in a state of stagnation for a long time (<http://www.jama.org/japanese-government-incentives-purchase-environmentally-friendly-vehicles/>).

mini-vehicles, the tax exemption was greatest when the vehicle exceeded by 25% the 2010 fuel efficiency standard. This action took effect on January 19, 2009.⁵²

	Next-Generation Vehicles	Low-Emission and Fuel-Efficient Vehicles (Passenger cars and mini-vehicles)		Heavy-Duty Vehicles (Trucks and buses with GVW>3.5 tons)	
	Electric (including fuel cell) vehicles			Compliant with 2009 emission standards	
	Plug-in hybrid vehicles	Emissions down by 75% from 2005 standards	Emissions down by 75% from 2005 standards		Compliant with 2005 emission standards*
	Clean diesel vehicles	and	and	and	*And with NOx or PM emissions down by 10% from those standards
	Hybrid vehicles				
	Natural gas vehicles	Fuel efficiency 25% above 2010 standards	Fuel efficiency 15%-20% above 2010 standards	Compliant with 2015 fuel efficiency standards	Compliant with 2015 fuel efficiency standards
Tonnage Tax	Exempt	75% reduction	50% reduction	75% reduction	50% reduction
Acquisition Tax (new vehicles only)	Exempt	75% reduction	50% reduction	75% reduction	50% reduction

[Figure 26] Tax Breaks of 2009⁵³

The exemption of the acquisition tax was re-offered from April 1, 2012, to March 31, 2015, on the basis of the newly-updated fuel efficiency standards. Benefits for the tonnage tax were provided again from May 1, 2012, to April 30th, 2015.⁵⁴ It was renewed once more in 2015, and the deadline was extended until 2017.⁵⁵

Apart from the tax benefits, the Japanese government introduced subsidies in May 2009 and April 2012 to promote the purchase of eco-friendly vehicles. The deadline for the second subsidy was set in February 2013, but ended early in September 2012 due to the related budget being exhausted (approximately 2.7 trillion JPY).⁵⁶

In just a few years, the number of hybrid vehicles and electric vehicles in Japan has surged, and Japanese motorists and automakers have fully embraced and commercialized related technologies and mass-produced many models of eco-friendly vehicles. A series of government incentives that were first implemented in 2009 are considered to have been a major catalyst for this development. In fact, 2010 was the first time in seven years that sales of new vehicles increased.⁵⁷

⁵² Ibid.

⁵³ Ibid.

⁵⁴ JAMA, 2012, "Green is the Colour", Issue No. 2, Retrieved 25 February, 2019, from http://www.jama-english.jp/europe/news/2012/no_2/peternunn.html.

⁵⁵ IEA, 2016, "Eco-Car Tax Break and Subsidies for Vehicles", Retrieved 25 February, 2019, from <https://www.iea.org/policiesandmeasures/pams/japan/name-24924-en.php>.

⁵⁶ Kitano Taiju, 2016, "Measures to Promote Green Cars: Evaluation at the car variant level", RIETI Discussion Paper Series.

⁵⁷ IEA, 2011, "Hybrid and Electric Vehicles: The Electric Drive Plugs In", Retrieved 25 February, 2019, from http://www.ieahev.org/assets/1/7/IEA-HEV_2010_annual_report_6MB.pdf.

3) China

Since 2006, GPP in China has been promoted by steadily expanding the range of preferential products. Currently, it is divided into two types of certified products: Energy Conservation Products and Eco-labelled Products. Mandatory purchase is based on the type of products and the level of government.⁵⁸

(1) Subsidies and Tax Breaks for the New Energy Vehicles

The Chinese government, in 2009, adopted its national plan in order to be the world leader of the electric and hybrid automobile industry by the year 2012. In June 2012, the State Council of China adopted a plan to further conserve domestic energy and develop the New Energy Vehicle industry, and established its goal to sell 0.5 million New Energy Vehicles by 2015 and reach 5 million by 2020.⁵⁹

The Chinese government elected to use the term “New Energy Vehicles (NEVs)” to indicate eco-friendly vehicles which only include, from the legal perspective, battery-powered electric vehicles, plug-in hybrid electric vehicles, and fuel cell vehicles.⁶⁰

The central government (Ministry of Treasury, Ministry of Industry and Information Technology, Ministry of Science and Technology and the National Development & Reformation Committee) offers a subsidy program to consumers. This subsidy program is renewed every two to three years, where the size of subsidy is reduced while eligibility for subsidies is increased. In 2010, a subsidy of between 4,000 CNY (575 USD) and 50,000 CNY (7,190 USD) was given when a plug-in hybrid vehicle was purchased, and 60,000 CNY (8,630 USD) for electric vehicles. The size of these subsidies equates to 40% to 60% of the cost of electric vehicles.

After the first round of subsidy program expired in 2012, subsidies for plug-in hybrid vehicles were adjusted to 35,000 CNY (5,000 USD) in 2013, and subsidies for electric vehicles were between 35,000 CNY (5,000 USD) and 60,000 CNY (8,630 USD) depending on the driving range of vehicles. The subsidies were reduced by 5% in 2014 and 10% in 2015 from the level of 2013. The subsidy program was renewed again in 2016 where up to 55,000 CNY (7,910 USD) and 30,000 CNY (4,315 USD) was given for electric vehicles and plug-in hybrid vehicles respectively. The subsidies were to be reduced by 20% in 2017 and 2018, and by 40% in 2019 and 2020 from the level of 2016. China plans to

⁵⁸ UNEP, 2017b.

⁵⁹ The Central People's Government of the People's Republic of China, 2012, “Notice of the State Council on Printing and Distributing the Development Plan for Energy-Saving and New Energy Vehicle Industry (2012-2020)”, *in Chinese*, 国发[2012]22号.

⁶⁰ Ministry of Finance of the People's Republic of China, 2015, “Notice on the Financial Support Policy for the Promotion and Application of New Energy Vehicles in 2016-2020”, *in Chinese*, 财建[2015]134号.

completely abolish subsidies by 2020.^{61,62}

In February 2018, the Chinese government adjusted requirements for driving ranges to promote better energy efficiency for vehicles. Although incentives for eco-friendly vehicles with a driving range of more than 400km were increased from 44,000 CNY to 50,000 CNY, the vehicles with a driving range of less than 150km were excluded.⁶³ Such adjustments to policies are characterized by step-by-step reductions in government subsidies, enhanced vehicle requirements, and “improved” incentive designs.

Local governments also offer supportive measures for the purchase of eco-friendly vehicles. For instance, Beijing and Shenzhen began their matching programs to provide subsidies identical with the central government. However, when cases of manipulation of this system were discovered, the central government imposed restrictions to lower the local subsidies to 50% of the subsidies offered by the central government.⁶⁴

Tax benefits are also available for eco-friendly vehicles in addition to subsidies. Vehicle purchase tax was exempted between 2014 and 2017, and the government has extended such benefits through 2020. Vehicle purchase tax usually amounts to 10% of the net price of a vehicle.⁶⁵ In addition, various benefits are being provided or have been offered for manufacturers (consumption tax, value-added tax, corporate income tax) and consumers (vehicle purchase tax, vehicle/vessel tax, value-added tax) of eco-friendly vehicles through applicable laws and regulations.⁶⁶

The latest financial incentive is exemption of the annual vehicle tax (vehicle/vessel tax) for eco-friendly vehicles, introduced in July 2018. Although each region may vary, this tax amounts to hundreds or thousands CNY based on the engine size and capacity of vehicle.⁶⁷

Public procurement of eco-friendly vehicles by government also makes a significant contribution. The Chinese government in 2014 demanded that central government as well as some local governments and public institutions change at least 30% of their vehicles to eco-friendly vehicles by 2016. The limit has been raised to at least 50% of eco-friendly vehicles since 2016.⁶⁸

⁶¹ Lu, J., 2018, “Comparing U.S. and Chinese Electric Vehicle Policies”, Environmental and Energy Study Institute, February 28, 2018.

⁶² International Council on Clean Transportation, 2017, “Adjustment to Subsidies for New Energy Vehicles in China”, Policy Update, May 2017.

⁶³ Bloomberg News, 2018, “China Raises Subsidies to Reward Longer Range Electric Cars”, February 13, 2018. Retrieved 25 February, 2019, from <https://www.bloomberg.com/news/articles/2018-02-13/china-raises-subsidies-to-reward-longer-traveling-electric-cars>.

⁶⁴ Lu, J., 2018.

⁶⁵ The Guardian, 2014, “China makes new electric cars tax-free”, July 10, 2014. Retrieved 25 February, 2019, from <https://www.theguardian.com/environment/2014/jul/10/china-exempts-electric-cars-from-tax>.

⁶⁶ 电动邦, 2018, “新能源汽车到底有哪些税收政策优惠呢? 详解新能源汽车税收政策优惠”, in *Chinese*, March 23, 2018.

⁶⁷ Li, F., 2018, “Annual vehicle tax cut for NEVs, small engine cars”, China Daily, August 6, 2018. Retrieved 25 February, 2019, from <http://www.chinadaily.com.cn/a/201808/06/WS5b67b384a3100d951b8c8ce6.html>.

⁶⁸ Lu, J., 2018.

(2) Price Reduction and Bonus Point for Green Products

National laws and policies provide general guidelines on the procedures of GPP, including products subject to mandatory purchase. However, specific implementation of these guidelines may vary by region due to structural and institutional differences among provinces and municipalities in China.

The Public Procurement Center manages actual procurement procedures for all public organizations, hospitals and colleges under each local government (province or municipality). This centralized system enables professionalization of procurement procedures and gives economies of scale. The Public Procurement Centers are subordinated to the Public Procurement Bureaus under each local government, but a certain leeway is given for the development of procedures and communication with suppliers.⁶⁹ On this basis, the Public Procurement Centers may be deemed to assume a central role in GPP. These agencies engage in procurement activities upon purchase requests from public organizations.

Products certified with Eco-label, which are preferential products for procurement, may be subject to preference during bidding procedures. The fact that a product carries “high preference” means that a lowered price or bonus points can be given to the product under various bidding methods. For example, price reductions under the “lowest price evaluation” method means that the evaluation price of preferential product is lowered from the offered price by a defined ratio. Under the “comprehensive evaluation” method, all evaluation indices are converted into points, and the higher the points the higher the probability of winning a bid. In this case, bonus points for preferential products are allowed to earn additional points from certain indices.

The Chinese government does not prescribe a general GPP policy concerning preferential products. Hence, the methods on price reduction and bonus points are determined by policies of province or municipal governments (more specifically, of Public Procurement Centers), and discrepancies arise between regions.⁷⁰

The Implementing Agency learned that the following provincial governments currently implement special procurement policies regarding green products.⁷¹ Jilin Province in the northern region of China offers 3% price reduction benefit for preferential products using the lowest price evaluation method, and gives 3% bonus points using the comprehensive evaluation method. Liaoning Province prescribes the range of benefits for price reduction and bonus points to be 3-5%, and the ratio is determined directly

⁶⁹ Philipps, S. et al., 2011, “Advancing Sustainable Public Procurement in Urban China: Policy Recommendations”, Sustainable Public Procurement in Urban Administrations in China, Paper No. 14.

⁷⁰ Hu, B. and Yi, S., 2014, “Status Report of China’s Green Government Procurement”, Top10 China.

⁷¹ Ibid.

by public organizations during their procurement processes.

Gansu Province stipulates a 5-10% price reduction benefit for preferential products when using the lowest price evaluation method, and 4-8% of bonus points using the comprehensive evaluation method. At the same time, when the “performance price method” is used, environmental performance is included in additional bonus elements, and preferential products may additionally earn a price reduction of 4-8%. When the “competitive negotiation” and “price inquiry” methods are employed, it is mandatory to include energy-saving products for consideration. When performance and quality are identical, energy-saving products are allowed to carry a price 5-10% higher than other products.

Guangxi Province developed standard procurement procedure regarding energy and water-saving products, and allows products included in the State List of preferential products to earn one additional point during bidding evaluation procedures. Fujian Province also sets the benefits according to procurement methods. If comprehensive evaluation is conducted, bonuses are presented based on past procurement performance; when the purchased proportion of energy and water-saving products has reached 20% or less, green products earn 4% bonus points, while 6% and 8% of bonus points are offered when the proportion is 20-40% and 50% or higher respectively.

The specific details of procurement policies by province and municipal governments, other than those described above, were not investigated since relevant literature was not available. Thus, it should be noted that those that are introduced above do not represent all the relevant policies currently being implemented in China.

(3) Other Reputational Incentives

The “Contribution Award for Green Public Procurement” is the first reputational incentive in China, awarded at the ‘2017 Government Procurement Summit’ co-hosted by the Chinese Public Procurement Newspaper and the Public Procurement News Network on January 4, 2018. The China Environmental United Certification Center (CEC), which has established and operates the China Green Purchasing Network (CGPN), was honored with the award for its contribution to the field of GPP over the past few years.⁷²

It is still unclear whether this award will be held on a regular basis and which agencies or individuals are eligible for evaluation and awards.

⁷² CGPN, 2018, “CGPN Awarded Contribution Award for Green Public Procurement”, *in Chinese*, January 10, 2018. Retrieved 25 February, 2019, from <http://www.mepcec.com/news/show-2444.html>.

4) Malaysia

GPP in Malaysia was introduced later than in the other countries mentioned in this report; however, it became mandatory for the federal government three years after the pilot implementation that started in 2013. Following the national development plan, the 11th Malaysian Plan, the GPP target for specific products to be achieved by 2020 has been set at 20%.

The Malaysian government provides a variety of effective short-term incentives to accelerate the implementation of GPP.

(1) Performance Evaluation of Public Sector

The Star Rating Index (SRI) is a mechanism for measuring the performance of public sector agencies and thereby formally acknowledging their excellence, using a set of criteria predetermined by the Malaysian Administrative Modernization and Management Planning Unit (MAMPU) under the Prime Minister's Department together with other relevant parties. This scheme was first introduced in 2008 and the evaluation has been carried out bi-annually.⁷³

The evaluation is conducted for federal ministries and some major departments and agencies, and a total of 61 institutions were included in the evaluation of 2015. These institutions are evaluated in four areas: compliance, quality, transformation, and innovation. The results are expressed in terms of the number of stars, as the name of the mechanism suggests, which are graded from Excellent to Not Satisfactory.

As the evaluation criteria were fully revised in 2015, items for GPP were added to the Quality group.⁷⁴ The detailed evaluation criteria and results for each item are not disclosed to the public, and thus, the GPP performance of each public institution is not known. However, the final evaluation report of MAMPU suggests that each public institution should promote the implementation of GPP, which indicates that a substantive evaluation has been carried out.⁷⁵

It is not possible to determine to what extent GPP efforts by the public sector have improved, as the 2017-2018 evaluation results have not yet been released. Also, the evaluation results are not linked to the provision of economic bonuses as in Korea, which make this mechanism classified as a Reputational Incentive. The institutions that acquired 'Excellent' grade used the results for their own publicity.⁷⁶

⁷³ MAMPU, n.d., "Star Rating", Retrieved 25 February, 2019, from <http://www.mampu.gov.my/en/star-rating>.

⁷⁴ Malaysia Government, 2016, "Government Green Procurement (GGP): Long-term Action Plan 2016-2030".

⁷⁵ MAMPU, 2016, "Laporan Indeks Penarafan Bintang (Indeks SSR) 2015", *in Malay*, Retrieved 25 February, 2019, from <http://www.mampu.gov.my/images/agensikerajaan/perkhidmatan/Laporan-Indeks-SSR-2015.pdf>.

⁷⁶ For example, Malaysia Employees Provident Fund (EPF) has utilized the evaluation result of 2013 as the material for public relations and distributed it to the media.

(2) Tax Breaks

In recognizing Green Technology as a driver for the nation's economic growth, the Malaysian government has provided an investment tax allowance for the purchase of green technology equipment and income tax exemption for green technology services companies. This tax benefit aims to further spur the adoption and awareness of green technology in the various sectors of the economy.

The tax breaks were announced by the Prime Minister of Malaysia on 25 October 2013 during the Budget Year 2014. The government provides three types of tax break, as described in the table below, until 31 December 2020.⁷⁷

Type	Explanation
Green Investment Tax Allowance (GITA) on Assets	Applicable for companies that acquire qualifying green technology assets that are listed under MyHIJAU Directory.
Green Investment Tax Allowance (GITA) on Projects	Applicable for companies that undertake qualifying green technology projects for business or own consumption.
Green Income Tax Exemption (GITE) on Services	Applicable for qualifying green technology service provider companies that are listed under MyHIJAU Directory.

[Table 38] Tax Breaks related to GPP

MyHIJAU is a recognition scheme operated by the Malaysia Green Technology Corporation (MGTC) under the Ministry of Energy, Green Technology and Water (KeTTHA)⁷⁸. The scheme is designed to issue MyHIJAU ("hijau" in Malay means green) marks to environmentally-friendly products and services that obtain certificates of Eco-labeling in Malaysia or overseas, and to list them in the MyHIJAU directory.

While these tax benefits are generally provided for the development of green technology rather than for green procurement, the Malaysian government has closely linked it with GPP in several policy documents in order to encourage enterprises to supply more environmentally-friendly products and services.⁷⁹

■ Green Investment Tax Allowance (GITA) on Assets⁸⁰

The Green Investment Tax Allowance on assets provides a tax allowance for 100% of the capital cost of purchasing an asset that satisfies certain conditions. The assets that are considered to qualify the conditions stated here are shown in the table below.

Kinibiz Online, 2014, "EPF wins MAMPU's 5-star service rating", 14 October 2014. Retrieved 25 February, 2019, from <http://www.kinibiz.com/story/corporate/113878/epf-wins-mampu%E2%80%99s-5-star-service-rating.html>.

⁷⁷ Malaysia Government, 2016.

⁷⁸ The name of this ministry has been changed to the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC) in 2018.

⁷⁹ Malaysia Government, 2016.

⁸⁰ The following three tax breaks summarize the following document: Malaysian Green Technology Corporation, 2016, "Guidelines for Green Technology Tax Incentive", Updated June 2016.

No.	Sector	Technology	Product Categories
1	Energy Efficiency	Transformer	Energy Efficient Transformer (up to 33kV)
2	Building	Energy Efficient Appliances	Solar air-conditioning equipment/system
3			Thermal energy storage equipment/system
4			Variable Air Volume (VAV) equipment/system
5			Variable Refrigerant Volume (VRV) equipment/system
6	Transport	Electric Vehicle	Electric motorcycle/scooter
7			Electric bus
8			Electric MPV/truck
9		Infrastructure	Electric Vehicle (EV) charging equipment/system

[Table 39] List of Qualifying Assets for GITA

After accepting applications from manufacturers, MGTC conducts technical verification of the assets concerned and evaluates the environmental impact from the purchase of the asset. If the application is approved, a certificate is issued to the company so that it can apply for the tax allowance by submitting the certificate to the Inland Revenue Board (IRB) of Malaysia.

From the list above, products that are directly targeted by GPP in Malaysia only include energy-efficient heavy vehicles, such as electric buses and electric trucks. Thus, the qualifying assets for GITA do not match with those of GPP. However, since GPP service criteria for “building energy management” and “cooling system management” are established, it is expected that GITA will be able to support GPP through production of relevant assets.

■ Green Investment Tax Allowance (GITA) on Projects

As with GITA for assets, businesses are allowed to apply for tax allowances of 100% of the fund invested into green technology projects.

Prior to verification by MGTC, applicants are required to obtain approval from the National Committee of Investment under the Malaysian Investment Development Authority (MIDA). Upon approval by the committee, MIDA issues the business with a certificate of conditional approval. The applicant is required to submit the certificate of conditional approval together with an application form, to MGTC. MGTC then verifies potential environmental impacts of the project in addition to technical performance of major equipment/assets.

Businesses are allowed to apply for GITA benefits on Project with respect to activities listed in the table below.

No.	Sector	Activities
1	Renewable Energy	Commercial and industrial business entities which undertake generation of energy using renewable energy resources such as: biomass, biogas, mini hydro, geothermal, and solar power.
2	Energy Efficiency	Companies investing in energy efficiency equipment or technologies and invest in energy saving equipment.
3	Green Building	Owners of the commercial/industrial building that have been awarded green building certificates from locally developed rating tool/certification body approved by the government.
4	Green Data Center	Companies that purchased any energy-efficient product or solution for data center which have been awarded green building certifications from locally developed rating tool/certification body approved by the Government.
5	Waste Management	Companies which undertake/invest in waste recycling or waste recovery or waste treatment and additional activities such as composting or store or collection or disposal.

[Table 40] List of Qualifying Activities for GITA

A number of products needed for the activities above (especially related to energy conservation and green data center) have already been designated as priority products subject to green procurement. With over 60% of expenses for GITA required to be used to purchase eco-friendly products, by promoting production, related products in the market are expected to increase substantially.

■ Green Income Tax Exemption (GITE) on Services

Lastly, Green Income Tax Exemption (GITE) is granted to businesses offering green technology services registered at MyHIJAU directory and verified by MGTC. Companies offering activities of green technology services need to fulfil the following criteria:

- (1) At least one competent/qualified personnel in the respective green technology
- (2) Must have a green policy related to the environment or sustainability
- (3) 100% of income must be derived from the respective green technology services

Businesses are entitled to 100% income tax exemption of their statutory incomes for up to 5 years. Similar to GITA for Projects, applicants need to acquire approval from the National Committee of Investment under MIDA prior to verification conducted by MGTC. Responsibilities for MGTC are to verify whether the service provided by the applicant is included in the MyHIJAU Directory, and whether earnings from green technology activities account for 100% of the income.

Businesses are allowed to apply for GITE benefits with respect to activities listed in the table below.

No.	Sector	Activities
1	Renewable Energy	Services related to renewable energy projects such as system design and feasibility study, advisory and consultancy, testing and commissioning.
2	Energy Efficiency	Services related to energy efficiency such as advisory and consultancy, energy audit and management, measurement and verification, testing and commissioning.
3	Electric Vehicle	(1) Services related to installation, maintenance and repair of EV charging equipment, infrastructure and EV charging stations (2) Services related to operation of the EV charging stations (3) Services related to maintenance, repair and overhaul of EV
4	Green Building	Services related to testing and commissioning of green building equipment and systems, and services related to green building design and consultancy services.
5	Green Data Center	Services related to system design and feasibility study, advisory and consultancy, testing and commissioning of green data center or ICT infrastructure.
6	Green Certification and Verification	Services related to green certifications of products, equipment and buildings.
7	Green Township	Services related to advisory and consultancy, design and feasibility study in Green Township and low carbon cities planning.

[Table 41] List of Qualifying Activities for GITE

All three types of tax breaks are means of energizing the MyHIJAU system operated by the Malaysian government, and it is expected to elevate the quality and quantity of eco-friendly products and services that can be purchased by public organizations by linking GPP to the system above.

Many countries are reluctant to introduce these types of economic incentives as they have a particular impact on the income and expenditure of the state budget. It can be learned that the Malaysian government intends to simply gain the impetus for green market development through the implementation of short-term measures.

2.2.2 Analysis of Current Incentives for GPP in Thailand

Although it was possible to assess the incentive mechanisms being utilized in other countries, simply transplanting such incentive mechanisms to Thailand was not always viable. Therefore, those measures that could be adopted in Thailand were recommended. These were selected by analyzing the GPP incentive mechanisms currently being implemented.

Before looking at GPP incentive mechanisms and related policies being implemented or implemented in Thailand, the Implementing Agency examined briefly GPP in Thailand.

1) GPP in Thailand: Overview

Thailand has led the implementation of GPP in the region for the past decade and has accumulated significant experience. The Pollution Control Department (PCD) under the Ministry of Natural Resources and Environment promotes the participation of public and private sectors through the establishment of the **Green Public Procurement Promotion Plan**. The plan has been updated twice, and the Third plan is awaiting approval by the Cabinet.

GPP in Thailand is carried out on a voluntary basis by all central government, local government and the private sector. However, there is no legal or regulatory provision at the moment that requires the implementation of GPP other than the GPP Promotional Plan. Therefore, there is much room for improvement for practical implementation.

The regulation on GPP allowed public procurers to prefer green products during the procurement process per the **Notification by the Prime Minister's Office on E-Purchase and E-Bidding** declared on February 4, 2015. However, the regulation was superseded by the new **Public Procurement and Supplies Administration Act** (the "Public Procurement Act" hereafter)' which came into force in 2017. Hence, regulations concerning public procurement in Thailand currently do not contain provisions legally enabling GPP.

Article 65 of the new Public Procurement Act allows a selection method, a more simplified procurement procedure, to be applied to goods which the government promotes and supports, just as the existing Regulation by the Prime Minister's Office. Currently, the Ministerial Regulation detailing this provision only includes certain agricultural products; products produced by small- and medium-sized enterprises and innovative products fulfilling specific requirements. The PCD has submitted a proposal to the Cabinet in order to include green products in the list. The Ministry of Finance is expected to prescribe rules and procedures of procurement by proclaiming a new Ministerial Regulation subject to a resolution by the Cabinet.

2) GPP Incentive Mechanisms of Thailand

Through the literature review, and meeting with the Focal Point and various stakeholders, tax breaks and subsidies provided to purchase electric vehicles and the "Best Procurement Award" awarded by the relevant Minister were identified as incentive mechanisms for GPP in Thailand.

The Thai government, in July 2017, announced a measure to lower excise tax for hybrid and electric vehicles. Based on the existing taxation scheme, 25% of excise tax was imposed on passenger pickup

vehicles (PPVs) emitting less than 175g/km of CO₂ and 12% on double-cab pickup trucks emitting less than 175g/km of CO₂. Under the new tax structure, the tax rates for these vehicles are lowered to 23% and 10% respectively.

Regarding passenger vehicles under the previous tax structure, 10% of excise tax was imposed on vehicles with 100g/km CO₂ emissions or lower, followed by 20% and 25% on vehicles with 150g/km or lower and 200g/km or lower respectively. Under the new tax structure, the tax rates for these vehicles are 5%, 10% and 12.5% respectively. The tax rate for electric vehicles was significantly lowered from 10% to 2%.⁸¹

New tax benefits are scheduled to continue until 2025. These incentives, together with Special Benefit Measures announced by the Board of Investment of Thailand in March of the same year (2017) apply only to vehicles assembled in Thailand using batteries and parts manufactured in Thailand. The policy aims to attract car manufacturers and core electric component makers to set up production lines in Thailand. This measure will help drive supply and boost consumer demand.⁸²

It was also found that the Best Procurement Awards, a reputational incentive, were given to public organizations or enterprises that made special efforts to promote green procurement. But, based on interviews with the Focal Point, it appears that the award is not currently being presented since approval of the Third GPP Promotion Plan by the Cabinet has been delayed. PCD plans to continue making the award once the plan is passed.

It was also learned that certain form of mandatory purchasing may be introduced on GPP implementation, or new reputational incentives may be adopted (such as performance evaluation on public organization), depending on the approval and operation of the Third Promotion Plan. However, the details concerning the above could change during the course of political discussions within Thailand, and nothing has been fixed as yet.

3) Relevant Policies and Programs

The low number of GPP incentive mechanisms in Thailand has the effect of limiting the promotion of GPP implementation by the public and private sector. In addition to reviewing the applicability of the incentive mechanisms introduced in the previous chapter, this section also looks at Thailand's policies and programs that can be linked to GPP.

⁸¹ Chan, M., 2017, "Thai government reduces excise taxes on EVs, hybrids", *Paul Tan*, International News, 22 June 2017. Retrieved 25 February, 2019, from <https://paultan.org/2017/06/22/thai-government-reduces-excise-taxes-on-evs-hybrids/>.

⁸² Tunmuntong, S., 2017, "New auto tax rewards greener cars", *Bangkok Post*, Opinion, 12 Jul 2017. Retrieved 25 February, 2019, from <https://www.bangkokpost.com/opinion/opinion/1285539/new-auto-tax-rewards-greener-cars>.

(1) Green Building Certification Scheme

The Thai government has been making efforts related to ‘green’ buildings since 1992, and many consider such efforts are still ongoing.⁸³ Nevertheless, the Thai government has yet to demonstrate that it values the use of eco-friendly construction and building materials, as environmental requirements for buildings only regulate their energy consumption.

In accordance with the **Energy Conservation Promotion Act** amended in 1992, the Thai government enforces mandatory energy regulations on buildings which are greater than a specific size. This regulations apply to commercial buildings and those of public organizations, and they also specify a series of standards for exterior, lighting and ventilation system of buildings to conserve energy.⁸⁴ Based on interviews with the relevant departments, the Implementing Agency learned that public organizations are required to consider “environment-friendly” elements, in principle, during construction projects, but there are no practical regulations concerning the use of eco-friendly materials.

In addition to energy regulations on buildings, the Ministry of Energy in Thailand developed a certification system called ‘TEEAM (Thailand Energy & Environmental Assessment Method)’ based on a number of standards, regulations and experiences in Thailand and overseas. Although “materials and method of construction” are included in the evaluation criteria, building owners or construction companies do not have to consider the use of eco-friendly building materials in practice since no points are given to this set of criteria.⁸⁵

Another notable aspect of green building system in Thailand is that a number of certification schemes exist, with some competition among them. The US LEED (Leadership in Energy and Environmental Design) was the first one to be adopted, which led to the greatest number of certifications that have been issued so far in Thailand. The TREES (Thai’s Rating of Energy and Environmental Sustainability) system, independently developed by the Thai Green Building Institute to accommodate the situations specific to Thailand, was also launched and is currently in operation.

According to the TREES certification criteria, points are distributed for the use of eco-friendly building materials (“Materials and Resource” criteria). For newly-constructed buildings, one or two points are issued when products certified with Thai Green Label or Carbon Reduction Label account for not less than 10% or 20% of total material costs respectively.⁸⁶

⁸³ Lohmeng, A. et al., 2017, “State of the Art of Green Building Standards and Certification System Development in Thailand”, 2017 International Conference on Alternative Energy in Developing Countries and Emerging Economies.

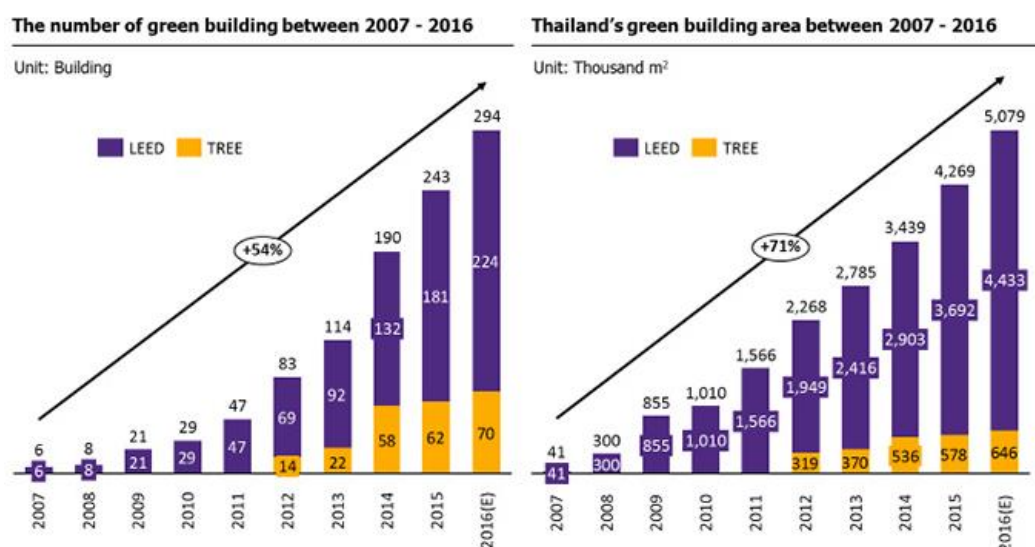
⁸⁴ APEC, 2013, “APEC Building Codes, Regulations and Standards: Minimum, Mandatory and Green”, APEC Sub-committee on Standards and Conformance.

⁸⁵ Chutarat, A., 2013, “Building and Construction Labelling and Certification Systems in Thailand”, German International Cooperation based in Bangkok.

⁸⁶ For the newly-built buildings, the total score is 85.

In addition, the Green Mark of Singapore and the DGNB scheme of Germany issue certificates to existing or newly-developed buildings in Thailand. Currently, these green building-related standards are not mandatory; however, it is possible that Thailand will enforce mandatory use of certain certification systems in the future, since many countries are adopting compulsory certification for buildings of specific types or sizes for the purpose of reinforcing sustainability. The adoption of TEEAM, the standards developed by a government agency, demonstrates increasing interests in this particular issue.⁸⁷

Although the number of certified buildings has been increasing steeply since the first green building appeared in 2007, it is still attracting attention only in private development projects. In general, 10% to 15% of additional costs arise in order to build eco-friendly buildings compared to general construction, and 30% additional costs are required to improve existing buildings compared to general renovation works.⁸⁸ The government has introduced some policies and incentives to encourage these eco-friendly developments, yet they have been criticized for not being consistent.⁸⁹



[Figure 27] Certification Trends in Thailand, 2007-2016⁹⁰

For example, some economic incentives have been provided to promote green building certification in Thailand. In 2012, the Bangkok City government provided incentives, through its city plan, to reduce the restriction on the floor area of buildings that had obtained preliminary certification under TREES. Depending on the four grades of the building, up to 20% of the floor area ratio bonus could be obtained.

⁸⁷ Lorenz & Partners, 2016, "Green Building in Thailand", Newsletter No. 208.

⁸⁸ Ibid.

⁸⁹ Panasonic Newsroom Global, 2016, "The New Era of Building Green in Thailand", Feature Story, 18 May 2016. Retrieved 25 February, 2019, from <https://news.panasonic.com/global/stories/2016/45142.html>.

⁹⁰ SCB Economic Intelligence Center, 2016, "Advancing Thailand's green material industry, backing the green building trend", EIC Analysis/Note, 16 November 2016. Retrieved 25 February, 2019, from <https://www.scbeic.com/en/detail/product/2936>.

TREES –Pre-New Construction – apply for F.A.R. Bonus (Bangkok City Plan 2012)		
Certification Level	Points (max 62)	F.A.R. Bonus
1 st Level	22-27 Points	5%
2 nd Level	28-32 Points	10%
3 rd Level	33-44 Points	15%
4 th Level	45-62 Points	20%

[Figure 28] TREES-related Incentives in Bangkok City⁹¹

It is believed that the Ministry of Energy also recognizes the TREES system as one of the significant drivers of the government's energy conservation policies.⁹² Owners of buildings are allowed to request financial support for part of their investment costs injected into energy conservation through the Energy Efficiency Revolving Fund (EERF) operated by the Department of Alternative Energy Development and Efficiency under the Ministry of Energy.⁹³

The green building certification scheme in Thailand has a sufficient linkage with the construction of public organizations, and future cooperation between the ministries could potentially improve GPP implementation and also show the leadership role of the public sector. However, it seems that coordination between the various certification systems may be needed to make this process effective. It is also very important to put forward incentive mechanisms which conform with the situation in Thailand and are not biased.

(2) Performance Evaluation of the Public Sector

Performance evaluation is an important tool for the government to achieve results and promote organizational behaviors to change in order to execute in a more efficient and effective manner. Thailand has been pursuing the implementation of Results-Based Management in the public sector for over a decade.

Performance evaluation of government agencies at various levels and in various regions has been in operation since 2003, with the Office of the Public Sector Development Commission (OPDC) established in 2002 as an operating body pursuant to the **State Administration Act**. Each agency establishes the Key Performance Index (KPI) for specific fields of its responsible works, and evaluation is conducted based on this index.⁹⁴

⁹¹ Maneesatid, P., 2016, "Energy Efficiency in Buildings", Keynote Address, German-Thai Chamber of Commerce.

⁹² Ibid.

⁹³ Lorenz & Partners, 2016.

⁹⁴ World Bank, 2011, "Results-Based Management in Thailand", Country Development Partnership on Governance and Public Sector Reform.

In order to measure the performance of each agency, the OPDC adopted the Balanced Scorecard concept with four elements: effectiveness of strategic plan implementation, efficiency of public work, quality of service delivery, and organizational development. Moreover, the Cabinet approved a series of principles and procedures in order to utilize incentive systems designed to promote performance improvement.⁹⁵

A performance index related to GPP has already been applied to PCD. According to the evaluation result in the 2016 fiscal year, the number of agencies in the public sector participating in GPP was designated as a major evaluation criterion, where the participation rate of government agencies, public institutions, local administrative organizations and public enterprises has to be calculated.

According to the literature review, OPDC presents annual awards (Public Sector Management Quality Awards (PMQA)) to individuals or departments obtaining high scores on the organizational management category from performance evaluations. This is one of the reputational incentives capable of encouraging related parties to invest continuous efforts.

In addition, it was learned that the system stipulates that financial bonuses can be paid to government officials at the agency whose total points from performance evaluation exceed a certain score. But, based on interviews with PCD, this type of bonus has not been offered for some time.

2.2.3 Draft Recommendation Report

The Implementing Agency prepared a draft Recommendation Report highlighting the results of the previous two steps of research. The Implementing Agency tried to assess the incentives that can be adopted and promoted most effectively in Thailand, together with stakeholders including the relevant ministries of Thailand. Accordingly, the conclusion of the draft Recommendation Report contained a plan to gather stakeholder opinions rather than a list of proposed incentive mechanisms.

The draft Recommendation Report was shared and discussed with the Thai Focal Point and KEITI at the interim meeting. The Implementing Agency revised the draft report (both contents and format) based on this discussion, and launched additional outreach to gather further stakeholder input on GPP incentive mechanisms.

⁹⁵ Col, J. et al., 2006, "Results-Based Management in Thailand: Evaluation Report".

2.2.4 Review by Stakeholders

To collect the opinions of the stakeholders on the draft Recommendation Report, the Implementing Agency held a meeting with line ministries. The purpose of this meeting was to discuss existing and potential GPP incentive mechanisms for Thailand. In addition to the Ministry of Finance and the Ministry of Interior, an invitation was extended to the Ministry of Commerce⁹⁶ and the Budget Bureau under the Office of Prime Minister.⁹⁷ The Pollution Control Department requested the ministries' participation to this meeting via an official channel, and sent the draft Recommendation Report for their review.

The Comptroller General's Department leads implementation of the newly enacted Public Procurement Act and is responsible for preparing detailed regulations for implementation. This Department is currently cooperating with the Pollution Control Department regarding the Third GPP Promotion Plan submitted to the Cabinet, along with the development of other relevant GPP policies. The GPP Promotion Plan is the sole national policy document directing GPP in Thailand. With the enactment of the new Public Procurement Act, the existing GPP-related regulation became invalid. As such, there is a need for a new ministerial regulation on how GPP will be integrated and executed under the new legal system. The Comptroller General's Department is tasked with the development of the corresponding ministerial regulation, and thus, plays a substantial role in GPP implementation.

The Comptroller General's Department of the Ministry of Finance, and the Department of Public Works and Town and Country Planning of the Ministry of Interior participated in the meeting. The Ministry of Commerce and Budget Bureau both declined the meeting invitation and did not attend. A list of participants is shown in Table 42.

No.	Name	Organization
1	Mrs. Nitiyaporn Imjai	Comptroller General's Department
2	Mrs. Suthisa Jarumaethawit	Comptroller General's Department
3	Ms. Suthasinee Srimanasak	Comptroller General's Department
4	Ms. Vucharanee Jaruma	Department of Public Works and Town & Country Planning
5	Mr. Viroj Junsri	Department of Public Works and Town & Country Planning

[Table 42] Participants from the Line Ministries

⁹⁶ The Ministry of Commerce sets the standard price of procurement products.

⁹⁷ The Budget Bureau of the Office of Prime Minister manages the budget of the public sector.

At the meeting, the Implementing Agency presented an overview of the various incentive mechanisms being adopted by countries based on the draft Report that was shared with participants prior to the meeting. Participants were asked questions about the incentive mechanisms and their implementation.

Questions concerning economic incentives such as tax benefits and subsidies could not be answered during the meeting, as these fell under the purview of the Fiscal Policy Department of the Ministry of Finance, who did not attend the meeting. The Implementing Agency subsequently carried out an additional literature review (see 2.2.2) to answer these questions.

There are no regulations that obligate the purchase of environmentally-friendly products in Thailand. Although the Energy Building Code must be applied for new construction projects, there are no regulations for purchasing environmentally-friendly construction and building materials. Moreover, although new construction projects are urged to consider environmentally-friendly factors in accordance with the scale and budget of the construction project, this principle is not enforced.

Meeting participants were asked a question about the role of various departments in incentivizing GPP in construction. Given that there is no requirement under the current law, although the Department of Public Works and Town and Country Planning is responsible for setting the construction standards and specifications for the construction works ordered by public organizations, the Department clearly stated that the introduction of policies related to GPP in construction works is still the responsibility of the Comptroller General's Department.

Upon the Cabinet's approval of the Third Promotion Plan, the existing reputational incentive, the "Best Procurement Awards", will be given out. However, the provision of any economic bonus tied to the results of the performance evaluation is not available, and the Focal Point stated that implementing such an economic incentive would be difficult in the near future.

Meeting participants discussed the potential for adopting marketing support measures for suppliers in the procurement process in order to promote GPP. The Focal Point and the Comptroller General's Department explained that the Cabinet broadly discussed issues such as obligatory purchasing of green products and easing of the procurement procedures. Therefore, there is a need to closely examine the resolution by the Cabinet and the progress of the development of the ministerial regulation by the Ministry of Finance. It is of the view of the Implementing Agency that the Recommendations Report could be potentially be used to inform the development of the regulation.

Participants also discussed the potential to integrate GPP into the newly enacted Public Procurement Act. As an example, a quota was set for the purchase of products manufactured by Thai companies within Thailand. If the quota is satisfied, a tax exemption would be granted. As such, there was a discussion about whether such a quota approach could similarly be applied to green products.

One participant raised the idea to include green products in the ‘selection method’ for bidding per Article 65 of the Public Procurement Act. It is expected that green products can be included as Thai Innovation Products among the product groups stipulated under the ministerial regulation per Article 65. The Innovation Products provide tax benefits for the products manufactured by Thai companies in Thailand for eight years.

There was a wide range of views among the government ministries in Thailand on potential GPP incentive mechanisms. The pending Cabinet decisions on new regulations also limited the extent to which incentive mechanisms could be selected. Once the specific procurement procedures and regulations are determined based on final decisions of the Cabinet, a corresponding incentive mechanism for GPP can be selected and designed. For these reasons, it was considered premature to pinpoint specific measures determined to be appropriate for Thailand at the time of preparation of this Report.

2.2.5 Revision of the Recommendation Report

As a result of the meeting, the Focal Point and the line ministries requested that the Implementing Agency proactively propose incentive mechanisms for Thailand based on Korea’s experience. The Implementing Agency presented the recommendations as the conclusion of the Report, combining the results of the benchmarking and analysis of current policies and incentives of Thailand. The conclusions of the Recommendation Report are presented below.

• Study Purpose and Steps

The purpose of the benchmarking of GPP incentive mechanisms was to examine methods adopted by countries within the region to promote GPP, to provide a variety of available options to the Thai government, and to help the Thai government select and adopt appropriate mechanisms. Additional analysis of the various local circumstances will be required to make an informed selection of appropriate and viable GPP incentives for Thailand.

The Implementing Agency first defined “incentive mechanisms for GPP”, and then classified them as either “economic”, “reputational”, and/or “regulatory” incentives. While an internationally recognized

definition and classification system for GPP incentives does not exist, the definition and classification system used relies on existing UNEP reports and literature.⁹⁸ The Implementing Agency defined GPP incentive as “the mechanisms that are in place to encourage procurement officials, procurement agencies, producers and suppliers to consume and produce environmentally-friendly products and services”.

Within the limits of data accessibility and language, this Report focused on the analysis of basic legal structures and incentive mechanisms associated with GPP in Korea. As requested by the Focal Point, the Implementing Agency examined the details of the legal basis, institutional structures, operating agencies, and procedures for each GPP incentive mechanism. In addition, the Implementing Agency investigated GPP incentive mechanisms utilized in leading GPP countries within the Asia-Pacific region (including Japan, China, and Malaysia), and key measures were subsequently presented.

• Study Limitations

Thailand has engaged in GPP both in the public and private sectors for the past ten years. Nevertheless, these procurements are based on voluntary participation and have been energized only through Promotion Plans for GPP, without any particular establishment of applicable laws and regulations. For example, the approval of the Third Promotion Plan has been delayed, and many details contained in the documents have yet to be implemented. This situation is an obstacle to accelerated implementation of GPP in Thailand.

PCD has asked for a study to be carried out on incentive mechanisms for GPP in this context. Proper use of GPP incentive mechanisms is expected to encourage participation in GPP from diverse sectors. To encourage participation, numerous elements need to be considered. However, these elements were not analyzed in this study due to limited time and difficulty in acquiring relevant data, including:

- ▼ Progress on enactment of laws and regulations regarding public procurement in Thailand, including GPP;
- ▼ Procedures and customary practices of local procurement related to GPP;
- ▼ Potential for inter-agency cooperation.

Moreover, the Third GPP Promotion Plan being considered by the Cabinet and a series of subsequent legislative measures will include a number of GPP incentive mechanisms. However, these procedures are still being designed, and have yet to produce any specific conclusions. Thus, presenting a complete set of GPP incentive mechanism recommendations may be premature.

⁹⁸ UNEP, 2017a.

After a draft of this Report was prepared, the Implementing Agency attempted to gather opinions from relevant ministries in Thailand about the incentive measures that Thailand could adopt, and the potential expanse of effects of these measures. However, the Implementing Agency was not able to arrive at a clear-cut conclusion for the reasons stated above.

● Recommendations

The Implementing Agency suggests the following measures to be considered as priorities for the introduction of GPP incentives.

In Thailand, where there are no laws or regulations surrounding GPP, and it would take a long time to establish a new law or policy. Therefore, the Implementing Agency recommends first integrating GPP within existing policies and programs.

Thailand's performance evaluation system and green building certification scheme can be major targets for GPP integration. This follows a similar strategy as GPP implementation in Korea where the integration of GPP into performance evaluation for public organizations as well as green building certification scheme has been successful.^{99,100}

Performance evaluation in itself can make the procurement organization pay attention to the rate at which green products are purchased. In addition, it can also facilitate implementation through follow-up measures identified in the evaluation. In Thailand, it is difficult to use economic incentives due to a lack of performance-based bonuses. However, it would be possible to stimulate GPP implementation through a number of mechanisms, including requesting other government agencies to cooperate with GPP, providing training and customized consulting services to poorly performing organizations, and giving out awards to the outstanding agencies.

At present, OPDC is conducting performance evaluation for all ministries in Thailand. Cooperation with OPDC and approval from the high-level government officials such as the Cabinet would be required for the integration of GPP within this performance evaluation process. The Implementing Agency recommends designing and distributing the methodology and procedures for collecting the results of GPP from the target organizations following a pilot. The pilot process could, for example, does not incorporate the assessment score of the GPP results into the final evaluation score of target organizations during certain periods to examine the responses and methodologies of evaluation.

⁹⁹ UNEP, 2017b.

¹⁰⁰ KEITI, 2014.

In Korea, KEITI continuously receives relevant data from the Public Procurement Service, and systematically manages purchasing records by re-checking them with the target organizations. Results are shared with the ministries in charge, and evaluation is carried out according to pre-defined indicators every year. To this end, in Thailand, the development and dissemination of methodology and the capacity building of relevant ministries should be carried out, and training provided to ensure that relevant requirements are fully understood and anticipated.

The Implementing Agency also recommends that the environmental impacts of procuring building and construction materials be considered as a priority. Typically, building and construction materials make up a large portion of overall spending by governments. For example, currently, such materials account for nearly half of all GPP products in Korea (47% in 2016), up seven times from 2005 (6.6%). Incentive mechanisms could include requiring public sector organizations to purchase environmentally-friendly construction materials such as recycled aggregate; or requiring green building certification for buildings to evaluate the environmentally-friendly materials.

The green building certification scheme currently in operation in Thailand for private companies is expected to be easily linked with the incentive mechanism for GPP. Public sector adoption of the green building certification for various construction projects could effectively increase the magnitude of procurement of eco-friendly building and construction materials. The Implementing Agency recommends establishing economic incentive mechanisms in cooperation with relevant ministries and other efforts to maximize public and private sector participation.

However, the relationship between the various green building certification schemes currently operating in Thailand needs to be clarified. In addition, the green label and green cart certification standards for building and construction materials need to be further developed. The role of the Ministry of the Interior, which oversees the public sector's construction tasks, should be clearly defined and measures should be taken to ensure the procurement of eco-friendly building and construction materials at each stage of construction.

Therefore, the Implementing Agency strongly recommends the introduction of a green building certification system for public organizations in consideration of the general procurement scale of building and construction materials, as well as the integration of GPP with the performance evaluation system. The procedures and priorities for the introduction and implementation of the two systems were not the focus of this Report. It is expected that the Thai government will be able to benchmark specific methodologies in cooperation with related ministries in Korea, such as KEITI.

To further promote the implementation of GPP, enacting laws that stipulate GPP would be highly

effective. The Ministry of Finance's expected Ministerial Regulation should state that the government is obliged to provide appropriate measures to promote the implementation of GPP. This regulation must also specify the roles and responsibilities of each ministry in implementing GPP.

In addition to the above two measures, economic incentives granted to eco-friendly vehicles or green buildings are often offered not only to the public sector but also the private sector, such as manufacturers and consumers, in order to support the development of green markets. Hence, positive consideration and tight-knit inter-agency consultation are required. Effects similar to the above can be achieved through incentives related to procurement procedures. Procurement procedures can be adapted for public organizations to favor green products in public sector purchasing, which sends a powerful message to manufacturers.

Regulatory incentives, for example, the mandatory purchase of certain products such as eco-friendly vehicles and building materials, are also effective since they directly impose an obligation on public organizations to purchase green products. However, in Thailand, where GPP is practiced on a voluntary basis, it may be a challenging task to design such policies or negotiate with relevant ministries concerning the introduction of this type of incentive.

● **Future Direction**

Before introducing specific measures, the Thai government, and especially the PCD (a competent agency in charge of GPP), will need to pay special attention to the following matters.

First, a thorough examination needs to be conducted as to whether any of the proposed GPP measures conflicts with procurement-related laws, in particular the newly-established Public Procurement Act. In some countries, there have been cases where GPP became non-effective after legal provisions designed to support it ran into conflict with procurement-related laws and regulations. If there is a conflict, Thailand should consider creating a stand-alone GPP law, as in Korea and Japan.

Second, Thailand must minimize any overlap between newly-added administrative procedures involving GPP incentives and existing procurement procedures, and integrate new procedures into existing procedures. Protocols should avoid confusion, and allow government procurers to carry out additional tasks without any extra burden.

Third, awareness of GPP must be raised within the ministries' adopting the incentive measures. Ministry leadership and staff need to have a better understanding of the expected effects of GPP incentive measures, as well as their responsibilities in implementing them. They also need to be encouraged to embrace these measures positively, in order to mitigate the burden that the measures

may impose upon departments in charge of GPP.

Fourth, the Thai government must consider possible trade-offs between incentive mechanisms and other related policies and programs when evaluating potential GPP policy and incentive measures. Meticulous planning is required in order to achieve positive outcomes and avoid negative impacts.

In addition to the four issues described above regarding the selection of incentive mechanisms, consideration can be given to the following questions posed by the World Bank, which help to determine the feasibility of introducing specific policies.¹⁰¹

Box 2. Screening Process to Evaluate Incentives

- (1) What is the intended purpose of the incentive?
- (2) Who does the incentive target?
- (3) Is the incentive aligned with organizational goals/outcomes?
- (4) Are the criteria for identification of good performance clear, and is the process transparent?
- (5) Is there any way to determine whether the incentive achieves its intended purpose?
- (6) What are the potential costs/unintended consequences that might emerge as a result of the incentive?
- (7) Do employees perceive it as equitable, more objective, and genuinely rewarding performance?

The Implementing Agency investigated the demand and preference for incentive mechanisms by collecting feedback from stakeholders and delivered the findings of this research. The demands from (and difficulties experienced by) manufacturers, especially small- and medium-sized enterprises, should be also considered. The main content of the Recommendation Report was shared with stakeholders at the final workshop held in conjunction with the Second Awareness-raising Workshop, and additional comments were collected. Participants in the private sector were particularly interested in incentive measures that could be awarded to the industry, such as preferential treatment, subsidies, and tax benefits for eco-friendly products. They expressed interest in the adoption of these types of incentive mechanisms at the government level.

The Implementing Agency prepared an amended Report reflecting the opinions of the Focal Point, KEITI, and the stakeholders of GPP incentive measures, and requested their additional review. After the discussion with the Focal Point and KETI, the report was finalized and delivered as a project output.

¹⁰¹ Adopted from: World Bank, 2011.

2.3 Knowledge Transfer and Awareness-Raising on GPP

The transfer of knowledge regarding GPP implementation and support for raising awareness were originally set as two separate consulting items. In this report, results for both actions are explained together. As agreed and documented in the Action Plan, the first awareness raising workshop and the knowledge transfer networking session were held as one combined event. The time frame of organizing this workshop is presented below in Table 43.

The objectives of knowledge transfer and awareness raising on GPP were to promote interaction between the experts of Thailand and Korea; to share Korea's experience in promoting GPP implementation in the construction sector; and to bring awareness about the use of GPP in the construction and building sectors to stakeholders, including relevant ministries, government procurers, and companies.

Although there are active Green Building certification schemes in Thailand, such as LEED and TREES (described in the previous chapter), they began as private sector initiatives, and have yet to apply to buildings owned by public-sector agencies. A substantial portion of Thai government spending is currently focused on infrastructure development projects. Accordingly, the Focal Point and the Implementing Agency agreed that policies linking forthcoming public sector construction work to Green Building certification would be effective in advancing GPP, as in Korea.

To establish a foundation for activating GPP in the construction sector, it is important to improve awareness and transfer knowledge on relevant policies and programs. The project sought to increase networking between Korean and Thai GPP, Green Building certification scheme experts, and green building stakeholders.

Implementation Steps		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1st	1. Propose Agenda										
	2. Invite Experts										
	3. Invite Stakeholders										
	4. Organize Session										
2nd	1. Propose Agenda										
	2. Invite Experts										
	3. Invite Stakeholders										
	4. Organize Session										

[Table 43] Schedule for Networking Session and Awareness-raising Workshop

2.3.1 First Awareness-raising Workshop and Networking Session

The Agenda of the event held on May 16, 2018, at the Sukosol Hotel in Bangkok, Thailand is shown in Table 44 below. To invite stakeholders in Thailand to the event, the Focal Point recruited participants by sending official letters. There were a total of 60 participants at the event including the government officials from the line ministries, such as Ministry of Natural Resource and Environment, Ministry of Finance and Ministry of Interior; experts from the specialized institutions such as Thailand Environment Institute, Thailand Green Building Institute, Thailand Greenhouse Gas Organization, and Thailand Industrial Standard Institute; and companies that manufacture construction and building materials.

Time	Session	Note
09:00-09:10	Opening Remarks	
09:10-09:40	Global Trend of Green Public Procurement	Dr. Mushtaq Memon (UNEP)
09:40-10:10	Korea's Experience on Implementing GPP in Construction Sector	Mr. Kyoung Chae Lee (KEITI)
10:30-11:00	Korea's Experience on Promoting GPP: Green Building Program(G-SEED)	Dr. Chang-U Chae (KICT)
11:00-11:20	Current Status and Future Plans for GPP in Thailand's Construction Sector	Mr. Janejob Suksod (PCD)
11:20-11:50	Introduction of Asia Pacific Green Public Procurement Partnership Project	Mr. Hyunjin Chang (SMaRT ECO)
11:50-13:00	Lunch	
13:00-13:25	Technical Requirements for Building & Construction Materials for GPP and G-SEED in Korea	Dr. Chang-U Chae (KICT)
13:25-13:50	Future Prospects for the Improvement of Technology and Performance of Building & Construction Materials for GPP in Thailand	Dr. Atch Sreshthaputra (TGBI)
13:50-15:00	(Panel Discussion) Challenges and Opportunities for the Introduction of GPP in Thailand's Construction Sector – Policy Perspective	Chair: Dr. Ik Kim (SMaRT ECO) Panelist: - Ms. Aran Chae (KEITI) - Dr. Chang-U Chae (KICT) - Mr. Janejob Suksod (PCD) - Dr. Chaeyod Bunyagidi
15:20-16:30	(Networking) Status and Future Prospects for Implementing GPP in Thailand's Construction Sector– Technical Perspective	Chair: Dr. Ik Kim (SMaRT ECO) Panelist: - Ms. Aran Chae (KEITI) - Dr. Chang-U Chae (KICT) - Mr. Janejob Suksod (PCD) - Dr. Atch Sreshthaputra (TGBI) - Dr. Kanyanee Seangkiatyuth (TEI)

[Table 44] Agenda of the first Awareness-raising Workshop and Networking Session

A brief explanation of the contents of each session is provided below.

First, the need to implement GPP in public-sector construction work was introduced through an examination of global trends and Korea's experience with this topic. Dr. Mushtaq Memon, regional coordinator of the UN Environment Asia-Pacific Regional Office, presented on the role of GPP as a tool to support the priorities of national policies. In this presentation, Dr. Memon described the importance of GPP in the construction sector given the long-term environmental impact of buildings, as well as precedents in various countries. Mr. Kyoung Chae Lee, team manager of the KEITI, presented a case study of Korea, and introduced the procedures and supporting policies for the stages of construction work that promote the procurement of environmentally-friendly materials.

Dr. Chang-U Chae, senior researcher of Korea Institute of Civil Engineering & Building Technology, presented the Korean Green Building certification scheme and explained the contents of the scheme in detail. He emphasized the role of the government in mobilizing corporate participation in the early stages of policy development.

Mr. Janejob Suksod, director of the Pollution Control Department in the Ministry of Natural Resources and Environment of Thailand, presented the current status of GPP implementation in Thailand, summarized the barriers to implementation, and described plans for expanding GPP in Thailand's construction sector. Mr. Hyunjin Chang from the Implementing Agency introduced the project, which aimed to support such implementation and expansion. These presentations focused on GPP implementation in the construction sector and the policy interests of the Thai government regarding GPP in this sector.

The afternoon of the workshop focused on the technical aspects of sustainable construction and building materials production. Dr. Chang-U Chae presented the evaluation criteria for construction and building materials stipulated under the Green Building certification scheme of Korea, and how these resources and materials are evaluated. Dr. Atch Sreshthaputra, the Vice-chairman of the Thailand Green Building Institute, presented on the general environmental impacts of construction and building materials, and emphasized the need to have stakeholder discussions on progress and future planning in Thailand.

In planning the workshop, the Implementing Agency chose to hold panels to effectively limit the scope of discussion. The panelists were directed to respond to questions sent to them by the chair prior to the workshop. The panel discussion related to GPP policy was scheduled immediately before the networking session to increase the participation of the stakeholders.

The following key issues emerged through discussion by stakeholders in the workshop. The companies that participated in the event were interested in the development of green products and participation in GPP. They agreed that the development and manufacture of environmentally-friendly products were only possible when there were definitive demands for them. For this reason, they requested that the government first establish relevant laws or policies before they started to invest in developing and making these products.

The Thai Pollution Control Department stated that although stakeholder awareness of GPP has improved substantially over the last decade, promoting or enforcing implementation through legal regulations has not achieved sufficient outcomes in comparison to the efforts put in. Accordingly, companies could manufacture improved environmentally-friendly products by competing with each other, prior to the establishment of the legal basis.

Although the government and private companies agreed that implementation of GPP must be promoted by the establishment of a legal basis, there are differences in opinion on which actions need to be taken first. Under the current situation, it is difficult for the Ministry of Natural Resources and Environment to enact law or policy immediately given the lengthy processes needed to cooperate with other ministries.

Participants generally displayed interest in Korea's experience with GPP implementation, especially in the construction sector and in the Green Building certification scheme. Participants were also interested in benchmarking Thailand's scheme with that of Korea.

In conclusion, it appears that the Thai government needs to improve its legal and institutional basis of GPP. Rather than pursuing it independently within the Ministry of Natural Resource and Environment, it should be pursued collaboratively among the Ministry of Finance, other line ministries, and relevant companies; all of these groups should provide their opinions and execute their respective roles regarding GPP implementation. Based on the outcomes of workshop and questionnaire survey, the private sector intends to actively participate in these activities, and is waiting for direction to be given by the government.

Photographs from the workshop and networking session are presented below in Figure 29.



[Figure 29] Photographs of the First Awareness-raising Workshop and Networking Session

At the end of the workshop, an assessment questionnaire was distributed to the participants. The results are summarized in table 45.

Items	Very Good	Good	Average	Poor	Very Poor
Fulfilment of Workshop Objectives	9%	68%	23%	0%	0%
Usefulness of Information	9%	77%	14%	0%	0%
Level of Contents	14%	50%	36%	0%	0%
Distribution of Time	9%	59%	23%	9%	0%
Panel Discussion	18%	38%	38%	5%	0%
Networking Session	19%	38%	38%	5%	0%
Overall Assessment	9%	68%	23%	0%	0%

[Table 45] Results of Questionnaire for the First Workshop

The level of overall satisfaction on the workshop was 77%, which was lower than the targeted level of 80%. Concerns included problems in communication between the experts of both countries due to the translators' ability. To prevent recurrence of the same issue in the second awareness-raising workshop, the translators' capabilities were verified more thoroughly. Additionally, translators were

provided with more comprehensive information and data about the workshop contents well ahead of the event.

2.3.2 The Second Awareness-Raising Workshop

The second awareness-raising workshop was held on November 26 at the Century Park Hotel in Bangkok, Thailand. The second and final workshops were combined after discussions with KEITI, the Focal Point, considering the remaining period of the project and overlap between the content of each workshop.

The Implementing Agency and the Focal Point agreed that the second awareness-raising workshop should be carried out with a diverse set of stakeholders as the target audience. During the first event, several participants commented that appropriate momentum was not being generated in Thailand on GPP due to the lack of stakeholder awareness of GPP. Therefore, the Focal Point and the Implementing Agency decided that it was important to raise comprehensive awareness among various stakeholders in Thailand, including government procurers and manufacturers.

The second workshop was held with approximately 60 participants, including government officials of the line ministries related to the development and implementation of GPP policy, and specialists of GPP product manufacturers subject to the draft criteria. Similar to the first event, the Focal Point and the Federation of Thai Industries supported the recruitment of participants by forwarding official invitations to stakeholders.

As with the first event, presenters shared various case studies on implementation of GPP. In addition, the Implementing Agency presented the outcomes of the project to date, and collected opinions of the participants on GPP implementation. The Workshop Agenda is shown in Table 46.

Time	Session	Presenter
09:30-09:40	Opening Remarks	
09:40-10:00	Introduction of Asia Pacific GPP Partnership Project and its Future Project	Ms. Aran Chae (KEITI)
10:35-10:55	Global Trend of Green Public Procurement	Dr. Mushtaq Memon (UNEP)
10:55-11:30	Korea's Experience in Implementing GPP	Ms. Hyunju Lee (KEITI)

11:30-12:00	Benefits and Roles for the Companies to Participate in GPP	Ms. Piyaporn Thanangteerapong (PTT)
12:00-13:30	Lunch	
13:30-14:10	Green Cart Criteria for the Building & Construction Materials	Mr. Hyunjin Chang (SMaRT ECO)
14:30-15:10	Incentives to Promote GPP Implementation – Recommendation Report	Mr. Hyunjin Chang (SMaRT ECO)
15:10-15:50	Current Status and Future Plans for GPP in Thailand	Mr. Janejob Suksod (PCD)
15:50-16:00	Closing	

[Table 46] Second Awareness-raising Workshop Agenda

The first presentation was given by Ms. Aran Chae, researcher of KEITI, who shared the background, purpose, and implementation progress of the project. Ms. Chae also presented the consulting items derived in the first year of the project and introduced the second year's awareness-raising workshops. In addition, in order to garner interest and stakeholder participation, KEITI announced the planned 2019 activities.

The workshop included sessions introducing the global trends of GPP, along with the experiences and achievements made in Korea to raise awareness about GPP. Dr. Mushtaq Memon, the regional coordinator at the UN Environment Asia-Pacific Regional Office, presented on various activities of the UN Environment targeted towards raising awareness about GPP in the region. Ms. Hyunju Lee, senior researcher at KEITI, presented a case study on GPP in Korea, including the legal basis, implementation mechanism, public procurement process, supporting policy, and performance of GPP.

Ms. Piyaporn Thanangteerapong, Vice President of the PTT (a Thai state-owned oil and gas company), presented on GPP under the theme of 'benefits and roles for the companies to participate in GPP'. This discussion included the background, purpose, and details of a series of green procurement activities carried out by the PTT, in addition to the advantages of green purchasing by the private sector.

In the afternoon, Mr. Hyunjin Chang from the Implementing Agency shared the process and results of the Green Cart criteria development and the *Recommendation Report on the Incentive Mechanisms for GPP*. Mr. Chang also collected opinions of the participants on GPP implementation. Finally, Mr. Janejob Suksod from PCD discussed the status of GPP implementation in Thailand, including the legal and institutional basis and certification scheme. Mr. Suksod also announced plans to further promote GPP implementation that will utilize the outcomes from the project.

Discussion with participants followed the presentations. In this discussion, the Implementing Agency note that the private sector has yet to recognize the full value of GPP and the eco-labeling scheme. Participants recommended the Thai government to provide active support for small and medium enterprises (SMEs) to participate in GPP, and should strive to balance the views of both large and small businesses. In Korea's experience, the main beneficiaries of GPP have been SMEs. It is of the opinion of the Implementing Agency that additional research on this topic could be undertaken and presented to the countries in the region.



[Figure 30] Photographs of the Second Awareness-raising Workshop

Participants completed a post-workshop assessment questionnaire. The results are summarized in Table 47.

Items	Very Good	Good	Average	Poor	Very Poor
Fulfilment of Workshop Objectives	14%	64%	22%	0%	0%
Usefulness of Information	22%	57%	21%	0%	0%
Level of Contents	14%	61%	21%	4%	0%
Distribution of Time	7%	50%	43%	0%	0%
Overall Assessment	18%	61%	21%	0%	0%

[Table 47] Results of Questionnaire for the Second Workshop (I)

Average Score		GPP		Green Label & Green Cart		Willingness to Participate			
Before workshop		6.00		6.11		6.05			
After Workshop		8.37		7.75		7.85			
Very insufficient		Insufficient		Sufficient		Improved		Very much improved	
1	2	3	4	5	6	7	8	9	10

[Table 48] Results of Questionnaire for the Second Workshop (II)

Participants were also asked to subjectively judge, from one to ten, the degree of improvement in awareness of GPP through presentations and discussions as a result of the workshop. Analysis of the questionnaire results showed that participant's awareness of GPP had improved significantly through the workshop. The participants' assessment scores on their awareness of GPP were 7.26 (improved), an increase of 35.2% from an average of 5.37 points (moderate) before the workshop. In particular, the incentive mechanism showed the highest increase from before to after the workshop (50.4%).

The questionnaire results also show that the satisfaction rate with the workshop was 79%, higher than for the first workshop. Problems in communications still rose from simultaneous translation. Although information was shared with the translator in advance of the workshop, the translation of technical terms was problematic. Consideration should be made as to whether or not to use simultaneous translation in subsequent projects and events in Thailand.

2.3.3 Results and Implications

Through the implementation of this consulting item, the Implementing Agency raised awareness for promoting GPP in Thailand through sharing advanced experience in Korea and other countries, and transferred the knowledge for implementation of GPP in the construction sector. The two events were held for public and private sector participants. Through presentations and discussions, the following implications were identified for both Thailand and the Korean partners.

First of all, participants generally displayed interest in Korea's experience with GPP implementation, especially in the construction sector and in the Green Building certification scheme. Participants were also interested in benchmarking Thailand's scheme with that of Korea. Although companies have a great interest in the development of green products and the participation in GPP, they have requested the government to set up relevant laws and policies, especially incentive mechanisms that support enterprises in regulatory and/or financial ways.

Under the current situation where it is difficult for the immediate enactment of laws and policies, the government hoped that the private sector could lead the establishment of the basis for GPP by putting in more efforts to supply environmentally-friendly products. Therefore, although the government and private companies agreed that the implementation of GPP must be promoted by the establishment of a legal basis, there are differences in opinion on which actions need to be taken first.

Moreover, the Implementing Agency noted that the private sector has yet to recognize the full value of GPP and the eco-labeling scheme. The Thai government is expected to strengthen awareness-raising and public outreach on the current policies and future plans for the effective implementation of GPP. In this regard, the Thai government should also provide active support for small and medium enterprises (SMEs) to participate in GPP, and should strive to balance the views of both large and small businesses.

One of the limitations of this consulting item was that the problem of communication has persisted in the process of using simultaneous interpretation, which seems to have been difficult in translating technical terms in addition to the inherent difficulties of interpreting between Thai and Korean. Focal Point suggested that the future local events be conducted in English, and the follow-up projects need further consideration of whether or not the simultaneous interpretation is necessary.

Other limitations include the lack of awareness of stakeholders in Thailand and the limited effect of the event for its one-off characteristic. As a result, evaluations of participants were not able to be systematically carried out, making it difficult to judge the degree of awareness-raising. As a way to overcome these limitations, the Implementing Agency propose, as a follow-up project, to nurture experts through intensive training programs so that they can further improve education and awareness of local stakeholders (See Chapter 3).

3. Consulting Outcomes and Future Plans

3.1 Consulting Outcomes and Limitations

Progresses and Performance

Thailand has been implementing GPP over the last decade, led by the Pollution Control Department under the Ministry of Natural Resource and Environment. The two priorities for Thailand's GPP established in project Year One were identifying the measures to promote existing GPP in Thailand, and selecting a new area to expand the range of the priority products of GPP.

The construction sector was determined to have the greatest potential in activation of GPP implementation. Therefore, the first consulting item was to establish GPP criteria for construction and building materials. In addition, an interactive event with experts from Thailand and Korea was planned in order to transfer knowledge on adopting GPP in the process of procuring construction and building materials by the public sector.

The Focal Point in Thailand was interested in the means of promoting voluntary implementation of GPP. Therefore, it was also proposed to benchmark the experiences of Korea and various other countries on GPP activities and incentive mechanisms. In order to support the process and build capacity, two awareness-raising workshops were planned for government officials and manufacturers. The workshops provided an opportunity to emphasize the necessity and potential benefits of implementing GPP with important stakeholders.

The project in year two was implemented in accordance with the agreed-upon Action Plan. All of the scheduled consulting items were successfully completed within the project period with the cooperation of the Focal Point and local partners. The following key outcomes were achieved.

Firstly, the final draft criteria were established through literature review, a market readiness study, and the collection of stakeholder opinion. This work will enable the Technical Sub-committee responsible for establishing criteria to examine drafts without significant revision. Criteria for cement and construction steel products developed through this project will enable substantial portion of the basic materials infused into construction and building works to be substituted with environmentally-friendly products, if there is sufficient cooperation among the relevant ministries. There would be enormous positive environmental impact arising from such implementation. In addition, on the basis of the procedures and methods utilized in this project, it is anticipated that the Focal Point in Thailand could more efficiently establish the criteria regardless of the presence of Green Label criteria in the future.

The recommendation report on incentive mechanisms can also be used in the development of policy between government ministries as requested by the Focal Point. For the report, the legal basis, institutional structure and operational procedures for various policies of the four countries (Korea, Japan, China and Malaysia) benchmarked were analyzed in order to present the potential benefits arising from the introduced measures. Most importantly, GPP of Thailand was analyzed to seek methods appropriate for Thailand, and the Implementing Agency hoped to present realistic recommendations through meetings with the relevant ministries. The Focal Point in Thailand is anticipated to design effective incentive mechanism in accordance with the domestic trend of policy development in the future, and based on the report's findings.

Finally, approximately 100 personnel from government ministries and manufacturers were engaged through two local events, effectively raising awareness and transferring knowledge. Stakeholders became more aware of the need to promote GPP implementation in Thailand by acquiring international experience, in particular from Korea. This provided opportunity for mutual learning - not only for the participants of events but also the Focal Point, and the institutions in Korea. Their participation shed light on what is needed to support GPP implementation in the public and private sectors.

Dissemination of Project Deliverables and Outcomes

Information on the consulting items and on the two workshops held in Thailand was published on the UN Environment website¹⁰², and the final report for the Year One project is shared through the One Planet platform¹⁰³. The Focal Point contributed to the dissemination of project results by publishing the results of the two workshops held through the newsletter published by the PCD, and on the Thai GPP website. Figure 31 below displays this PCD newsletter.



[Figure 31] Newsletters from PCD

¹⁰² <http://www.unenvironment.org/events/workshop/asia-pacific-green-public-procurement-partnership-project>

¹⁰³ <http://www.oneplanetnetwork.org/initiative/asia-pacific-green-public-procurement-partnership-project-0>

The Implementing Agency is planning to distribute English version of this final report through various channels including the Focal Point and KEITI. The recommendation report on incentive mechanisms will be designed and published as an independent publication in order for external institutions to use as a reference document, as this information can be utilized in countries and regions other than the partner country.

In addition, the Implementing Agency sought to create synergy with other international support projects on GPP in the region, and to prevent redundancy. For example, PCD ensured that the “Advance SCP project” with the German International Cooperative (GIZ) selected categories other than construction and building materials to prevent redundancy between the projects.

Project Risk Management

In Year Two of the project, risks included the possibility of delay in pursuing the relevant works due to delay in coordinating of works with the partner country, and delay from the official or unofficial works due to differences in culture between Korea and Thailand. However, the project was implemented through close discussion between the Implementing Agency and the Focal Point, and there was no delay in coordinating with the Focal Point in Thailand. Communications and cooperation was actively managed to ensure that the Action Plan was implemented.

The Implementing Agency also tried to plan sufficient time when executing works with the Focal Point or other stakeholders. The period for which implementation of activities could be difficult due to official (public holiday) and unofficial reasons (audit) by the government of the partner country was mutually shared in advance and was reflected in the schedule of each consulting item. To this end, the Implementing Agency visited the local site additionally and collected the opinions of the stakeholders in order to effectively plan for consulting items.

Lastly, in the case of some of consulting items, additional steps might have to be taken because the project could not be completed within the project period, thereby continuing into the following year. The Implementing Agency designed consulting items to be able to be implemented continuously, even after the conclusion of the project in the partner country, regardless of the presence of follow-up projects. This final report will be provided to support this implementation process.

Limitations in Project Implementation

Although the Implementing Agency sought to solve some limitations faced in implementing the project in Thailand, the voluntary efforts of the Focal Point or the next stage of the project will be needed to overcome limitations.

First, in relation to the establishment of Green Cart, the definition and scope of the products were not clearly established in the process of expanding the scope of Green Cart criteria for steel bars to those for construction steel products, thereby causing confusion among stakeholders. Moreover, some of the environmental impacts from the entire life-cycle of the products were omitted from draft criteria due to the limited technical levels of the local companies in Thailand.

Although the Implementing Agency was not able to request immediate revision of these criteria for which agreements were reached between the manufacturers and the government, the omitted environmental impacts need to be included in future revisions of the criteria. It was noted in this regard that an excellent foundation for establishing the Green Cart criteria would be to build on the Thailand Green Label criteria.

Although it was anticipated at the time of planning of the project that the Third GPP Promotion Plan would be approved by the Cabinet within short period of time and be implemented within the project period, approval of the Plan was delayed due to various political reasons. Establishing and facilitating the Technical Sub-Committee, which is tied with the approval of the Plan, was beyond the scope of the Implementing Agency. Therefore, the Implementing Agency was not able to provide support for the evaluation at the Technical Sub-committee meeting.

Due to the delay in the approval of the Third GPP Promotion Plan, numerous measures related to the implementation of GPP are currently put on hold without a clear decision on whether they will be implemented or, in what specific manner if they are to be implemented. For the same reason, the recommendation report on incentive mechanisms is also incomplete and needs revising within the next phase of the project by re-assessing the policy trends. The recommendation report also provided mostly information, rather than solid measures to be taken step-by-step. The Focal Point needs to closely work with ministries in order to develop the relevant policy following the report.

In addition and adding to the delay, the enforcement of the newly enacted 2017 Public Procurement Act has not been fully settled. There was confusion over the legal basis for GPP since the original Regulation of the Office of Prime Minister of 2015 has been invalidated due to the newly enacted Act. Finally, enactment of ministerial regulation on GPP is also being held at the Cabinet, and it is anticipated that substantial time will be taken for the establishment of such regulation by the Ministry of Finance.

Since the Ministry of Finance has the practical authority over the issue of procurement in Thailand, the scope of authority that PCD can exercise on GPP is limited. As it can be seen from the cases in other countries, cooperation and support between the relevant ministries is necessary to successfully develop and implement GPP policy, and Thailand is not an exception.

Lastly, the effects of the networking and awareness-raising events were limited since these were one-off workshops with a relatively small group of experts. In addition, it was difficult to evaluate the extent of improvement in awareness since the workshops were not designed as trainings carried out periodically and systematically. As a means of overcoming these problems and other various limitations, the Implementing Agency is proposing cultivation of experts through intensive training program in the partner country as the follow-up project.

3.2 Future Plans for GPP in Thailand

According to the Focal Point, the Thai government plans to actively promote the expansion and activation of GPP in Thailand based on the two achievements derived from the project.

First, the Technical Sub-committee will be established to take charge of establishing Green Cart criteria for construction and building materials, regardless of whether the Third GPP Promotion Plan is approved by the Cabinet, and the three criteria will be deliberated in the near future. For construction steel products criteria, it is important to continue discussions to further integrate the product groups that were discussed with stakeholders, as shown in table 49 below. In addition, PCD will continue to enact the Green Cart criteria of the construction and building materials that are generally used in the construction projects and have high demands from the stakeholders.

No.	TIS No.	Title
1	TIS 528-2548 (2005)	Hot rolled flat carbon steel of commercial and drawing qualities
2	TIS 1479-2558 (2015)	Hot-rolled carbon steel coil, strip, plate and sheet for general structure
3	TIS 1499-2541 (1998)	Hot-rolled carbon steel coil, strip, plate and sheet for welded structure
4	TIS 1735-2542 (1999)	Hot-rolled carbon steel coil and strip for pipes and tubes
5	TIS 2011-2543 (2000)	Superior atmospheric corrosion resisting hot-rolled steel coil strip plate and sheet

[Table 49] Other construction steel products discussed in opinion-gathering

Second, the recommendation report on incentive mechanism for GPP is intended to be utilized as a reference for planning and introducing measures to promote the implementation GPP in Thailand. It can be used appropriately in the process of discussing and supporting the Cabinet and the Ministry of Finance to make relevant decisions in the near future.

In the networking session and two awareness-raising workshops, stakeholders from various sectors provided valuable feedback to improve and upgrade GPP. As their participation is essential, it is expected that the direction and the focus of future improvement and capacity building is considered with the feedback received.

A follow-up project to the aforementioned “Advance SCP project” of GIZ will be implemented to share the outcomes of the corresponding project for the countries in Asia from 2018. Thailand was selected as a key partner country being considered best-practice among existing participating countries. If the Asia-Pacific Green Public Procurement Partnership Project is also progressed into a follow-up project, it is anticipated that the project of GIZ can be utilized to promote this project’s outcomes through close cooperation with GIZ and PCD.

3.3 Proposal for Follow-up Projects

The following limitations were experienced in the Pilot project, in general, and the Implementing Agency wishes to present means of improving them.

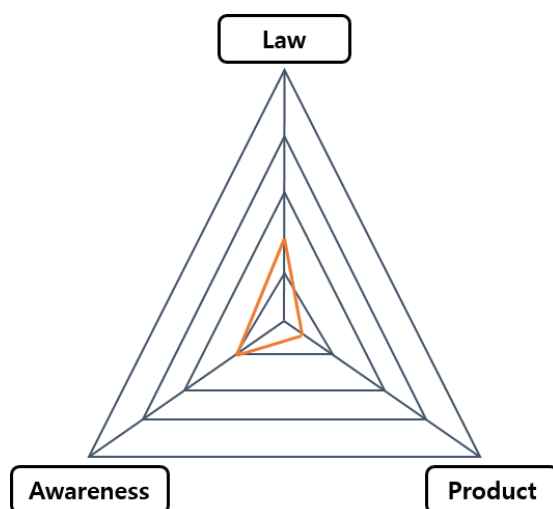
First, the Focal Point of the partner country in both Thailand and Vietnam was the competent department for environmental issues in partner countries, but in both cases, they lacked the authority to establish or adjust the legal and procedural requisites of public procurement (including GPP). Accordingly, we recommended that it would be preferable for a ministry with direct and actual authority and influence on public procurement such as the Ministry of Finance or the Office of Prime Minister to play the primary role in future GPP projects, with the environmental ministry providing political and technical support. The Committee can be composed of representatives from all of the relevant ministries, as in the case of Malaysia.

Second, the project was implemented in the structure of ‘delivering’ the results by the Implementing Agency to the partner country due to limitations such as the project period and communication with the local stakeholders. Accordingly, there was inadequate means of ensuring that the Focal Point and the local stakeholders continuously utilize the outcomes even after the conclusion of the project, and build ownership for their programs.

Therefore, the Implementing Agency recommends that the follow-up project should be implemented to focus on strengthening capacity of the government officials and experts, improving stakeholder awareness, and enabling stakeholders to directly participate in the design of GPP policy and program. This focus would replace that of quantifiable outcomes from the project such as establishing the legal and institutional basis - for which the Implementing Agency has no direct control.

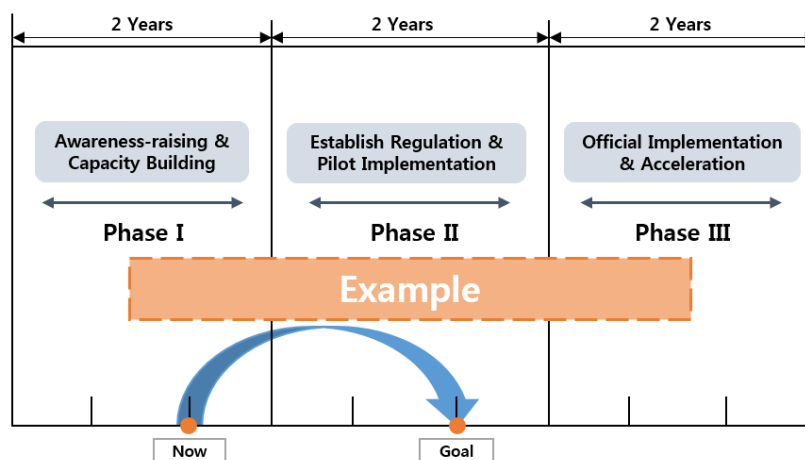
The Implementing Agency proposed the following follow-up project on the basis of the experiences of having designed and implemented the Pilot project.

When selecting a new partner country through the preliminary study, more objective indices are needed to assess the foundation for implementation of GPP, and to determine the areas of possible cooperation and expected outcomes of the project in the partner country. When selecting countries, for the successful introduction and implementation of GPP, the appropriate legal basis, stakeholder awareness of GPP, and availability of green products should be considered, as shown in Figure 32 below. Through a review of these three factors, project partners can also deduce the level of appropriate support for GPP in the country.



[Figure 32] Level of GPP in Vietnam (Example)

A stepwise approach can be taken to support the introduction and implementation of GPP. To set goals, parties should agree to pursue the project on the basis of the results of preliminary study. Assuming that there are three stages to introducing and implementing GPP (as illustrated in Figure 33 below), a balance between advancing the legal basis, stakeholder awareness, and supply of green products should be made, with no single factor dominating.



[Figure 33] GPP Development Phase and Project Goal-Setting (Example)

It would be very helpful to assess the level of maturity in GPP the partner country is currently before work begins. Following this assessment, the consulting items of the project should be selected, and based on the estimated time-frame needed to execute each of the items. Project goals should also be set together with the partner country, and used as the basis for evaluating project outcomes. To this end, a systematic rating and evaluation system to measure outputs and outcomes should also be established.

In future projects, KEITI should carefully consider and then select the Focal Point organization, as this role directly affects the implementation of the project. As mentioned previously, it is essential to have active involvement from government departments such as the Ministry of Finance or Office of the Prime Minister, particularly in the country wishing to introduce and implement GPP for the first time. The selection of the Focal Point can be made through UNEP or via other diplomatic channels. It is essential to determine the intention of such Focal Points to actively participate in the project in order to ensure efficacy and to enhance the project's wider impact.

It is preferable to strengthen the capacities of the partner country to pursue further work on GPP rather than directly intervening with the three pre-requisites for GPP (legal basis, stakeholder awareness and supply of green products). Focus should be placed on providing support for the following two areas: the cultivation of experts through training, and support for eco-labelling certification for local companies. Each is described below.

① Cultivation of Experts Through Intensive Training

Rather than developing and providing legal or policy documents directly, the cultivation of experts and strengthening of their capacities to design the system themselves may be preferable and more feasible in the time frame allowed. The existing awareness-raising workshop has limited effects as a one-off event to introduce the need to implement GPP. In the future, trained experts would take a leading role in carrying out education and training for the general public, government officials, and companies/industrial associations.

Curriculum for the experts needs to be carefully designed and developed. Time and resources should be invested to make sure that the transfer of knowledge from Korea is combined with the experts' existing knowledge and their needs for technical support. This training should be long-term (more than several weeks), and would include training for around 30 people per partner country. Additional considerations will include the educational period (short or long-term), location (Korea or partner country), participating country (singly or jointly), invitation format and so on, and will need to be fit within the project budget, timeline, and protocols. Some of the curriculum could be designed in association with relevant training programs related to GIZ project of Germany or SWITCH ASIA

project of the European Commission. The method of cooperation on developing training can be decided through discussions between the relevant parties.

② Support for Eco-labeling Certification of Local Companies

Providing support for eco-labeling and/or GPP certification for local companies will help to increase the number of environmentally-friendly products in the local market. If no criteria for the product groups for which the companies want support are available, the project could potentially help to support criteria development. To further support companies in gaining the relevant certifications, project partners could help to negotiate with the testing laboratories - which companies generally find burdensome.

Finally, additional support might be needed for deepening and extending the consulting items implemented through this Pilot project in Thailand and Vietnam.

Annex 1. Comparison Results of Thailand Green Label and Green Cart

(1) Toner Cartridge

Criteria	Green Label (TGL-30-1-R4-15)	Green Cart (TGC-C-010.01-5/58)	Note
Return of used product system	The manufacturer shall have an effective used-product return policy and system, which shall be declared in product document or on product packaging.	The return of used-product shall be as follows: (1) The manufacturer must have a plan to return the used-product effectively (2) There must be distributor, service provider or licensed recycling company for the reusable or recyclable cartridges (3) If the cartridges can not be reused or recycled, manufacturer shall bear all disposal and related costs.	Difference in Requirements
Design of toner cartridge body	The cartridge parts can be easily removed and disassembled from each other.	The cartridge parts can be easily removed and disassembled from each other.	Identical
	The material and components used are recyclable.	The material and components used are recyclable.	Identical
Identification and symbol for plastic	Separable plastic parts weighing more than or equal to 25g or has a flat surface of more than equal to 200 mm ² shall be marked properly for plastic identification and symbol used shall be in accordance with TIS 1310 or ISO 1043 or ISO 11469.	Separable plastic parts weighing more than or equal to 25g or has a flat surface of more than equal to 200 mm ² shall be marked properly for plastic identification and symbol used shall be in accordance with TIS 1310 or ISO 1043 or ISO 11469.	Identical
Materials for plastic casting part	Each plastic casting part weighing more than 25g shall be made from one single polymer or polymer blends. Total plastic casting parts weighing more than 25g shall be made from four or fewer types of mutually separable polymers or polymer blends.	Each plastic casting part weighing more than 25g shall be made from one single polymer or polymer blends. Total plastic casting parts weighing more than 25g shall be made from four or fewer types of mutually separable polymers or polymer blends.	Identical

		Plastic parts of the cartridge must be made of homopolymer, copolymer or polymer blends for easy separation. If the plastic parts of the cartridges are labeled with marks or decals that are difficult to remove, they must be made of the same material as the plastic parts attached to it. This should not be a barrier to the recycling of plastic parts.	Difference in Requirements
Heavy metals and flame retardants [Plastic parts]	Plastic parts of toner cartridge weighing more than or equal to 25g shall not contain heavy metals, heavy metals compounds and flame retardants. Heavy metals (lead, mercury, and chromium hexavalent) due to impurities or traces deriving from raw materials in plastic parts shall not exceed 0.1% (1000 mg/kg) by weight, for cadmium 0.01% (100 mg/kg) by weight, and for flame retardants (PBB and PBDE) 0.1% (1000 mg/kg) by weight. [If total chromium content is less than or equal to 1000 mg/kg, the criteria for chromium hexavalent content shall be considered.]	Plastic parts and electronic parts of toner cartridge weighing more than or equal to 25g shall not contain heavy metals, heavy metals compounds and flame retardants. Heavy metals (lead, mercury, and chromium hexavalent) due to impurities or traces deriving from raw materials in plastic parts shall not exceed 0.1% (1000 mg/kg) by weight, for cadmium 0.01% (100 mg/kg) by weight, and for flame retardants (PBB and PBDE) 0.1% (1000 mg/kg) by weight. [If total chromium content is less than or equal to 1000 mg/kg, the criteria for chromium hexavalent content shall be considered.]	Identical
Photoconductor drum	The photoconductor drums shall not contain cadmium, lead, mercury, selenium and compound of these metals.	The photoconductor drums shall not contain cadmium, lead, mercury, selenium and compound of these metals.	Identical
Organic chlorinated compounds	Organic chlorinated compounds such as CFCs, listed in Table 2, shall not be used during cleaning of parts.	Organic chlorinated compounds such as CFCs, listed in Table 1, shall not be used during cleaning of parts.	Identical

Operating instructions	<p>Operating instructions shall be provided clearly on the product packaging or in the product user manual with details as follows:</p> <ol style="list-style-type: none"> (1) Name of company (or trademark) with the product series (2) Proper handling of product and toner cartridge applicable to the product series (3) After-sales service and contact information (4) Clear instructions on returns of used toner cartridge and location for return available in user manual, the company's website or other channels. (5) Safety handling shall include <ul style="list-style-type: none"> · Proper package opening · Suitable Storage method and out-of-children's reach · Measures for accidents or toner ingestion accident · Measures when the toner adheres to clothing or hands, or enter eyes or mouth · Caution to avoid toner inhalation or contact 	<p>Operating instructions shall be provided clearly on the product packaging or in the product user manual with details as follows:</p> <ol style="list-style-type: none"> (1) Name of company (or trademark) with product series (2) Proper handling of product and toner cartridge applicable to the product series (3) After-sales service and contact information (4) Clear instructions on returns of used toner cartridge and location for return available in user manual, the company's website or other channels. (5) Safety handling shall include <ul style="list-style-type: none"> · Proper package opening · Measures for accidents or toner ingestion accident · Caution to avoid toner inhalation or contact · Measures when the toner adheres to clothing or hands, or enter eyes or mouth · Suitable storage method and out-of-children's reach 	Identical
Heavy metals [Toner]	Toners shall not contain the following heavy metals in the formula: mercury, lead, cadmium, chromium hexavalent, nickel and their compounds.	Toners shall not contain the following heavy metals in the formula: mercury, lead, cadmium, chromium hexavalent, nickel and their compounds	Identical
Prohibited substances [Toner]	<p>Substance required to be marked with hazard symbol "R" in accordance with Annex I of EC Directive 67/548/EEC or "H" in accordance with Appendix VI of Regulation (EC) No.1272/2008.</p> <ul style="list-style-type: none"> · R40 or H351 · R45 or H350 · R46 or H340 · R49 or H350i · R60 or H360F · R61 or H360D · R62 or H361f · R63 or H361d · R68 or H341 	<p>Substance required to be marked with hazard symbol "R" in accordance with Annex I of EC Directive 67/548/EEC or "H" in accordance with Appendix VI of Regulation (EC) No.1272/2008.</p> <ul style="list-style-type: none"> · R40 or H351 · R45 or H350 · R46 or H340 · R49 or H350i · R60 or H360F · R61 or H360D · R62 or H361f · R63 or H361d · R68 or H341 	Identical

	Substances classified as carcinogenic, mutagenic and toxic to reproduction in TRGS 905.	Substances classified as carcinogenic, mutagenic and toxic to reproduction in TRGS 905.	Identical
	Substances required to be marked with hazard symbol on the whole product in accordance with Annex II of EC Directive 67/548/EEC and EC Directive 1999/45/EC.	Substances required to be marked with hazard symbol on the whole product in accordance with Annex II of EC Directive 67/548/EEC and EC Directive 1999/45/EC.	Identical
	Substances required to be marked by R43 in accordance with Annex III of EC Directive 67/548/EEC.	Substances required to be marked by R43 in accordance with Annex III of EC Directive 67/548/EEC.	Identical
Azo colorants [Toner]	Azo colorants that degenerated into one or more of the amines listed in Table 3 shall not be used.	Azo colorants that degenerated into one or more of the amines listed in Table 2 shall not be used.	Identical
Plastic packaging	Plastic packaging shall be symbolized to indicate the type of plastic according to TIS 1310 for Recycling Plastic or an abbreviation to indicate the type of plastic according to ISO 1043 or ISO 11469.		Difference in Requirements

(2) Steel Furniture

Criteria	Green Label (TGL-21-R2-14)	Green Cart (TGC-O-004.00-2/51)	Note
Composition	The product shall be composed of at least 70% steel.		Difference in Requirements
Surface preparation	Alkyl phenol ethoxylates (APEOs) and 1,1,1-Trichloroethane (Methyl Chloroform) shall not be used for the surface preparation process.		Difference in Requirements
Coatings and coating substances	The following coatings or coating substances are prohibited from use on the product and supporting apparatus: (1) Formaldehyde (2) Halogenated solvents (3) Aromatic hydrocarbons such as thinner, toluene and xylene (as solvent); except other substances that are more reactive than or equal to the mentioned aromatic hydrocarbons as solvents	The following coatings or coating substances are prohibited from use on the product and supporting apparatus: (1) Formaldehyde (2) Halogenated solvents (3) Aromatic hydrocarbons such as thinner, toluene and xylene (as solvent); except other substances that are more reactive than or equal to the mentioned aromatic hydrocarbons as solvents	Identical
	(4) Heavy metals such as mercury, lead, cadmium, and chromium hexavalent shall not be present in the product. Exception: Total concentration of heavy metals due to impurities or traces deriving from raw materials shall not exceed 0.1% (1000 ppm) of total weight.	(4) Heavy metals such as mercury, lead, cadmium, and chromium hexavalent shall not be present in the product.	Identical
	(5) Volatile organic compound (VOCs) used for coatings or coating substances shall not exceed 0.5 mg/dm ³ . Remarks: If powder coating is used, then no test is required for VOCs.	(5) Volatile organic compound (VOCs) used for coatings or coating substances shall not exceed 250 g/l.	Difference in Level
		Accessories shall not be coated with chromium, nickel, zinc or mercury.	Difference in Requirements

Manual	Existence of manual or storage, transportation and installation or product handling recommendations.		Difference in Requirements
Packaging	Paper packaging shall consist of recycled pulp as follows: (1) For corrugating medium, 100% by weight (dry basis). (2) For kraft liner board, at least 70% by weight (dry basis).	Paper packaging shall consist of at least 70% of recycled pulp by weight.	Difference in Level
	Plastic packaging shall be symbolized to indicate the type of plastic used according to TIS 1310 for recycling plastic or display an abbreviation according to ISO 1043 or ISO 11469.		Difference in Requirements
	Straps made from PVC or composed of PVC shall be displayed with a logo "Do not burn" on the plastic part.		Difference in Requirements
	Ink or pigments used for printing on packaging or labels on packaging shall not contain mercury, lead, cadmium, and chromium hexavalent. Exception: Total concentration of heavy metals due to impurities or traces deriving from raw materials shall not exceed 0.01% (100 ppm) of total weight.		Difference in Requirements
		Cushioning materials shall not use CFCs as foam substances.	Difference in Requirements

(3) Paint

Criteria	Green Label (TGL-4-R4-14)	Green Cart (TGC-O-011.00-6/51)	Note
Volatile Organic Compounds	Quantities of volatile organic compounds permitted at point of use are shown in the table below and subject to the following related conditions. <i>(Detailed numbers are omitted)</i> a. For construction purposes b. For automobile repairs c. For painting traffic signs d. Others (Should the product fall into more than one of the above groups, the stricter requirement shall apply in considering the product for Green Label)	Quantities of volatile organic compounds shall not exceed the following criteria: (1) For emulsion paints, the VOC content shall not exceed 50 g/l. (2) For other paints, enamels, and lacquers that are water-based, the VOC content shall not exceed 100 g/l. (3) For paints, enamels, and lacquers that are solvent-based, the VOC content shall not exceed 380 g/l.	Difference in Level
Ingredients	Ingredients containing heavy metals (lead, mercury and cadmium) due to impurities or traces deriving from raw materials shall not exceed 0.01% (100 mg/kg) by weight; for chromium (+6) 0.1% (1000 mg/kg) by weight; and the sum of all 4 metals shall not exceed 0.1% (1000 mg/kg) by weight. Arsenic and antimony are prohibited as paint ingredients.	Heavy metals, including lead, cadmium, chromium hexavalent, arsenic, antimony and their compounds are prohibited as paint ingredients. Note: The total volume of heavy metals (lead, mercury, cadmium and chromium hexavalent) due to impurities or traces deriving from raw materials shall not exceed 0.1% (1000 mg/kg) by weight.	Difference in Level
	Triphenyl tins (TPT) and tributyl tins (TBT) shall not be used as ingredient.	Triphenyl tins (TPT) and tributyl tins (TBT) shall not be used as ingredient.	Identical
Aromatic hydrocarbons	Aromatic hydrocarbons shall not be used as solvents, but the following contaminations are allowed: (1) For emulsion paints, contamination of aromatic hydrocarbons shall not exceed 0.1% by weight. (2) For other paints, enamels, and lacquers that are water-based, contamination of aromatic hydrocarbons shall not exceed 1% by weight. (3) For paints, enamels, and lacquers that are solvent-based, contamination of aromatic hydrocarbons shall not exceed 5% by weight.	Aromatic hydrocarbons shall not be used as solvents, but the following contaminations are allowed: (1) For emulsion paints, contamination of aromatic hydrocarbons shall not exceed 0.1% by weight. (2) For other paints, enamels, and lacquers that are water-based, contamination of aromatic hydrocarbons shall not exceed 1% by weight. (3) For paints, enamels, and lacquers that are solvent-based, contamination of aromatic hydrocarbons shall not exceed 5% by weight.	Identical

Volatile aromatic compounds	Amount of volatile aromatic hydrocarbons (VACs) shall be in accordance with the following criteria: (1) For solvent-based paints, VACs content shall not exceed 25% by weight, and benzene content shall not exceed 0.1% by weight. (2) For water-based paint with solvents of no more than 1% by weight shall contain VACs (aromatic free) as follows: For emulsion less than or equal to 0.15% by weight; for others, 0.1% by weight.		Difference in Requirements
Halogenated solvents	Halogenated solvents shall not be used in the production process. However, contamination of no more than 0.1% (1000 ppm) by weight is permitted.	Halogenated solvents shall not be used in the production process.	Identical
Formaldehyde	Formaldehyde shall not be used in the production process, but contamination of not more than 0.01% (100 ppm) by weight is permitted.	Formaldehyde shall not be used in the production process.	Identical
Packaging	Plastic packaging must be symbolized by type of plastic used according to TIS 1310 (symbol for Recycling Plastics) or identified the type of plastic used by abbreviated terms under ISO 1043 or ISO 11469.	Plastic packaging must be symbolized by type of plastic used according to TIS 1310 (symbol for Recycling Plastics) or identified the type of plastic used by abbreviated terms under ISO 1043 or ISO 11469.	Identical
	Packaging made from PVC plastic shall display a logo with the following phrases on the product: “ห้ามเผา” or “Do not burn”.		Difference in Requirements
		Metal container shall not contain lead.	Difference in Requirements

(4) Fluorescent lamp

Criteria	Green Label (TGL-2-R4-15)	Green Cart (TGC-E-003.01-2/58)	Note
Energy efficiency	Product shall be certified to Thai Industrial Standards on energy efficiency requirements, TIS 2309 for double-capped fluorescent lamp or ITS 2334 for single-capped fluorescent lamp or TIS 2310 for self-ballasted lamp for general lighting services or shall pass the TIS product energy efficiency requirements as aforementioned or recognized international/national standard.	Product shall be certified to Thai Industrial Standards on energy efficiency requirements, TIS 2309 for double-capped fluorescent lamp or ITS 2334 for single-capped fluorescent lamp or TIS 2310 for self-ballasted lamp for general lighting services or shall pass the TIS product energy efficiency requirements as aforementioned or recognized international/national standard.	Identical
Power factor	Power factor of a self-ballasted lamp for general lighting services shall not be less than 0.85.	Power factor of a self-ballasted lamp for general lighting services shall not be less than 0.85.	Identical
Mercury content	Mercury content in a fluorescent lamp shall not exceed 10 milligram per lamp.	Mercury content in a fluorescent lamp shall not exceed 5 milligram per lamp.	Difference in Level
Heavy metals and flame retardants	Product shall not contain lead, mercury, cadmium, chromium hexavalent, polybrominated biphenyl (PBB) or polybrominated diphenyl ether (PBDE) below 0.1% by weight in homogeneous materials and the concentration cadmium below 0.01% in homogeneous materials shall be assumed that the presence of those hazardous substances are non-detected.	Product shall not contain lead, mercury, cadmium, chromium hexavalent, polybrominated biphenyl (PBB) or polybrominated diphenyl ether (PBDE) below 0.1% by weight in homogeneous materials and the concentration cadmium below 0.01% in homogeneous materials shall be assumed that the presence of those hazardous substances are non-detected.	Identical
Packaging	Packaging of a fluorescent lamp shall be made from recycled pulp. - shall be made from 100% recycled pulp in which using corrugating medium paper - shall be made from at least 85% recycled pulp in which using Kraft liner board, reported on a dry weight basis or an 'as received' basis - shall be made from at least 70% recycled pulp in which using boxboard	Packaging of a fluorescent lamp shall be made from recycled pulp. - shall be made from 100% recycled pulp in which using corrugating medium paper - shall be made from at least 85% recycled pulp in which using Kraft liner board, reported on a dry weight basis or an 'as received' basis - shall be made from at least 70% recycled pulp in which using boxboard	Identical

	<p>Paints or pigments used for printing on packaging or for labeling on packaging are permitted to have the sum of concentrations of mercury, lead, cadmium, and chromium hexavalent due to impurities and contamination not exceeding 0.01% (≤ 100 mg/kg) by weight.</p>		Difference in Requirements
	<p>Blowing agent, laminates or plastic composite raw material shall not be used in packaging.</p>		Difference in Requirements
Manual	<p>The following instruction shall be stated in user manual accompany with the product packaging;</p> <ol style="list-style-type: none"> (1) Warning and/or proper instruction to use in combination with additional accessory, such as Dimmer switches. (2) Appropriate procedures or conditions for storage of end-used product and packaging by means of simplified message or figure. (3) The name and address of the user authorized to use Thai Green Label mark shall be clearly stated on product or on the packaging. In case of the authorized user is not a manufacturer, the name and address of the manufacturer shall be stated instead as well. (4) The locations for the return of end-used product shall be stated. 	<p>The following instruction shall be stated in user manual accompany with the product packaging;</p> <ol style="list-style-type: none"> (1) Warning and/or proper instruction to use in combination with additional accessory, such as Dimmer switches. (2) Appropriate procedures or conditions for storage of end-used product and packaging by means of simplified message or figure. (3) The locations for the return of end-used product shall be stated. 	Identical
Take-back	<p>Appropriate take-back policy regarding end-used product shall be provided in reasonably practical way. Assessment and report shall be clearly stated as well.</p>	<p>Appropriate take-back policy regarding end-used product shall be provided in reasonably practical way. Assessment and report shall be clearly stated as well.</p>	Identical

Annex 2. Comparison Result of the Steel Bar-Related Eco-labeling Criteria

Category	NEW ZEALAND	MALAYSIA	BRAZIL	PROPOSED CRITERIA
Raw materials	Manufacturers using post-consumer scrap must implement procedures to exclude feedstocks containing undesirable materials, including: (1) Radioactive materials (2) Polychlorinated Biphenyls (PCBs)	The steel scrap substitutes and recycled feedstock shall not contain radioactive materials .	The company shall have procedures to identify and ensure the non-use of hazardous substances prohibited by law, as well as ascarel (PCBs) and radioactive materials .	The steel scrap substitutes and recycled feedstock shall not contain radioactive materials and polychlorinated biphenyls (PCBs)
		For steel products used in construction using Electric Arc Furnace, the ferrous feedstock shall contain a minimum of 88% steel scrap .		For steel products used in construction using Electric Arc Furnace, the ferrous feedstock shall contain a minimum of 88% steel scrap .
		For steel products for Basic Oxygen Furnace, the ferrous feedstock shall contain a minimum of 70% steel scrap .		For steel products for Basic Oxygen Furnace, the ferrous feedstock shall contain a minimum of 70% steel scrap .
			If using charcoal within its production process (as well as for the production of pig iron and other raw materials), the manufacturer shall ensure that the origin of the forest to be planted or legally authorized forests.	If using charcoal within its production process (as well as for the production of pig iron and other raw materials), the manufacturer shall ensure that the origin of the forest to be planted or legally authorized forests.
Recyclability	Steel products must not be impregnated, labelled, coated or otherwise treated in a manner which would prevent recycling in New Zealand or in the country where the product is used.			Steel products must not be impregnated, labelled, coated or otherwise treated in a manner which would prevent recycling.

Energy management	Electricity consumption in the EAF must not exceed 500 kWh/tonne of liquid steel, based on a rolling 12-month average.			Electricity consumption in the EAF must not exceed 500 kWh/tonne of liquid steel, based on a rolling 12-month average.
	The steel product manufacturer must have and implement effective energy management policies and procedures and/or an energy management program .	The manufacturer shall have energy management program to demonstrate clear targets of continuous improvement of energy consumption.	The manufacturer shall have an energy efficiency management program of its production process and annually conduct the CO₂ emissions inventory .	The manufacturer shall have an energy efficiency management program of its production process and annually conduct the CO₂ emissions inventory .
Hazardous substances	License holders must report annually on hazardous heavy metals in the steel product, including: - Results of analysis of hazardous heavy metals (lead and cadmium) concentrations in the steel; and - Initiatives taken to minimize levels of hazardous heavy metals in the steel	The limit of hazardous substances in long steel products shall comply the following requirements: Lead: 1000 ppm or 0.1% Mercury: 1000 ppm or 0.1% Cadmium: 100 ppm or 0.01% Hexavalent chromium: 1000 ppm or 0.1%		The limit of hazardous substances in long steel products shall comply the following requirements: Lead: 1000 ppm or 0.1% Mercury: 1000 ppm or 0.1% Cadmium: 100 ppm or 0.01% Hexavalent chromium: 1000 ppm or 0.1%
	The steel products shall not be treated with: - Compounds containing mercury, lead, cadmium, hexavalent chromium, arsenic or their compounds - Halogenated organic compounds - Any chemicals that are included in the IARC lists for proven (Group 1) or probably (Group 2A) carcinogens - Slushing oil		Fuel oil and other raw material and/or input that compose the process shall not contain mercury and its compounds .	The steel products shall not be treated with: - Compounds containing mercury, lead, cadmium, hexavalent chromium, arsenic or their compounds - Halogenated organic compounds - Any chemicals that are included in the IARC lists for proven (Group 1) or probably (Group 2A) carcinogens - Slushing oil

Packaging			The materials used in packaging, labels and accessories should be recycled . Woods used in the packaging or products shall be proven legal origin .	The materials used in packaging, labels and accessories should be recycled . Woods used in the packaging or products shall be proven legal origin .
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Annex 3. Final Draft Green Cart Criteria

① Thermal Insulation

1. Scope and Description

Thermal insulation includes glass wool and foam plastic insulation for use in office, residential, commercial, and industrial buildings.

Thermal insulation refers to a material or product that acts as a medium to reduce heat transfer between places of differing temperature.

2. Effects on the environment

Installation of thermal insulation in buildings can help in energy conservation and minimize heat transfer. However, manufacturing of thermal insulation resulted in significant environmental impacts. For instance, these impacts include the utilization of natural resources and energy to transform sand into glass wool; use of CFCs as a foaming agent; and the generation of solid waste after end-use.

3. Criteria

3.1 The product is a green labeled product.

Documents/evidence for the examination

Applicant must show a Green Label certification or license to use the green label.

3.2 If the product is not labeled green, observe the following guidelines to be the environmentally-friendly thermal insulation.

A. Glass wool insulation

3.2.1 General Provision

1) The product shall be certified with Thai Industrial Standard TIS 486 for Glass Wool.

Documents/evidence for the examination

The applicant must submit the proof of license showing the industrial standard according to the type of product.

2) The product shall be certified with Thai Industrial Standard in Table 1, or passed the product quality specification test under the same Thai Industrial Standard, or be certified with standards equivalent to the national standard or higher than Thai Industrial Standards, or be certified with international standards/other acceptable national standards such as ASTM or JIS.

Table 1. List of related Thai Industrial Standards

No.	Standard No.	Name of Standard
1	487	Standard for Glass wool boards
2	488	Standard for Glass wool pipe

Documents/evidence for the examination

The applicant shall declare the license issued for each type of product or test report for product quality specifications according to Thai Industrial Standards in Table 1 or test report according to test methods under international standards or other equivalent national standards.

- 3) The molded product shall contain thermal insulation materials more than 50 weight% or 70 volume% out of the constituent materials.

Documents/evidence for the examination

The applicant shall declare evidence that the product satisfies the requirement.

- 4) Products which are marked with the sound absorption performance shall verify that its sound absorption performance is excellent.

Documents/evidence for the examination

The applicant shall submit test report by an accredited testing laboratory in accordance with ISO 354 (Measurement of sound absorption in a reverberation room) or ASTM C423-09a (Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method) or equivalent national and international standards.

- 5) Manufacturing, transportation, and post-industrial waste disposal shall comply with national laws and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labour and Social Welfare.

Documents/evidence for the examination

The applicant shall declare evidence ensuring the manufacturing, transportation and waste disposal of the product comply with national laws and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labour and Social Welfare.

3.2.2 Special Provision

- 1) Use of glass cutlets retrieved from post-consumer waste and/or post-industrial waste in at least 80% of total glass wool weight, not including waste generated from the factory.

Documents/evidence for the examination

The applicant shall declare the formula for glass wool insulation, amount of bought and sold glass cutlets as raw materials, and calculation methods for a percentage of glass cutlets weight as compared to the finished product. This document shall have a company seal affixed and signed by the authorized director of the manufacturing company.

- 2) Acceptable chemicals

- Formaldehyde of no more than 0.05 ppm at 168 hours (7 days)
- Total volatile organic compounds (TVOCs) from C6-C12 of no more than 0.5 milligrams per cubic meter at 168 hours (7 days)

Documents/evidence for the examination

The applicant shall declare a test report of formaldehyde according to ASTM D5116 test methods (Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products) and amount of total volatile organic compounds according to the ASTM D5116 or other equivalent methods.

- 3) Thermal insulation product shall not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.

Documents/evidence for the examination

The applicant shall submit a declaration letter, signed by an authorized director, to certify that the product does not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.

- 4) Plastic packaging shall be symbolized to indicate the type of plastic according to TIS for recycled plastics under TIS 1310, ISO 1043, or ISO 11469.

Documents/evidence for the examination

The applicant shall declare evidence that the finished product conforms to the product's environmental requirement with the following documents:

- For plastic packaging, the applicant shall submit a declaration letter, signed by an authorized director of the company with company seal affixed, to certify that the plastic packaging is symbolized properly according to TIS 1310 for recycling parts, ISO 1043 or ISO 11469.

5) Paper packaging

- The paper used for linerboard shall be Green Label certified paper or passed the product's environmental requirements for paper used as linerboard.
- The paper used for corrugated medium shall be Green Label certified paper or passed the product's environmental requirements for paper used as a corrugated medium.

Documents/evidence for the examination

The applicant shall declare evidence that the finished product conforms to the product's environmental requirement with the following documents:

- For paper used as linerboard, the paper shall be certified with Green Label for paper or passed the product's environmental requirements for paper used as linerboard.
- For paper used in corrugated medium, the applicant shall declare Green Label certificate for paper used in corrugated medium, or declare a test report according to the product's environmental requirements of the Thai Green Label.

6) Ink, pigments, or additives used for printing the labels or on the packaging shall not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.

Documents/evidence for the examination

The applicant shall declare evidence that the finished product conforms to the product's environmental requirement with the following documents:

- A test report of heavy metals in pigments for printing the label or printing on the packaging according to the standard test method of ISO 3856-1 or ASTM D3335 for lead; ISO 3856-4 or ASTM D3335 for cadmium; ISO 3856-5 for chromium (+6) and ISO 3856-7 or ASTM D3624 for mercury; or other equivalent standards.

7) The existence of product manuals or recommendations for appropriate handling and use of the product as follows:

- Product information
- Transportation and storage
- Product installation
- Safe and efficient handling
- Disposal

Documents/evidence for the examination

The applicant shall declare a manual or labels.

B. Foam plastic insulation

3.2.3 General Provision

1) *Polyethylene* thermal insulation: product must be certified by TIS 1384 for polyethylene thermal insulation, or passed the product quality specification test according to TIS 1384, or passed other equivalent or higher standards.

Documents/evidence for the examination

For polyethylene thermal insulation, the applicant shall declare the license issued by TISI, or a test report for product quality specifications according to TIS 1384, or other equivalent or higher standards or other international standards.

2) *Polyurethane* thermal insulation: the product must pass the quality assessment according to ASTM C591 (Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation), or passed other equivalent or higher standards.

Documents/evidence for the examination

For polyurethane thermal insulation, the applicant shall declare evidence for passing the quality assessment according to ASTM C591 (Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation), or other equivalent or higher standards or other international standards.

3) *Polystyrene* thermal insulation: product must pass the quality assessment according to ASTM C 578 (Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation), or passed other equivalent or higher standards.

Documents/evidence for the examination

For polystyrene thermal insulation, the applicant shall declare evidence for passing the quality assessment according to ASTM C578 (Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation), or other equivalent or higher standards or other international standards.

4) The molded product shall contain thermal insulation materials more than 50 weight% or 70 volume% out of the constituent materials.

Documents/evidence for the examination

The applicant shall declare evidence that the product satisfies the requirement.

5) Products which are marked with the sound absorption performance shall verify that its sound absorption performance is excellent.

Documents/evidence for the examination

The applicant shall submit test report by an accredited testing laboratory in accordance with ISO 354 (Measurement of sound absorption in a reverberation room) or ASTM C423-09a (Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method) or equivalent national and international standards.

6) Manufacturing, transportation, and post-industrial waste disposal shall comply with national laws and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labour and Social Welfare.

Documents/evidence for the examination

The applicant shall declare evidence ensuring the manufacturing, transportation and waste disposal of the product comply with national laws and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labour and Social Welfare.

3.2.4 Specific Provision

1) The percentage of post-consumer waste and/or post-industrial waste shall be at least 80% by weight of the finished product. However, waste generated from the factory is not included.

Documents/evidence for the examination

The applicant shall declare the percentage of post-consumer/post-industrial foam plastic used in producing foam plastic insulation compared to the finished product including calculation methods. This document shall have company seal affixed and signed by the authorized director of the manufacturing company.

2) Use of CFCs, HCFCs, and HFCs are prohibited in the production process.

Documents/evidence for the examination

The applicant must submit the production formula as well as provide a list of chemical substances used in replacement of CFCs, HCFCs, and HFCs. This document must have the company seal affixed and signed by the authorized director of the manufacturing company.

3) No presence of carcinogens in group 1 (carcinogenic to humans) and group 2A (probably carcinogenic to humans) as classified by the International Agency for Research on Cancer (IARC).

Documents/evidence for the examination

The applicant shall submit a declaration letter, signed by the authorized director of the company, to certify the non-use of prohibited carcinogens in group 1 (carcinogenic to humans) and group 2A (probably carcinogenic to humans) as classified by the International Agency for Research on Cancer.

4) Mixture of toxic substances in the product is prohibited. The following are prohibited toxic substances:

- R45 (may cause cancer)
- R46 (may cause heritable genetic damage)
- R48 (serious damage to health by prolonged exposure)
- R61 (may cause harm to the unborn child)
- R63 (possible risk of harm to unborn child)
- R68 (possible risk or irreversible effect)
- polybrominated biphenyls (PBB)
- polybrominated diphenyl ethers (PBDE)
- hexabromocyclododecane (HBCD)
- polyurethane composed of halogenated organic compounds partially or completely according to RAL-UZ30a and hazardous substances list according to Annex I of Directive 67/548/EEC

Documents/evidence for the examination

The applicant shall submit a declaration letter, signed by the authorized director of the company, to certify that the non-existent of toxic substances in the product.

5) Foaming agent or blowing agent for production shall have ODP value equaled to 0 and Global Warming Potential (GWP) value of no more than 140 kilograms CO₂ over 100 years.

Documents/evidence for the examination

The applicant shall submit a declaration letter, signed by the authorized director of the company, to certify that foaming agent or blowing agent has ODP value and GWP value according to product's environmental requirement.

6) Foam plastic insulation shall not have hazardous properties according to the Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.

Documents/evidence for the examination

The applicant shall submit a declaration letter, signed by an authorized director, to certify that the product does not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.

7) Plastic shall be symbolized by type on the product according to Thai Industrial Standard TIS 1310 for recycling plastic or ISO 1043 or 11469.

Documents/evidence for the examination

The applicant shall provide a sample of foam plastic insulation together with a declaration letter, signed by the authorized director of the company, to certify the plastic is symbolized by type.

8) Plastic packaging shall be symbolized to indicate the type of plastic according to TIS for recycled plastics under TIS 1310, ISO 1043, or ISO 11469.

Documents/evidence for the examination

The applicant shall declare evidence ensuring product's environmental requirement have been met with the following documents:

- For plastic packaging, the applicant shall submit a declaration letter, signed by an authorized director of the company with company seal affixed, to certify that the plastic packaging is symbolized properly according to TIS 1310 for recycling parts, ISO 1043 or ISO 11469.

9) Paper packaging

- Paper used for linerboard shall be Green Label certified paper or passed the product environmental requirements for paper used as linerboard.
- Paper used for corrugated medium shall be Green Label certified paper or passed the product environmental requirements for paper used as corrugated medium.

Documents/evidence for the examination

The applicant shall declare evidence ensuring product's environmental requirement have been met with the following documents:

- For paper used as linerboard, the paper shall be certified with Green Label for paper or passed the product's environmental requirements for paper used as linerboard.
- For paper used in corrugated medium, the applicant shall declare Green Label certificate for paper used in corrugated medium, or declare a test report according to the product's environmental requirements of the Thai Green Label.

10) Ink, pigments, or additives used for printing the labels or on the packaging shall not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.

Documents/evidence for the examination

The applicant shall declare evidence ensuring product's environmental requirement have been met with the following documents:

- A test report of heavy metals in pigments for printing the label or printing on the packaging according to the standard test method of ISO 3856-1 or ASTM D3335 for lead; ISO 3856-4 or ASTM D3335 for cadmium; ISO 3856-5 for chromium (+6) and ISO 3856-7 or ASTM D3624 for mercury; or other equivalent standards.

11) The existence of product manuals or recommendations for appropriate handling and use of the product as follows:

- Product information
- Transportation and storage
- Product installation
- Safe and efficient handling
- Disposal

Documents/evidence for the examination

The applicant shall declare a manual or labels.

Note:

1) The test or measurement must be done in the official laboratory or a private laboratory that has been accredited for testing in accordance with TIS 17025 (ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories), and the test results must be valid (no more than three years from the date of application).

2) Certificate of compliance must be valid (no more than three years from the date of application for certification) and must be signed by the authorized signatory and seal (if any).

3) This certification is valid for two years from the date of certification. When expired, products and services that have been certified in accordance with this requirement may not be considered for re-certification, if the comparable specifications in line with the requirements of the Green Label are not met.

② Portland and Hydraulic Cement

1. Scope and Definition

The criteria cover Portland Cement under TIS 151, part 1, and Hydraulic Cement under TIS 2594.

Portland cement refers to a product made from grinding clinker with calcium sulphate into a powder.

Hydraulic cement refers to cement that sets and hardened after it has been mixed with water or when it is under water.

2. Effects on the Environment

Cement is important in the public utility and construction sector. Currently, it is mainly used as construction materials for buildings, houses, roads, bridges, and barrage. Cement is categorized according to its property and use. Proper environmental management of cement is needed in order to prevent environmental impacts.

Therefore, in order to promote environmental management, the Green Cart criteria for Portland Cement and Hydraulic Cement was developed. The criteria focus on reducing environmental impacts and consumer safety by controlling emissions of greenhouse gases and other substances in the production process as well as limiting the use of heavy metals used in ink or pigments for packaging. Moreover, the criteria promote recyclable packaging and proper disposal of packaging.

3. Criteria

3.1 The product is a green labeled product.

Documents/evidence for the examination

Applicant must show a Green Label certification or license to use the green label.

3.2 If the product is not labeled green, observe the following guidelines to be the environmentally-friendly thermal insulation.

3.2.1 General Provision

1) The product shall be certified with Thai Industrial Standard TIS 15, part 1 for Portland Cement or TIS 2594 for Hydraulic Cement.

Documents/evidence for the examination

The applicant shall submit a certificate for TIS 15, part 1 or TIS 2594.

2) Environmental management shall comply with national laws and regulations as specified in the environmental impact assessment report.

Documents/evidence for the examination

The applicant shall submit a report to declare results for reducing environmental impacts and environmental monitoring and evaluation in accordance with national laws and regulations for the past two consecutive years.

3) Manufacturing, transportation, and post-industrial waste disposal shall comply with national laws and regulations, or the manufacturer shall be accredited by ISO 14001.

Documents/evidence for the examination

The applicant shall submit one of the following documents:

1. License or evidence to prove that manufacturing, transportation, and post-industrial waste disposal complies with national laws and regulations.
2. Certification of ISO 14001 from the manufacturer.

3.2.2 Special Provision

1) The greenhouse gas emissions during the manufacturing process shall not exceed 800 kg CO_{2e} per tonnes of product.

Remarks: The IPCC 2006 was used as a reference for the calculation of greenhouse gas emissions, while the emission factors are referenced from Thailand Greenhouse Gas Management Organization (Public Organization).

Documents/evidence for the examination

The applicant shall submit one of the following documents:

1. A third-party certified result of the greenhouse gas emission value calculation (third-party must be registered with Thailand Greenhouse Gas Management Organization)
2. Certification of Carbon Reduction Label or Carbon Footprint Reduction.

2) Paper or plastic packaging should have advice on how to handle the packaging after use, either printed on the packaging or listed in the invoice document or order form, including the following statements:

1. Packaging can be recycled.
2. Packaging can be reused as fuel in power plants that are licensed by government agencies.
3. Send packaging to the collectors or local government.

Documents/evidence for the examination

The applicant shall submit a declaration letter ensuring the existence of instructions for recycling and disposal on paper and plastic packaging as well as declaring a picture of the instruction or evidence of clear instructions on the packaging.

3) Ink or pigments used for printing or labels on packaging shall not contain heavy metals and heavy metal compounds. Heavy metals (lead, mercury, cadmium, and chromium hexavalent) due to impurities or traces deriving from raw materials in packaging shall not exceed 0.01% (≤ 100 mg/kg) by weight.

Documents/evidence for the examination

The applicant shall submit one of the following documents:

1. A declaration letter from ink manufacturer or supplier, which includes test results for the lead, mercury, cadmium, and chromium hexavalent in color ink or pigments for printing or labels on the package (test methods shall be in accordance with number 2).
2. Test results for lead, mercury, cadmium, and chromium hexavalent shall use test methods according to the following standards:
 - 1) For mercury, ISO 3856-7 or ASTM D 3642 or IEC 62321 or other equivalent standards.
 - 2) For lead, ISO 3856-1 or ASTM D 3335 or IEC 62321 or other equivalent standards.
 - 3) For cadmium, ISO 3856-4 or ASTM D 3335 or IEC 62321 or other equivalent standards.
 - 4) For chromium hexavalent, ISO 3856-5 or IEC 62321 or other equivalent standards.

Note:

- 1) The test or measurement must be done in the official laboratory or a private laboratory that has been accredited for testing in accordance with TIS 17025 (ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories), and the test results must be valid (no more than 3 years from the date of application).
- 2) Certificate of compliance must be valid (no more than three years from the date of application for certification) and must be signed by the authorized signatory and seal (if any).
- 3) This certification is valid for two years from the date of certification. When expired, products and services that have been certified in accordance with this requirement may not be considered for re-certification, if the comparable specifications in line with the requirements of the Green Label are not met.

③ Construction Steel Products

1. Scope and Definition

Construction Steels Products in these criteria refer to “finished and semi-finished steel products used for the construction of residential and commercial buildings and civil structures,” which are listed in the Appendix A. These include concrete-reinforcing steel bars which are considered long products.

2. Effects on the Environment

Considering the immense usage of steel products in nowadays construction, it is important to consider the impact of steel during the entire life cycle of products. The use of by-products, recycling, and energy management are important focus areas. This is due to the amount of materials and energy involved in the production stage, and also the long lifespan of the product when built into the construction.

This criteria strives to ensure the maximum utilization of available resources, including raw materials and energy input to the production processes, while also protecting environment and human health from harmful substances that may generate from the products during and after the usage stage.

3. Criteria

3.1 The product should observe the following guidelines to be the environmentally-friendly construction steel products.

3.1.1 General Provision

1) The product shall be certified with relevant Thai Industrial Standard.

Documents/evidence for the examination

The applicant shall clarify its product category and submit the certificate accordingly.

2) Environmental management shall comply with national laws and regulations as specified in the environmental impact assessment report.

Documents/evidence for the examination

The applicant shall submit a report to declare results for reducing environmental impacts and environmental monitoring and evaluation in accordance with national laws and regulations for the past two consecutive years.

3) Manufacturing, transportation, and post-industrial waste disposal shall comply with national laws and regulations, or the manufacturer shall be accredited by ISO 14001.

Documents/evidence for the examination

The applicant shall submit one of the following documents:

1. License or evidence to prove that manufacturing, transportation, and post-industrial waste disposal complies with national laws and regulations.
2. Certification of ISO 14001 from the manufacturer.

3.2.2 Special Provision

- 1) The steel products shall not contain radioactive materials.

Documents/evidence for the examination

The applicant shall submit a declaration letter, supported by documentation on procedures and standards for examining the radioactive materials contained in the steel products.

- 2) Steel products must not be impregnated, labeled, coated or otherwise treated in a manner which would prevent recycling.

Documents/evidence for the examination

The applicant shall submit a declaration letter and samples (photographs). Relevant test certificates and information sheets shall be supplied for review.

- 3) Specific Energy Consumption in Steel Production Process including Reheating furnace, Rolling Mill and all Utilities must not exceed 2,100 MJ/ton steel product (total energy) based on a rolling 12-month average.

Documents/evidence for the examination

The applicant shall submit a declaration letter and supporting documents.

- 4) The manufacturer shall have an energy efficiency and CO₂ emissions management program of its production process to demonstrate clear targets of continuous improvement of energy consumption and CO₂ emissions, and annually conduct the CO₂ emissions inventory.

Documents/evidence for the examination

The applicant shall submit a declaration letter and supporting documents that clarify the established energy efficiency and CO₂ emissions management program established for the production process, and the CO₂ emissions inventory.

- 5) The limit of hazardous substances in steel products shall comply the following requirements:

Lead: 1000 ppm or 0.1%

Mercury: 1000 ppm or 0.1%

Cadmium: 100 ppm or 0.01%

Hexavalent chromium: 1000 ppm or 0.1%

Documents/evidence for the examination

The applicant shall submit testing results of heavy metal concentrations in steel undertaken in accordance with the relevant ISO or equivalent national and international test methods.

6) The steel products shall not be treated with:

- Compounds containing mercury, lead, cadmium, hexavalent chromium, arsenic or their compounds
- Halogenated organic compounds
- Any chemicals that are included in the International Agency for Research on Cancer (IARC) lists for proven (Group 1) or probable (Group 2A) carcinogens.
- Slushing oil (otherwise known as anticorrosive that contains harmful substances)

Documents/evidence for the examination

The applicant shall submit a declaration letter and supporting documents that state the products are not treated with the prohibited substances.

7) Paper or plastic packaging should have advice on how to handle the packaging after use, either printed on the packaging, or listed in the invoice document or order form, including the following statements:

1. Packaging can be recycled.
2. Packaging can be reused as fuel in power plants that are licensed by government agencies.
3. Send packaging to the collectors or local government.

Documents/evidence for the examination

The applicant shall submit a declaration letter ensuring the existence of instructions for recycling and disposal on paper and plastic packaging as well as declaring a picture of the instruction or evidence of clear instructions on the packaging.

8) Ink or pigments used for printing or labels on packaging shall not contain heavy metals and heavy metal compounds. Heavy metals (lead, mercury, cadmium, and chromium hexavalent) due to impurities or traces deriving from raw materials in packaging shall not exceed 0.01% (≤ 100 mg/kg) by weight.

Documents/evidence for the examination

The applicant shall submit one of the following documents:

1. A declaration letter from ink manufacturer or supplier, which includes test results for lead, mercury, cadmium and chromium hexavalent in color ink or pigments for printing or labels on package (test methods shall be in accordance with number 2).
2. Test results for lead, mercury, cadmium, and chromium hexavalent shall use test methods according to the following standards:
 - 1) For mercury, ISO 3856-7 or ASTM D 3642 or IEC 62321 or other equivalent standards.
 - 2) For lead, ISO 3856-1 or ASTM D 3335 or IEC 62321 or other equivalent standards.
 - 3) For cadmium, ISO 3856-4 or ASTM D 3335 or IEC 62321 or other equivalent standards.
 - 4) For chromium hexavalent, ISO 3856-5 or IEC 62321 or other equivalent standards.

Note:

- 1) The test or measurement must be done in the official laboratory or a private laboratory that has been accredited for testing in accordance with TIS 17025 (ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories), and the test results must be valid (no more than 3 years from the date of application).
- 2) Certificate of compliance must be valid (no more than three years from the date of application for certification) and must be signed by the authorized signatory and seal (if any).
- 3) This certification is valid for two years from the date of certification. When expired, products and services that have been certified in accordance with this requirement may not be considered for re-certification, if the comparable specifications in line with the requirements of the Green Label are not met.

Appendix A. List of Construction Steel Products under this criteria

No.	TIS Number	Title
1	TIS 20-2559 (2016)	Steel bars for reinforced concrete: round bars
2	TIS 24-2559 (2016)	Steel bars for reinforced concrete: deformed bars