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REGIONAL POLICY ADVOCACY

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Monitoring the Implementation and Estimating the Benefits

of Sustainable/Green Public Procurement

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1. Introduction

This report provides an introduction to monitoring sustainable public procurement with a focus on environment -normally known as Green Public Procurement (GPP)-, the different elements that can be evaluated and the benefits of each of them, as well as how different central governments in the Asia are defining their monitoring systems. The objective is to inspire other countries and authorities in the region to set up such systems to support their GPP policies and the global reporting of SGD target 12.7.

The strategic use of public procurement

Public agencies at all levels are increasingly using their purchasing power in a strategic way to support their policies and commitments. They have realized that **public procurement is not a mere administrative procedure but a powerful instrument** that can be leveraged to achieve the sustainability goals of the organization. Public money has to be expended efficiently and this inevitably means in a way that is coherent and supports the organization's policies in order to achieve the most benefits per money spent.

This strategic use of public procurement has been **recognized as key to the global effort for sustainability**, important enough to have a specific target within the Sustainable Development Goals of the 2030 Agenda for Sustainable Development, target 12.7: “Promote public procurement practices that are sustainable, in accordance with national policies and priorities”.

This is also recognised in the North-East and South-East Asia regions, where 80% of the countries have included GPP/SPP in their national guidelines or policies; and 60% already have a dedicated GPP/SPP policy, regulation and/or mandate in place to promote GPP/SPP (referred to as GPP/SPP policies hereafter)[1].

The benefits of monitoring and evaluating GPP

In the deployment of GPP, efforts have focused on developing resources for implementation rather than on defining monitoring systems to track progress and evaluate results. The former is necessary to support practitioners to actually procure more sustainable solutions; however, **monitoring and evaluating is also important and provides many benefits**:

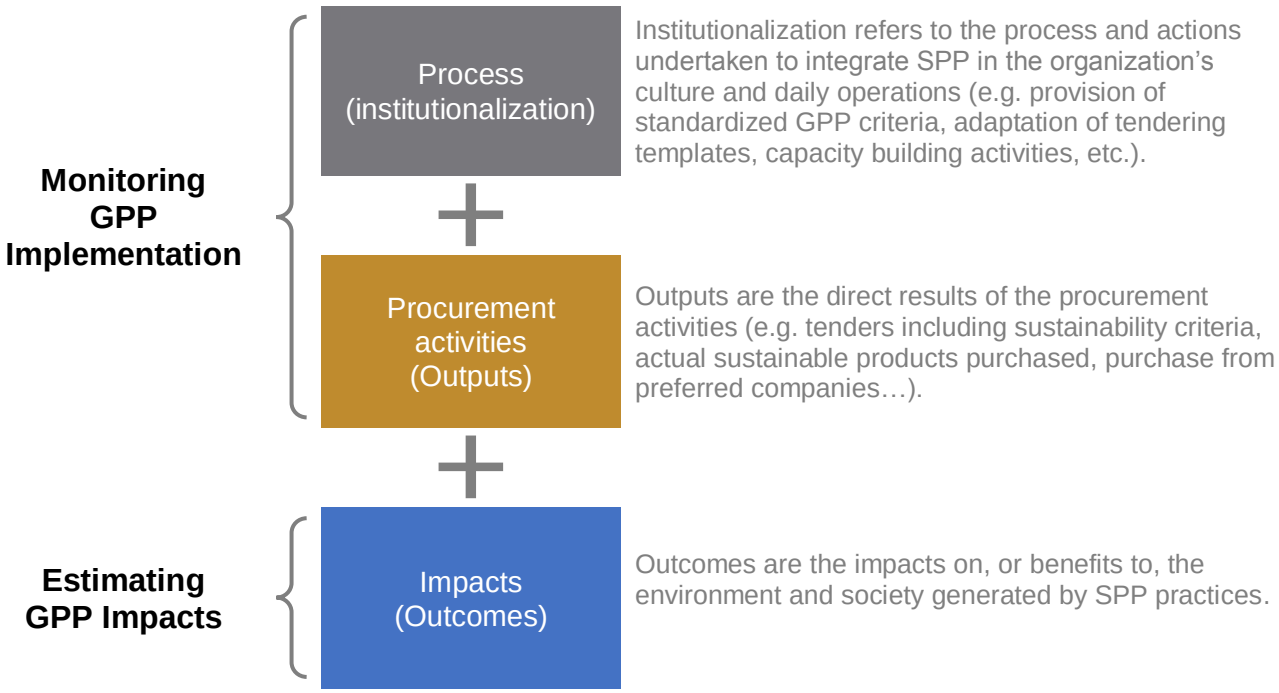
- **At the management level**, it helps to raise compliance by keeping each agency accountable and helps managers to improve implementation effectiveness by targeting support in identified areas for improvement.
- **At the policy level**, monitoring and reporting results demonstrate political commitment, enhances transparency and reinforces the exemplary role of the administration, which encourages and legitimizes the promotion of sustainable consumption by others.

What to monitor and evaluate

Public entities monitor and evaluate different aspects based on their specific GPP policy goals, priorities, tool, resources and objectives of their monitoring systems:

[1] Based on a survey conducted in 2019 by United Nations Environment Programme as part of the SWITCH-Asia Regional Policy Advocacy Component.

Figure 1. Aspects that are assessed when monitoring and evaluating GPP/SPP policies



Source: Adapted from "Monitoring Sustainable Public Procurement Implementation. Recommendations and Case Studies" 10YFP Sustainable Public Procurement programme, United Nations Environment Programme, 2016 (available in English)

The following sections will present the different aspects and advantages of both monitoring GPP implementation and estimating its benefits; and will present the approaches of several central governments in the region in order to show that setting up monitoring and evaluating systems is possible, and encourage all to improve and/or set up such systems to support their national GPP policies and the global reporting of SGD indicator 12.7.1. "Number of countries implementing sustainable public procurement policies and action plans", whose approved methodology is published here: https://www.oneplanetnetwork.org/resource/spp-index-methodology-sdg-indicator-1271 .

2. Monitoring GPP Implementation

When we monitor the implementation of GPP, evaluating both GPP institutionalisation and outputs are important. The later shows if we are achieving actual results and which priority product categories are lagging behind; but the former is also key to identify challenges and successful factors that can help us better define supporting actions to accelerate the uptake of GPP.

Measuring GPP Institutionalisation

The introduction of sustainability considerations in public procurement is a process that cannot be implemented overnight. Managers and practitioners must understand the importance of using procurement strategically, need information on what sustainable alternatives exist in the market and how to request them in tendering processes, require training and capacity building, etc.

In order to ensure that supporting measures are in place, authorities should monitor GPP institutionalisation, that is, to monitor the actions to support the integration of GPP in the organization's culture and daily operations.

Measuring only the level of green procurement achieved in not enough to identify why GPP is being implemented or not, that is why it is also important, specially at the beginning, to also evaluate GPP institutionalisation. This will help to **identify challenges and success factors** in order to define corrective measures to increase and speed GPP implementation.

From previous research, data to assess GPP institutionalisation is usually gathered through **surveys or questionnaires**, though interviews, scorecards and direct review of documentation are other possible data sources; and some of the common key indicators evaluated include:

Table 1. GPP Institutionalisation. Key indicators

Aspect	Indicators	Unit
GPP Process (Institutionalisation)	• Overall GPP policy, law, plan, etc. in place • GPP action plans at organisation or department level • Procurement legal framework includes GPP provisions • Leadership, responsibilities, and coordination roles/mechanisms established or assigned • Staff dedicated to supporting the implementation of GPP • Training/Capacity-building of practitioners on GPP • Categories of products, services, and works prioritised and with criteria developed • Procurement procedures and tools integrating GPP • Support activities and resources available/developed • Monitoring and reporting systems in place	Number Percentage over the total

Source: Adapted from "Monitoring Sustainable Public Procurement Implementation. Recommendations and Case Studies" 10YFP Sustainable Public Procurement programme, United Nations Environment Programme, 2016 (available in English)

Measuring GPP Outputs

The other aspect to monitor when evaluating GPP implementation is the actual level of green procurement, that is the output that results from the procurement activities. We might have a policy, provide training and resources, etc. but it that does not translate into an increasing number of purchases and contracts with environmental criteria, we are not achieving the objectives of our GPP policies.

The aspects, approaches and methodologies to measure GPP outputs vary considerably depending on the policy objectives set, the sustainability aspects monitored, the scope of the monitoring (both in terms of authorities and product categories covered) as well as on the data gathering options.

The main aspects and indicators monitored by public organisations are the following:

Table 2. GPP Outputs. Key indicators

Aspect	Indicators	Unit
Procurements with environmental criteria	• Number of procurements with environmental criteria • Financial value of procurements with environmental criteria	Absolute value Percentage over all procurements/purchases, over priority product categories and/or all contracted companies
Green products, services, or works purchased[2]	• Number of green products purchased • Financial value of green products purchased	
Contract or purchase with/ from preferred companies	• Number of contracts awarded to preferred companies • Expenditure on preferred companies	

Source: Adapted from "Monitoring Sustainable Public Procurement Implementation. Recommendations and Case Studies" 10YFP Sustainable Public Procurement programme, United Nations Environment Programme, 2016 (available in English)

Regarding data collection, authorities try to use as much as possible existing tools to track this information and report results. This includes: e-procurement platforms, central procurement databases and online shops, standardised tendering forms, reports from vendors, internal financial software.

This task used to be very time consuming, but thanks to the expansion of e-procurement platforms and tool and the integration of different systems, tracking and reporting actual GPP outputs are improving and becoming less burdensome.

[2] "Products, services, or works" will also be referred to as simply "products" for simplification purposes.

3. Estimating GPP Impacts

Estimating the outcomes or impacts of GPP/SPP can help build the case for GPP/SPP, increase buy-in within the organisation and by other authorities, and guide action by selecting priority action areas from a cost-benefit perspective.

As stated in the definition adopted under the 10YFP SPP Programme, SPP is “a process whereby public organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life cycle basis. This means generating benefits not only to the organisation, but also to society and the economy, whilst significantly reducing negative impacts on the environment”.

Because of those expected benefits, public authorities have been developing and implementing GPP policies for many years now. However, few authorities estimate and communicate those benefits or outcomes despite the advantages this can have. Furthermore, there are still many authorities that need quantified "proof" of those outcomes in order to build buy-in.

When estimating and communicating the benefits of GPP, different approaches and methodologies have been used depending on, inter alia, the objectives of the authority conducting the evaluation. In general, the estimation of GPP impacts can be conducted:

- As a **pre-assessment on the potential benefits of implementing GPP**. This is normally based on overall procurement data and it is conducted to build the case for GPP and to guide action from a cost-benefit perspective (focusing on those product categories that can have a greater positive impact on the authority's sustainability priorities while being cost-effective); or
- Based on **actual purchases and contracts**, to communicate the benefits of actual GPP/SPP implementation and how it contributes to sustainability objectives, thus increasing also buy-in within the organisation and by other authorities in the region.

Furthermore, the methodologies also differ in terms of what the scope and baseline is, what is defined as green or sustainable, what conversion factors are used to estimate benefits or what indicators are calculated. Some indicators used by different authorities when estimating the outcomes of GPP are the following:

Table 3. GPP Outcomes. Key indicators

Outcome	Commonly estimated Indicators
Environmental benefits	• Water, energy and (toxic) materials savings • Greenhouse gases and other air emissions reduction • Waste generation reduction
Economic benefits	• Costs savings (from a life-cycle perspective) • Externality costs savings
Market transformation	• Number of ecolabeled products and companies • Market share of ecolabeled products • Number of jobs created in the green economy

Source: Adapted from "Monitoring Sustainable Public Procurement Implementation. Recommendations and Case Studies" 10YFP Sustainable Public Procurement programme, United Nations Environment Programme, 2016 (available in English)

In the following section different approaches by national governments in the region are briefly presented in order to inspire other authorities to set up such systems to support their GPP policies and the global reporting of SGD target 12.7.1. Additional information to define and implement monitoring systems is also included in the References section.

4. Examples from the region

4.1. The approach in China

The government of China has two main regulations to promote GPP, both focused on the procurement of green products:

- the Implementation Opinions on Government Procurement of Energy Conservation Products (ECP) from 2004, which was complemented in 2007 with the State Council Regulation on Compulsory Government Procurement for Energy Conservation Products; and
- the Implementation Opinions on Government Procurement of Environmental Labelling Products (ELP) from 2006.

Both regulations require public authorities from the national, regional and local levels to preferentially purchase products that are certified with either the China Environmental Label or with the China Energy and Water Conservation Label and which are included in two products procurement lists, one for each ecolabel.

Purchasing from both lists was voluntary at first, but since 2007 purchasing from the ECP list is mandatory for certain product groups (computers, monitors, printers, lamps, air conditioners, electric heaters, televisions, urinals and water faucets).

Furthermore, in 2019 the government published the Notice on Optimizing the Implementation Mechanism of Governmental Procurement of Energy Conservation Products and Environmental Labelling Products that updates the implementation mechanisms of GPP in China, still based on ECP and ELP but with certain modifications.

To evaluate progress in the implementation of these regulations, since 2004 the Government monitors **GPP implementation** at all levels of the public sector. Furthermore, to communicate the benefits of GPP and promote its further implementation, the government also estimates the **impacts of GPP** in terms of environmental impact reduction and market transformation.

Monitoring GPP Implementation

GPP implementation is monitored annually in terms of the **level of green product purchases (outputs)**, that is, on the level of procurement of green products from the categories included in the ELP and ECP lists, both in absolute expenditure and as percentage over the total expenditure on those priority product groups included in both lists.

The number of product categories included in both lists has increased over the years from the original 8 and 14 categories for the ECP and ELP respectively to 43 and 93 in 2019. Table 4 shows the GPP results for natural year 2019, based on data gathered through internal data systems:

Table 4. GPP level (in expenditure and %) by Chinese public authorities in 2019

Type of green product	No. of product categories	Total expenditure on green products	% of GPP over total expenditure on the priority product groups
Eco-labeled products	93	RMB 164.7 billion	90.2 %
Energy conservation products	43	RMB 165.4 billion	90.1 %

Source: www.mof.gov.cn

Estimating the impacts and benefits of GPP

Environmental benefits

In 2016, the China Environmental United Certification Center (in charge of the China Environmental Label) conducted a study to evaluate the environmental benefits of ELP in relation to GPP, using the GPP records on the number of ELP purchased by all public organisations, **for three product groups** with large procurement volumes - namely office IT equipment, office furniture and copy paper -.

For each product group, an average or **proxy eco-labelled product** is compared against a proxy conventional product considering the main impacts categories of each one and taking as reference the thresholds set in the ecolabel as criterion.

According to the study, the benefits of GPP for those three product groups was the following (Table 5):

Table 5. Environmental benefits of green procurement of office IT equipment, office furniture and copy paper by Chinese public authorities in 2016

Type of product	Environmental impacts reduction	
Office IT equipment	199,370	tons of CO_2
	402	tons of particles (PM 2.5)
Office furniture	19,210	tons of volatile organic compounds (VOCs)
Copy paper	516	tons of chemical oxygen demand (COD)
	5	tons of total phosphorus (TP)
	5	tons of ammonia (NH_3-N)

Source: "Report on Environmental Performance Evaluation of Government procurement for ELP in China", CEC, 2016.

Market transformation

Additionally, the government also monitors each year the number of products and companies certified with the China Environmental Label and the annual output value of those certified products. These indicators serve as an indirect indicator of the overall success of the GPP regulations.

For example, by the end of 2019, 3,447 enterprises had certified about 800,000 different product models.

Publication of Results

GPP data is publish on the website of the Ministry of Finance (only in Chinese) and information on the environmental benefits of ELP in general -not linked to GPP- can be found in the following report (only in Chinese): http://www.mepcec.com/upload/201911/05/201911051723066312.pdf

4.2. The approach in Japan

In 2000, the Government of Japan passes the Act No. 100 of 31 May 2000 on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities, also known as the Act on Promoting Green Procurement.

The Act requires each Ministry and their incorporated Agencies: 1) to define and make public annually a GPP policy or plan, with self-defined procurement targets for the priority product and services defined by the Government in the so-called basic GPP policy; and 2) to report a summary of its GPP records to the Ministry of the Environment after the end of each fiscal year and to make those records public.

Local public authorities (prefectures, cities, towns and villages) are not obliged to do so, but are encouraged to also define a policy every year for the promotion of the procurement of eco-friendly goods and services.

To monitor the level of compliance and progress, since the enforcement of the act in 2001 the Government monitors **GPP implementation** at both the central and local levels. Furthermore, it also evaluates the **impacts of GPP** both in terms of the market transformation (market availability of green products) as well as in greenhouse gases emissions reductions thanks to GPP.

Monitoring GPP Implementation in the Central Government and its Agencies

At the central level, two aspects are monitored. One the one hand, **GPP institutionalisation (process)**, simply in terms of the number of Ministries and Agencies that develop their annual GPP plans and reported on their implementation.

On the other, the actual **level of green purchases (outputs)** for each of the more than 270 products and services prioritized in the basic GPP policy. To qualify as green, they must comply with the environmental criteria set in the basic policy.

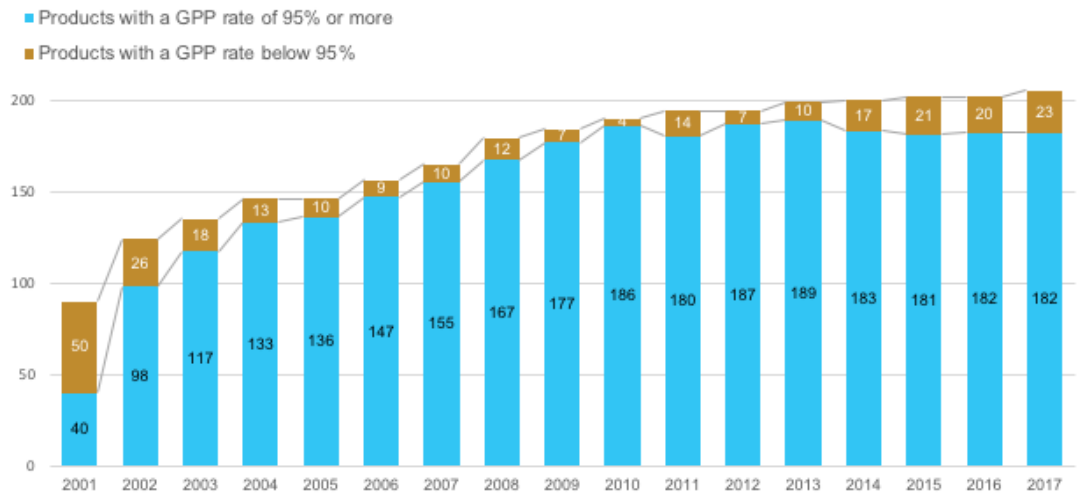
Purchases tracking in each entity is different depending on their internal systems. However, to collect and aggregate data, the Ministry of the Environment provides a standardized reporting form (a spreadsheet) on which each agency enters the number of products purchased each month (both green and in total) and which calculates annual data automatically. This allows the government to evaluate:

- The evolution in overall consumption, with the total amount of products purchased (in units).
- The progress in the level of GPP, with the percentage of green products over the total (%).

After the end of each fiscal year, all organizations submit the form to the Ministry of the Environment, which then prepares aggregated results for the whole central Government (Ministries and incorporated Agencies).

According to records, the number of product groups (excluding works) with a GPP rate of more than 95% has increased since 2001. At that time, the number of products with such a high GPP rate were 40 out of 90 products (44%) for which the central Government had to report results. In 2017, 182 out of 205 products (98%) show levels of GPP of 95% or higher (see Figure 2).

Figure 2. Number of products with a GPP rate of 95% or more (excluding works)



Source: Green Purchasing Results by National Institutions in Fiscal Year 2017 (available in Japanese)

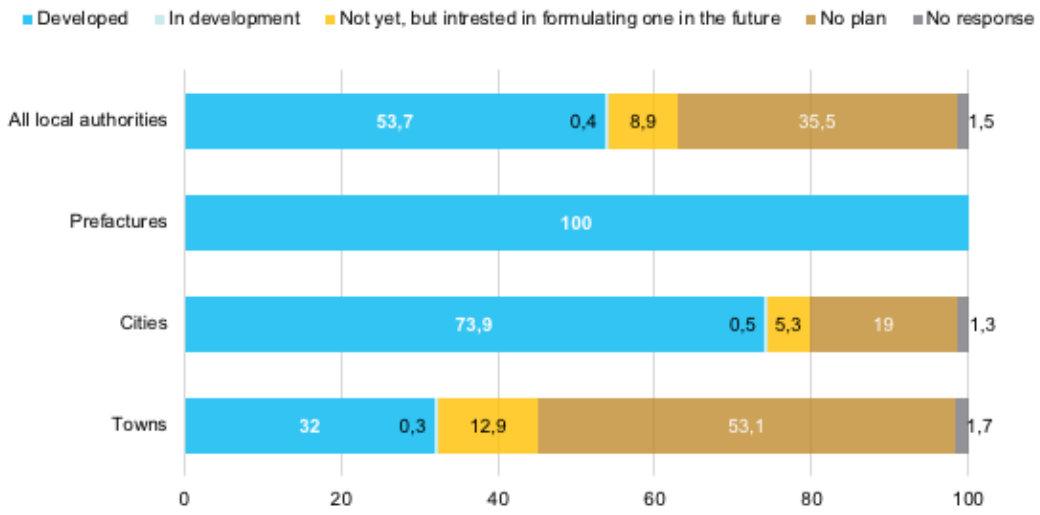
Monitoring GPP Implementation in Local Authorities

As the Act does not require local authorities to define annual GPP plans but encourages them to do so and promote GPP, the Government monitors annually local authorities' **efforts to implement GPP** (**process**). The objective is to assess the current status of GPP and to identify good examples and areas to provide advice and support in that endeavour.

The monitoring consists on a survey conducted via a questionnaire that is sent to the responsible person for GPP in all local authorities nationwide, based on the contacts list that the Government keeps up-to-date. The survey (with mostly multiple-choice questions) covers topics such as: if the authority implements GPP, what plans and/or management systems include GPP obligations, success factors and challenges in GPP implementation, etc.

Figure 3 shows the results of one of the questions of the survey for fiscal year 2018, the development status of GPP policies in local authorities.

Figure 3. Percentage of local authorities (in total and by type of authority) that have GPP policies in 2018



Source: Results of the Survey on Green Purchasing by Local Authorities in Fiscal Year 2018 (available in Japanese)

Estimating the impacts of GPP

Environmental benefits

To estimate the **environmental benefits of GPP**, Japan's Government uses the procurement records provided by the Central Government (Ministries and incorporated Agencies), that is, the amount of green products purchased versus non-green products purchased. Even though the central Government has to report on more than 270 products, benefits are calculated for only **19 product categories**.

For each category, an average or **proxy green product** is defined, based on the minimum green specifications set in the basic GPP policy, which are the criteria for agencies to qualify purchases as green or not.

Environmental benefits are estimated in terms of **greenhouse gas emissions** ($CO_{2\text{-eq}}$) **reductions**:

- For energy-consuming products or products that can affect energy consumption (such as tires), $CO_{2\text{-eq}}$ emissions are estimated based on energy consumption during the use phase for a certain number of years, depending on the product and the emissions factors of the energy source used.
- For non-energy-consuming products (such as stationery or textiles), different factors are considered in order to transform the environmental specification into $CO_{2\text{-eq}}$ emissions based on available studies.

Benefits are then calculated based on the GPP level of the year compared to the market share of green products in 2000, the year prior to the enforcement of the Act (obtained from data by the industry). The basic calculation formula is the following:

> *Total number of products purchased during the year * (% that is green – % of market share of the green product in 2000) * conversion factors of the green product characteristics to $CO_{2\text{-eq}}$ emissions * years of use of the product*

The following two examples[3], illustrate the calculation for imaging equipment and plastic binders and Figure 4 presents the avoided $CO_{2\text{-eq}}$ emissions avoided each year, since the implementation of the methodology to estimate the environmental benefits of GPP.

[3] From "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English).

Table 6. Example of the CO2-eq calculation for imaging equipment

Copying equipment	
Total number of products purchased in 2016:	11,266 units
Percentage of green products from the total in 2016:	99.57%
Percentage of the market share of green products in 2000:	33.3%
Annual power consumption of products in 2000:	302 kWh/unit
Annual power consumption of proxy green products in 2016:	150,8 kWh/unit
Electricity emissions factor:	0.518 kg CO2-eq./kWh
Years of use of the product:	5
Impact reduction obtained with the green purchases =	**11,266 * (0.9957-0.333) * (302-150.8) * 0.518 * 5 = 2,924 Tone CO2-eq saved**

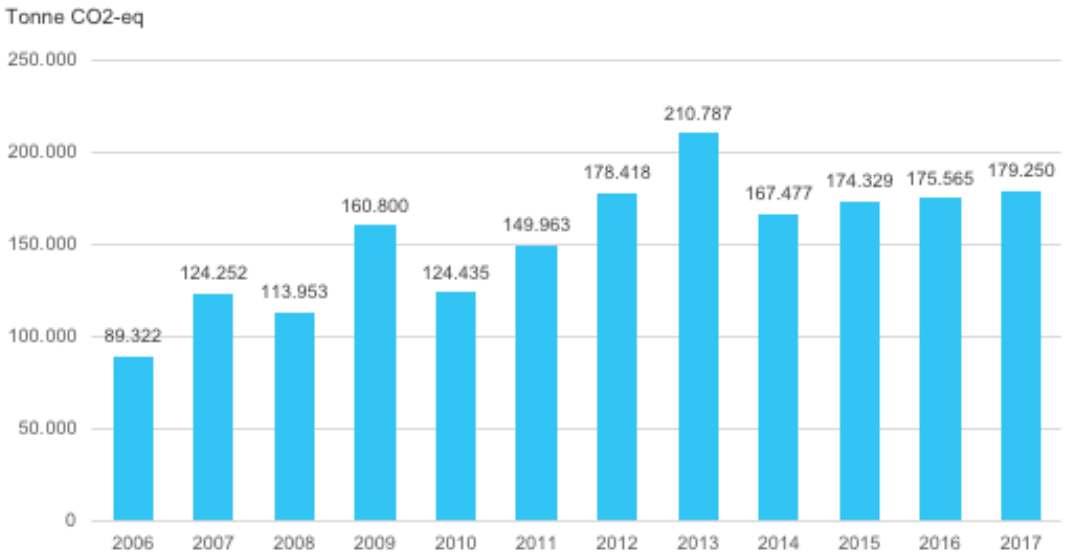
Source: Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Table 7. Example of the CO2-eq calculation for plastic binders

Office plastic binders	
Total number of products purchased in 2016:	13,541 (both made of plastic and paper)
Percentage of plastic binders from the total based on domestic shipment volumes of plastic and paper files, as no actual data on only plastic files is available:	24.9%
Percentage of green products from the total in 2016:	97.9%
Percentage of the market share of green products in 2000:	29.1%
Minimum recycled plastic contained in green plastic folders:	40%
Average weight of plastic folders based on market data:	100 g/folder
Emissions if the plastic was burned instead of recycled:	2,765 kg CO2-eq./Tone
Years of use of the product:	not applicable
Impact reduction obtained with the green purchases =	**(13,541*0.249) * (0.979-0.291) * 100/1,000,000 * 0.4 * 2,765 = 0,256 Tonne CO2-eq saved**

Source: Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Figure 4.Estimated environmental benefits derived from GPP by Japan's central Government (2006-2017)



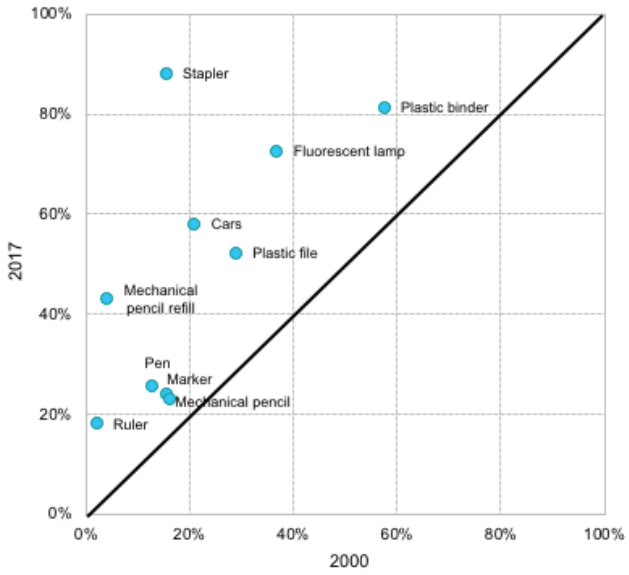
Source: Green Purchasing Results by National Institutions in Fiscal Year 2017 (available in Japanese)

Market transformation

One of the objectives of the Act on Promoting Green Procurement is to use the purchasing power of the public sector to have a positive pulling effect on the market and promote green growth. To evaluate if the policy has really impacted the market, the Government evaluates the share of green products over the total in the market for 10 of the product groups included in the basic GPP policy as compared to the baseline of 2000. The information required is provided by each industry association every year.

According to the last report available (for fiscal year 2017), the market share of all product groups has increased since 2001, as shown in Figure 5.

Figure 5. Percentage of green products in the Market (in 2017 against the 2000 baseline)



Source: Green Purchasing Results by National Institutions in Fiscal Year 2017 (available in Japanese)

Publication of Results

Once all data has been compiled, the Ministry of the Environment produces two reports, one on GPP in the Central Government and another on GPP at the local level. The reports are disclosed in the website of the Ministry, where the public can easily access them.

In addition, based on the information gathered through the local authorities' surveys, the Ministry prepared the "Green Purchase Guideline for Local Authorities", which is updated regularly and provides recommendations to implement GPP together with a collection of good practice case studies from Japanese local authorities. The status of GPP in each local authority based on the questionnaire answers and the case studies (organized by organization's size and category) are available in a searchable database.

Furthermore, the Ministry also provides feedback papers to all local authorities with information relevant to the authority, including the GPP situation of neighbouring and same-scale authorities for them to benchmark themselves against similar organizations.

4.3. The approach in Malaysia

The policy framework supporting GPP in Malaysia stems from the National Green Technology Policy from 2009, reinforced afterwards in the 10th (2011-2015) and specially the 11th (2016-2020) Malaysian national development plans, which consider GPP as a tool to stimulate the growth of the green industry in the country and states that:

"Government green procurement (GGP) will be made mandatory for all government ministries and agencies. GGP will create the demand for green products and services, encouraging industries to raise the standard and quality of their products to meet green requirements. GGP will complement the existing eco-labeling scheme in the country for green products certification. By 2020, it is targeted that at least 20% of government

procurement will be green. Concurrently, the private sector will also be encouraged to emulate Government efforts in green procurement."

Within this framework, GPP implementation started in 2013 with an initial GPP Short-Term Action Plan 2013-2015 with a first piloting phase covering 5 Ministries. Thanks to the successful outcomes achieved and the objectives set in the 11th national development plan, the Government developed a GPP Long-Term Action Plan 2016-2030 that has gradually expanded the coverage to 12 Ministries and their agencies in 2016 and to all 25 Ministries and their agencies in 2017, through an Instruction Letter from the Ministry of Finance. The 2017 Instruction Letter also directed all agencies to appoint a GPP focal point and to submit annual GPP implementation plans.

To evaluate progress in the implementation of the GPP, since 2014 the Government monitors **GPP implementation** by all targeted organisations in order to evaluate results and promote further implementation.

Monitoring GPP Implementation

To assess GPP implementation, the government monitors the **level of GPP (outputs)** by all targeted organisations in terms of GPP expenditure on the product and service categories prioritised in the Action Plan.

For sustainable products and services it is based on actual purchases, while for works it is be based on the actual contract value and amount of sustainable products purchased.

In order to qualify as green, products and services must comply with the GPP criteria set by the government. These criteria are aligned with various national and international ecolabelling schemes (such as the Malaysia Type I ecolabel and the energy and water conservation schemes) but adapted, whenever necessary, to ensure sufficient product availability.

Data is gathered through a standard questionnaire filled in by each ministry and agency annually that collects, for each procurement: the product category to be procured, allocated budget, tender announcement period, green criteria required, the main characteristics of the procurement process and final results of the procurement and total procurement cost.

Nevertheless, as the number of participating Ministries and agencies continues to grow, the Ministry of Finance is upgrading its e-procurement system and plans to introduce modifications in order to capture GPP information, which will make GPP data tracking significantly easier.

In the meantime, the Ministry of Energy, Science, Technology, Environment & Climate Change (through its environmental agency Malaysian Green Technology and Climate Change Centre aka GreenTechMalaysia) has developed a data collection spreadsheet in order to facilitate data collection and the estimation of environmental and economic outcomes of GPP.

Estimating the impacts and benefits of GPP

Environmental benefits

In order to visualise the positive effect on the environment of GPP, since 2016 GreenTechMalaysia estimates the environmental benefits associated to the government's green purchases.

The benefits are estimated for 7 energy-related product categories based on energy displacement from non-renewable to renewable electricity sources (for solar and mini-hydro energy) and on their energy efficiency (for ICT Equipment, Multi-purpose imaging equipment, street lighting, indoor lighting, air conditioning systems and fans and televisions). The estimated benefits for computers, imaging equipment and lighting for 2017 are summarised in Table 11.

For each product the specific environmental characteristics of the purchased green product must be included in the spreadsheet provided by GreenTechMalaysia in order to calculate the environmental benefit and they are compared to an average non-green conventional product set as baseline.

The general calculation formula is:

> *Total number of products purchased during the year * (Conventional product environmental parameters – Green product environmental parameters) * Conversion factors of the green characteristics to $CO_{2\text{-}eq}$ emissions*

The following example illustrates the calculation for indoor lighting sources.

Table 8. Example CO2 calculations for indoor lighting sources

Indoor lighting light sources (brand A)	
Total number of products purchased in 2017:	184 units
Power of the green light source purchased:	28 W (based on wining offer)
Power of the non-energy efficient light source:	44 W (set as baseline)
Time of use per year (12 hours x 365 days/year):	4,380 hours / year
Electricity cost:	0.365 RM / kWh
Electricity emissions factor:	0.694 kg $CO_{2\text{-eq}}$ / kWh
Impact reduction obtained with the green purchases =	184 * (44-28) * 4,380 = 12,895 kWh / year saved 12,895 * 0.694= 8,949 Tone $CO_{2\text{-eq}}$ / year saved

Source: Authors

Publication of Results

The national government does not make the results of the GPP monitoring exercises public, however some results are presented in Table 9, Table 10 and Table 11.

Table 9. GPP-related indicators by the Federal Ministries and agencies participating in the GPP Action Plans

Indicator	2013-2015	2016	2017	2018
Participating Federal Ministries and Agencies (Number)	5	12	25	25
Cumulative Green Procurement Expenditure (RM million)	352.1	489.7	776.1	904.4
CO_2 emission reduction (tons $CO_{2\text{-eq}}$)	-	1,634.8	6,544.8	1,031.3
Cumulative green products & services registered under the MyHIJAU Mark, Green Directory (Number)	181	369	1,330	3,142

Source: GreenTechMalaysia, Ministry of Energy, Science, Technology, Environment & Climate Change, Malaysia

Table 10. Distribution of GPP by priority category (2016-2018)

GGP Priority Product Categories	Percentage (%)
Solar & Mini Hydro Energy	24.9%
ICT Equipment	22.5%
Paint / Coating	12.2%
Building Facilities Management Services	11.8%
Rubber Based Products	7.4%
Paper	6.7%
Multi-purpose Printer	5.2%
Street Lighting	3.5%
Fire Protection System & Equipment	1.1%
Cleaning Services	1.0%
Air Conditioning System	0.8%
Green Fuel	0.6%
Green Data Services	0.6%
Toner	0.4%
Hotel, Logistic & Training Services	0.3%
Indoor Lighting	0.2%
Heavy Machine Vehicles	0.2%

Paper Based Printing Services	0.1%
Waste Management Services	0.1%
Fan & Television	0.1%
Automotive Workshop Services	0.1%
Stationery	0.0%
Furniture	0.0%
Coated Flat Steel Product	0.0%
TOTAL	**100%**

Source: GreenTechMalaysia, Ministry of Energy, Science, Technology, Environment & Climate Change, Malaysia

Table 11. Environmental benefits in terms of CO2 estimated from the green purchases of computers, multi-purpose printers and lighting by the Government of Malaysia in 2017

Product group	No. of items purchased	GPP Value (RM)	Energy Saving (kWh)	Energy Saving (%)	Economic Saving (RM)	CO_2 emissions reduction (t $CO_{2\text{-eq}}$)
Computers	3,752	15,488,024	566,117	1.3%	206,633	393
Multi-purpose printers	2,441	9,702,635	3,538,080	13.3%	1,291,399	2,455
Lighting	3,344	914,250	464,034	18.5%	169,372	322

Source: GreenTechMalaysia, Ministry of Energy, Science, Technology, Environment & Climate Change, Malaysia

4.4. The approach in the Republic of Korea

The Republic of Korea has several acts and policies to use public procurement strategically and support several national sustainability priorities. One of those acts is the Act on Promotion of Purchase of Green Products passed in 2005 by the government and deployed in 5-Year action plans.

The Act requires all public entities -from central to local governments and public institutions- to produce and submit to Korea Environmental Industry and Technology Institute, KEITI: 1) GPP Implementation Plans in which each entity sets its own voluntary targets; and 2) a Performance Report which includes the amount (in expenditure and number) of green products purchased.

To evaluate progress, since the enforcement of the act in 2005 the Government monitors **GPP implementation** at all levels of the public sector. Furthermore, to communicate the benefits of GPP and promote its further implementation, the government also estimates de **impacts of GPP** in terms of environmental impact reduction, economic benefits and green jobs creation.

Monitoring GPP Implementation

To assess progress in the implementation of the Act, the government monitors two aspects: GPP institutionalisation (process) and the level of green products purchased (outputs) by public entity.

GPP institutionalisation is measured in terms of the number of public entities that develop their annual GPP implementation plans and report on results. Each entity has to send this information through an online platform developed by KEITI to facilitate GPP implementation and data reporting (the GPIS-I).

Figure 6. Form in GPIS-I for the submission of GPP plans by public entities (in English)

Name of the Reporting Institute, (Year)							
Summary Table (Unit: 1000 KRW)							
Total		Total Procurement (Ordinary+Green)(A)		Green (B)		Percentage (%) (B/A)	
		Quantity	Amount	Quantity	Amount	Quantity	Amount
		0	0	0	0	0	0

Detailed Table (Unit: 1000 KRW)							
Product category		Total Procurement (Ordinary+Green)(A)		Green (B)		Percentage (%) (B/A)	
		Quantity	Amount	Quantity	Amount	Quantity	Amount
Office /Education/ Visonary/ Appliance	Office Equipment	0	0	0	0	0	0
		0	0	0	0	0	0
--	--						

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

The total number of public organisations in the country is higher than 30,000. However, they do not report individually. Umbrella organisations and regional governments compile the plans and records of subsidiary organizations and cities within their jurisdiction and summit the information. At the end of fiscal year 2017, 100% of the organisations reported their performance records and 97.4% submitted their implementation plans for 2018[4].

The actual **level of green products procurement** is calculated in terms of the quantity (in units and expenditure) of green products purchased from a list of more than 170 product groups and the percentage it represents over the total purchase of those product groups.

According to the Act, green products are those certified with either the Korea Eco-label and/or the Green Recycled Mark; and the list of product groups represent the list of types of products that can be certified by those two ecolabels, which has increased over the years.

Green procurement data is also collected through GPIS-I from three different sources, depending on which procurement platform is used:

- For purchases conducted centrally via the Korean On-line Procurement System (KONEPS) of the Public Procurement Service of the Ministry of Economy and Finance, data is provided in an Excel file on a monthly basis and integrated into GPIS-I.
- For all purchases done through KEITI's e-shopping mall "Green Market" –which public institutions can use for low-volume purchases that do not necessarily go through the Public Procurement Service as no tendering is required- data is automatically tracked and transferred to GPIS-I as KEITI manages both tools.
- Finally, for those procurements executed directly by the organisations through their own systems, data has to be tracked and imputed by each entity individually. Since 2017, however, central government, local government and educational public authorities are no longer required to manually input procurement data into GPIS-I as their purchase records are provided annually through their online accounting platforms.

Table 12 provides an overview of the evolution of GPP levels from 2006 to 2017 and shows how, most GPP is conducted via the national Public Procurement Service. Table 13 presents GPP results by type of public institution in 2017.

[4] "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019

Table 12. Total expenditure in green products and percentage over the total expenditure on those product groups

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total expenditure on green products (million USD)	759	1,184	1,396	1,436	1,447	1,450	1,522	1,801	1,940	2,126	2,508	2,945
% GPP over the total expenditure on those product groups	58.3	69.3	50.4	40	39.7	32.1	31.3	32.9	39.7	42.2	46.1	47.5
% GPP executed by PPS	65.8	67.6	51.2	61.0	51.4	57.3	70.2	82.5	81.4	79.1	85.4	87.2

Source: Adapted from "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Table 13. GPP level (in expenditure and %) by type of public organisation in 2017

Type of public authority	Total expenditure in product categories with GPP criteria (million USD) (A)	Total expenditure on Korea Eco-label and Good Recycle Mark products in these categories (million USD) (B)	% of GPP over total expenditure (B/A*100)
Central governments	866.5	367.9	42.5
Local governments	3,029.4	1,066.3	35.2
Educational authorities	1,351.2	859.9	63.6
Public enterprises	566.2	423.5	74.8
Quasi-governments	196.3	120.9	61.6
Local public enterprises and entities	111.2	62.0	55.7
Local research institutes	0.5	0.4	73.9
Others	74.3	44.3	59.7

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Estimating the impacts and benefits of GPP

Environmental benefits

To estimate the **environmental benefits of GPP**, Korea's Government uses the GPP records on the number of green products purchased from all public organisations. At the beginning, environmental benefits were calculated only in terms of annual $CO_{2\text{-eq}}$ emissions reduction for **19 product groups** of the Korea Eco-label. However, since 2015, the evaluation has expanded to measure comprehensive environmental impacts using life-cycle assessment data for a list of 134 product groups (results are presented in Table below).

Ten environmental impact aspects are considered based on data availability -including energy consumption, toxicity or recycling of resources. For each category, an average or **proxy eco-labelled green product** is compared against a proxy conventional product considering the impacts of each one during the product's lifespan. The proxy eco-labelled products represent the average value of the test results of products meeting the Korea Eco-label criteria. The proxy conventional product is the average value of the results of products failing to meet the Korea Eco-label criteria. If no test results are available, the environmental standards defined in the Korea Eco-label criteria are used as representative values for conventional product impacts, assuming that the performance of proxy eco-labelled products is higher than the criteria set in the Korea Eco-label standard.

Using the environmental impacts reduction of GPP, the government also estimates the **environmental externalities costs reductions** using different environmental impacts monetisation factors. The basic calculation formula is the following:

> *Total number of green products purchased during the year * (Conventional product environmental parameters - Green product environmental parameters) * Economic conversion factors of the environmental parameters*

The following example[5] (presented in tables 14, 15, 16 and 17), illustrate the calculation for personal computers. Overall environmental benefits from 2006 to 2017 are presented in Table 18 below.

Table 14. Example of the calculation of environmental costs reductions for personal computers

Personal computers	
Total number of green products purchased in 2013:	324,278 units
$CO_{2\text{-eq}}$ emissions reduction factor for the lifecycle of the product (5 years) using Life Cycle Assessment (LCA) data:	477 kg CO2-eq./ unit
Externality cost saving factor thanks to lower noise emissions of the green product *:	15.04 USD / unit
Economic saving factor thanks to the lower energy consumption of the green product throughout the life cycle *:	20.43 USD / unit
Impact reduction obtained with the green purchases in 2013 =	324,278 * 477 / 1,000 = 154,680 Tone $CO_{2\text{-eq}}$ saved
Externality costs savings with the green purchases in 2013 =	324,278 * (15.04 + 20.43) = 11.5 million USD saved

** Externality costs factors are defined based on for what parameters monetisation factors are available as describe in the tables bellow:*

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Table 15. Environmental parameters for a personal computer under the Korean Eco-label

Life cycle phase	Environmental parameters	Monetization factor available
Acquisition of raw materials	-	-
Manufacturing	Reduction of harmful substances and environmental loads	No
Distribution, usage and consumption	Energy saving	Yes
	Noise reduction	Yes
Disposal and recycling	Reduction of harmful substances and waste	No

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Table 16. Externality costs savings through the reduced noise emissions of personal computers

Level of Noise	Non-green product (A) [6]	Green product (B)	Environmental benefits (C, A-B)	Monetisation factor (D)	Externality cost savings (E, CxD)	Average externality cost savings
Minimum	38 dB	34 dB	4 dB	2.82 USD/dB	11.28 USD / dB	15.04 USD
General	46 dB	40 dB	6 dB		16.92 USD / dB	
Maximum	50 dB	44 dB	6 dB		16.92 USD / dB	

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

[5] From "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English).

[6] Given that noise test results of the non-green product are not available, the standards for noise defined in the Ecolabel criteria are used as representative values for impacts of conventional products.

Table 17. Economic savings related to energy consumption of personal computers

Electricity savings of a green vs non-green product (A)	Electricity price (B)	Economic savings (C, A x B)	Economic savings throughout the lifecycle (C x 5 years)
38 kWh	10.75 USD cents / kWh	4.09 USD / per year	20.43 USD

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Market transformation

In order to estimate the impact of the Act on the market, the government evaluates the **creation of jobs related to the green economy**. This is calculated using the annual GPP expenditure divided by an employment inducement coefficient, published by the Bank of Korea in 2010[7] and express in terms of additional number of green economy-related jobs as compared to the previous year (see Table 18 below). For example, in 2017 the total number of green economy-related jobs was estimated at 27,686 persons, which is 4,115 more persons-jobs than in 2016.

Table 18. GPP impacts in terms of environmental benefits, economic benefits and green jobs creation

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
$CO_{2\text{-eq}}$ emission reduction for the first list of 19 green products (in thousands of tons)	316	495	624	620	538	544	491	532	543	469	568	665
Economic benefits linked to the environmental impacts reduction (in million USD) *	4.8	6.2	5.8	6.3	5.8	6.3	16.0	24.2	33.7	36.5	30.4	35.4
Additional green economy-related jobs creation (in persons)	619	4001	1995	379	96	36	677	2624	1305	1754	3601	4115

** From total purchase executed by PPS*

Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

Additionally, KEITI also monitors each year the number of eco-labelled products and companies as well as their market share, which can serve as an indirect indicator of the overall success of the Act. Since 2005, the number of products certified with the Korea Eco-label has increased from 2,721 to 14,647 in 2017 and the sales of those products increased from USD 3 billion to 34 billion in 2013[8].

Macroeconomic study of the benefits of GPP

Finally, in 2019, KEITI commissioned a study to estimate the impact of its GPP policies not through the bottom-up approach used presently and presented above, but at a top-down macroeconomic level by using a dynamic computable general equilibrium methodology; approach that requires large amounts of data (such as input-output tables, national accounting, and consumer expenditure) to evaluate the effect on the economy and the environment of the GPP policies.

The study analyses the economic, environmental and social impacts of GPP policy under the greenhouse gases (GHG) mitigation policy of the Republic of Korea and studies the scenarios in which both policies can better coordinate to obtain a more positive effect. Based on the study, policies to support the production and consumption of green products under the GHG mitigation policy can help reduce the costs of GHG mitigation.

[7] The employment inducement coefficient integrates the number of employees directly hired for the production of commodities equivalent to KRW 1 billion, and the consequent number of employees indirectly hired in other sectors; and it was set at 8.3 persons per KRW 1 billion.

[8] "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019.

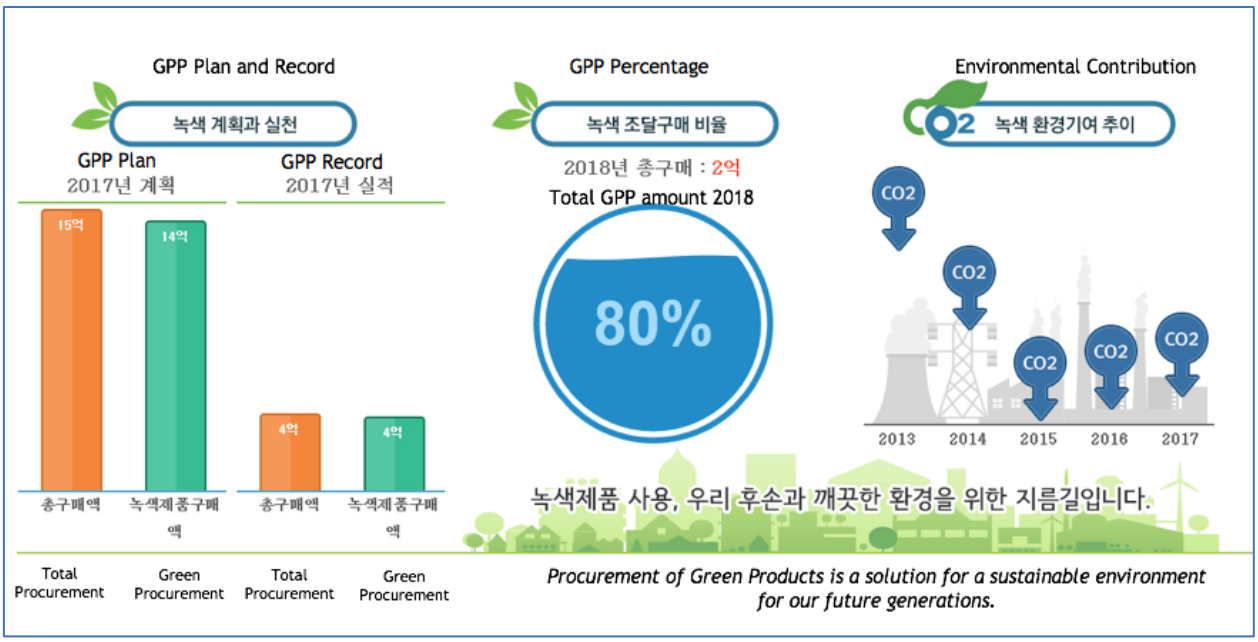
The GPP policy contributes to the transition to an environmentally friendly industrial structure, which in return contributes to a reduction in the proportion of energy-intensive industries.

The explanation of the model and results can be found in "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019.

Publication of Results

Once all data has been compiled through GPIS-I, green purchase records from each public entity are made available to the public. The platform provides graphic representations of the GPP plans, records and associated environmental benefits of each individual organisations, as shown in Figure 6.

Figure 6. Summary of the GPP records and environmental contribution of an individual organization in GPIS-I



Source: "Green Public Procurement in the Republic of Korea: a Decade of Progress and Lessons Learned" United Nations Environment Programme and KEITI, 2019 (available in English)

4.5. The approach in Thailand

The policy framework by the Government of Thailand to implement SPP/GPP was first nested in the 10th National Economic and Social Development Plan (2007-2011) and the Environmental Quality Management Plan (2007-2011), that state that the Government sector should be leader in green procurement in order to create proper markets of environmentally products and services[9].

This has been afterwards implemented through 4-year Green Public Procurement Promotion Plans (GPP Plans) that have progressively expanded the type of authorities covered by the plans and the number of priority product categories. The 1st GPP Plan (2008-2011) targeted only Governmental departments within Ministries and 17 product categories; whereas the 2nd GPP Plan (2013-2016) covered all public organisations from the central to the local levels as well as state enterprises, public organisations and universities and 22 product categories; and the 3rd GPP Plan (2017-2021) has been expanded to include also private companies registered in the stocks market and a total of 28 product categories.

Furthermore, in each plan annual targets are defined in terms of the number of implementing agencies and expenditure on green products and services, which increase year by year. For example, the 3rd GPP Plan set the following targets (based on the results from 2016):

[9] Suksod, J. (2013, August). Thailand Green Public Procurement (Thai GPP) [Slides presentation]. *Green Public Procurement Workshop, 28-29th August 2013*. Thailand: Bangkok.

Table 19. 3rd GPP Plan Targets by year

Percentage of participating organisations	2017	2018	2019	2020	2021
Public organizations, state enterprises, universities, and government agencies	60%	70%	80%	90%	100%
Local Authorities	60%	70%	80%	90%	100%
Private agencies	50%	70%	80%	90%	100%
Levels of green procurement (in economic value)	**2017**	**2018**	**2019**	**2020**	**2021**
Public organizations, state enterprises, universities, and government agencies	40%	50%	60%	70%	80%
Local Authorities	20%	30%	40%	50%	60%
Private agencies	30%	40%	50%	60%	70%

Source: Environmental Quality and Laboratory Division, Pollution Control Department (PCD), Ministry of Natural Resource and Environment, Thailand

To evaluate progress in the implementation of the GPP Plans, since 2009 the Government monitors **GPP implementation** by all targeted organisations and has also estimated the **impacts of GPP** in terms of environmental impact reduction, in order to communicate the benefits of GPP and promote its further implementation.

Monitoring GPP Implementation

In line with the targets set in the 3rd Plan, the government monitors: the percentage of participating organisations and the level of green procurement by entity.

To qualify as GPP participating entities, the Pollution Control Department (PCD) of the Ministry of Natural Resource and Environment keeps track of which and how many agencies comply with at least one of the following criteria, set in the 1st GPP Plan:

- Have signed the declaration of implementation form or sent an equivalent official letter
- Are registered in the GPP website, which gives access to the reporting system
- Have participated in a GPP training workshops
- Send the GPP reporting data

Results for year 2016 are compiled in Table 20.

Table 20. GPP Participating agencies in respect to the target set for 2016

Type of organisation (and total number in the country)	Target for 2016 (%)	Agencies targeted (number)	Participating agencies * (number)	Percentage in relation to the targeted number (%)
Central government (170)	100%	170	170	100%
State enterprises (56)	100%	56	49	88%
Universities and higher education (254)	100%	254	130	51%
Public organisations (39)	100%	39	33	85%
Independent departments & regulatory agencies (31)	100%	31	7	23%
Local authorities (2,519)	50%	1,259	710	56%
Total		1,809	1,099	61%

** Data from June 2017.*

Source: Environmental Quality and Laboratory Division, Pollution Control Department (PCD), Ministry of Natural Resource and Environment, Thailand

On the other hand, the actual **level of green purchases** is calculated in terms of the quantity (in units and expenditure) of green products purchased from a list of 17 product groups and the percentage it represents over the total purchase of those product groups.

To qualify as green, products have to comply with the Thai Ecolabel (Type I), the Green Leaf label (for hotels), or with the environmental procurement criteria developed by PCD (Green Cart criteria).

As procurement is decentralised in the Government, each organisation tracks its purchases differently, based on their internal systems. However, to facilitate data reporting and homogeneity, PCD set up an on-line electronic reporting system and requests Implementing Agencies to summit procurement data every 6 months. Results for fiscal year 2016 are compiled in Table 21.

Table 21. Level of green procurement and environmental benefits of those green purchases for fiscal year 2016

No.	Product category	Procurement Value (THB)			Reduction of greenhouse gases (Kg CO_2)
		Total	Green	%	
1	Paper	157,557,932.71	145,460,837.27	92	8,188,152.32
2	Correction products	3,213,730.29	2,889,922.27	90	12,118.01
3	Fluorescent tube	2,521,980.88	991,324.01	39	9,122,262.00
4	Iron furniture	571,609.81	560,509.81	98	3,480.00
5	Toilet paper	11,821,244.27	4,260,307.85	36	1,105.94
6	Primary battery	1,737,690.76	1,064,894.36	61	1,522.44
7	Whiteboard pen	1,078,894.61	485,588.27	45	81.07
8	photocopying machine	19,805,317.77	19,805,317.77	100	255,744.00
9	printer	15,120,494.49	2,056,336.76	14	39,760.00
10	Ink cartridge	159,768,689.06	25,131,981.45	16	58,960.48
11	Decorative Coating	9,797,531.99	2,933,518.59	30	-
12	Envelope	6,315,317.71	3,472,426.68	55	6,446.37
13	Document box	1,425,507.61	614,962.61	43	426.51
14	Cleaning service	317,708,204.03	254,237,344.89	80	24.58
15	Photocopying service	62,491,308.03	36,960,550.77	59	34,715,580.00
16	Hotel service	40,386,122.42	20,961,730.56	52	701.96
17	Car service station	970,480.19	15,664.17	2	-
	Total	812,292,056.63	521,903,218.09	64	52,406,365.68

** Based on the GPP procurement records that 773 of the agencies reported to the PCD.*

Source: Environmental Quality and Laboratory Division, Pollution Control Department (PCD), Ministry of Natural Resource and Environment, Thailand

Estimating the impacts and benefits of GPP

To communicate the benefits of GPP and promote it further, in 2012, after the end of the 1st Plan, PCD and the National Science and Technology Development Agency (NSTDA) conducted a research study to estimate the sustainability benefits of GPP in terms of environmental benefits, environmental externalities costs reductions and market transformation.

Environmental benefits

Environmental benefits were estimated taking into consideration the number of green products purchased by the government for **10 of the 17 priority product groups** included in the 1st GPP Plan, for which life cycle assessment data was available.

For each category an average or **proxy green product** and conventional product was defined, based on the GPP criteria defined by the government. Using different methodologies (life cycle assessment, life cycle

costing and others) NSTDA estimated the difference in impacts of conventional versus green products and established impact reduction coefficients per green product in terms of **$CO_{2\text{-eq}}$ emissions reduction** and **environmental externalities costs reductions** (linked to energy use, waste management, operational costs, etc.).

The environmental benefits were afterwards calculated for the whole green products procurement volume using the following basic calculation formula:

*Impact reduction coefficients * Total number of green products purchased during the year*

The following example illustrates the calculation for ink cartridges.

Table 22. Example of calculation of environmental benefits for ink cartridges

Ink cartridges	
Total number of green products purchased btw. 2008-2011:	67,599 units
$CO_{2\text{-eq}}$ emissions reduction factor of the green product vs non-green product using LCA data:	4.64 kg CO_2 / unit
Externality cost saving factor thanks to lower impacts of the green product *:	128 THB / unit
Impact reduction obtained with the green purchases =	67,599 * 4.64 / 1000 = 313.65 Tone $CO_{2\text{-eq}}$ / year saved
Externality costs savings with the green purchases =	67,599 * 128 = 8.65 million THB saved

** Externality costs factors are defined based on for what parameters monetisation factors are available as describe in the tables bellow:*

Source: Authors

Table 23. Externality costs savings of green ink cartridges in comparison to non-green cartridges

Environmental aspect	Unit	Environmental impact reduction per unit (A)	Externality cost of each unit in THB (B)	Externality cost savings (C = A x B)
Reduced energy consumption*	Kilowatt / hour	29.46	3.00	88.39
Reduce the amount of hazardous waste**	kg	2.11	15.00	31.65
Decreased amount of carbon dioxide	Kg	4.64	1.28	5.94
Reduced amount of nitrogen oxide	Kg	0.02	24.81	0.50
Reduced amount of sulphur dioxide	Kg	0.02	38.09	0.76
Reduced water pollution (COD value)	Kg	0.003	126.72	0.38
Total externality costs savings of the green product THB				**128**

** Specify the ability to re-use / refill the cartridge at 3 times in the calculation of the Functional unit.*

*** The average budget data for the management of hazardous waste from the community is 15,000 baht per ton*

Source: Environmental Quality and Laboratory Division, Pollution Control Department (PCD), Ministry of Natural Resource and Environment, Thailand

Table 24 shows the environmental benefits of the 1st GPP Plan based on the GPP procurement records reported to the PCD.

For the 2nd GPP Plan, PCD and NSTDA also estimated the potential benefits of the Plan if the voluntary implementation targets set in the plan were met, for the 17 products included in the Plan, which are presented in Table ; and the GPP impact reduction factors have been used to estimate the benefits of GPP each year, as presented in Table .

In 2020, PCD is working with relevant departments in order to update the impacts calculations for the final impact evaluation of the 3rd GPP Plan.

Table 24. Environmental benefits of the 1st GPP Plan and potential benefits of the 2nd GPP Plan

	GPP level	CO2-eq reduction	Externality cost savings
1st GPP Plan (reported GPP levels)	TBH 57.02 million (61%)	25,685 Ton	TBH 223.5 million
2nd GPP Plan (based on targets)		11,130,000 Ton	TBH 79,063.5 million

Source: "Current Status of Green Public Procurement & Eco-labelling in Four Asian Countries" KEITI, n.a. (available in English)

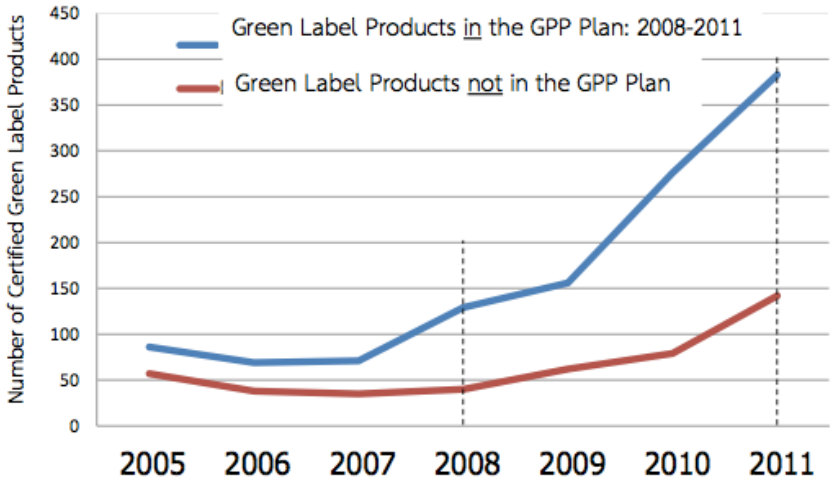
Market transformation

Regarding market transformation, for the 1st GPP Plan NSTDA evaluated two aspects:

- The evolution of the number of products certified with the Thai Ecolabel differentiating between products included in the 1st GPP Plan and products not included in the Plan, to assess if the Plan encouraged manufacturers to produce and certify designated green products.
- The evolution of market sales of ecolabeled products (Thai Ecolabel) including the government purchases (for 3 product groups: building paints, printing papers and photocopy machines).

As Figure 7 shows, the approval of the 1st GPP Plan greatly influenced the market in the country as many manufacturers and service providers became interested in certifying and producing environmentally-friendly products and services.

Figure 7. Evolution of the number of Thai Ecolabeled products during the 1st GPP Plan (from 2008 to 2011)



Source: "Monitoring Sustainable Public Procurement Implementation. Recommendations and Case Studies" United Nations Environment Programme, 2016 (available in English)

Publication of Results

With the information provided by implementing agencies, PCD compiles a monitoring results report every year.

Furthermore, an Evaluation Report based on the results of the research project conducted by PCD and NSTDA was also produced and made available on NSTDA's website.

5. Useful References

The following references can be useful to obtain more information on how to set up a monitoring system an evaluate the benefits of sustainable/green public procurement, illustrated with additional examples:

- SEAD Guide for Monitoring and Evaluating Green Public Procurement Programs (2013).

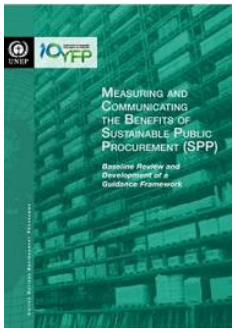
  This guide contains information and recommendations to support policymakers and practitioners at various levels of government to define and improve the systems to monitor and evaluate their GPP policies. It also contains a selection of short and in-depth case studies.

- Monitoring Sustainable Public Procurement Implementation. Recommendations and Case Studies (2016).

  This report provides organizations with a step-by-step guide to develop and implement effective monitoring systems to measure their SPP activities both in terms of process and outputs. Furthermore, it provides detailed case studies on how governments at different levels – and in different parts of the world – monitor their SPP programs.

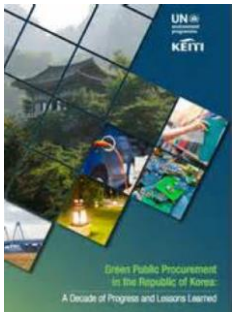
- Measuring and Communicating the Benefits of Sustainable Public Procurement (SPP): Baseline Review and Development of a Guidance Framework (2015).

  The purpose of this report is to provide organizations with a step-by-step guide to planning, measuring and communicating the benefits (outcomes) they are creating through the implementation of their SPP policies. It includes a Baseline Review on "Measuring and Communicating the Benefits of SPP", a Guidance Framework and supporting methodologies, indicators and recommendations for implementation.



- Green Public Procurement in the Republic of Korea: A Decade of Progress and Lessons Learned (2019).

  The objective of the study is to present the Republic of Korea's GPP impact measurement methodology, to compare it to others used by other public authorities internationally and to pilot a macro-economic analysis of the economic and environmental impacts of the Republic of Korea's GPP policy in order to improve the approaches used by the government to estimate GPP impacts and benefits. Also, it provides guidance to governments reforming their GPP policies and measurement approaches.



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