



**PRODUCT**  
[sustainable public procurement | ecolabelling]



**PROJECT “STIMULATING THE DEMAND AND SUPPLY OF SUSTAINABLE PRODUCTS  
THROUGH SUSTAINABLE PUBLIC PROCUREMENT AND ECOLABELLING” (SPPEL)**

**PRIORITISATION REPORT**



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## I. RATIONALE

### 1.1. Introduction

In the last two decades, Vietnam economy has witnessed a rapid growth (average growth rate per year in the 2000s is 6.4%). The economic growth on one hand brought the country from one of the poorest in the world to a lower middle income status country with per capita income of over \$2,000 by the end of 2014, while on the other hand created many concern related to sustainable development.

Regarding the sustainable development, in September 2012, the Prime Minister issued the Decision no. 1393/QĐ-TTg on “Approval of the National Green Growth Strategy”, which aimed to achieve a low carbon economy and to enrich natural capital; reduce greenhouse gas emissions and increase capability to absorb greenhouse gas. Among the activities identified in the National Green Growth Strategy, the activity no.64 is to **issue the green public consumption, in which the public investment and regular expenditure have to prioritise the products with an ecolabel or with recycling ability.**

### 1.2. Objectives of the prioritisation exercise

To promote the procurement of products with an ecolabel as indicated in the National Green Growth Strategy, UNEP provides support to Vietnam in the framework of the Sustainable Public Procurement and Eco-labelling project (SPPEL) to develop and implement Sustainable Public Procurement (SPP) policies by increasing awareness and building the capacities of policy makers and procurement managers.

The methodology applied at country- level is the “UNEP Approach to SPP” which is conceived as a series of steps that must be followed by governments to first design and then implement an action plan (see below graph).



The SPP Approach also stresses the need to reinforce the combined use of SPP with ecolabelling to create a dynamic framework for improving the performance of products throughout their lifecycle and stimulating demand and supply of products that are greener. As such, the project also focuses on the development and implementation of SPP policies, together with awareness-raising activities about the opportunities that ecolabels represent for the strengthening of the national SPP programme.

One of the key steps of the SPP Approach is to **identify and prioritise the sustainable products** which are meant to be procured by public entities during the first pilot tenders. This report describes the process of the prioritisation exercise, using UNEP’s tool adopted by the project Steering Committee in Hanoi, on 22<sup>nd</sup> of September 2015, and the preliminary results.

### 1.3. Methodology of prioritisation

The methodological tools provided by UNEP, referred to as the TORs on Prioritisation, were adjusted by the Consultant and the Steering Committee, after the consultation with other experts from different stakeholders (see annex 3 for a list of experts/specialists consulted).

In Vietnam, where **national ecolabelling schemes** are in place, the product selection was synchronised with the current ecolabels’ coverage of products to ensure the development of common products policies through SPP and ecolabels. In fact, the Steering Committee decided to use the **Ecolabelled products** (see Table F in UNEP TORs) as the first filter to identify the products with high potential and feasibility.

## II. PRIORITISATION EXERCISE

### 2.1. Preliminary products

Based on the suggested 15 product categories listed on the European Union (EU) GPP portal website<sup>1</sup>, the consultants team discussed with the members of the Steering Committee and two experts from the Vietnam Green Label Office and Department of Procurement Management to identify the preliminary product categories. 15 product categories were identified, including 44 products as described in the table below.

**Table 1- Preliminary product categories**

Type of products	Product
1. Cleaning products and services	1. Office cleaning service
	2. Glass cleaning chemical
	3. By-hand dish-washing chemical
	4. Soap bar
2. Printing and photocopy paper	1. Office paper
	2. Material paper
	3. Cover paper
3. Drinks and foods	1. Fruit
	2. Catering service
	3. Purified water
	4. Drinks auto-machine
4. Furniture	1. Wooden chair
	2. Wooden table
	3. Plastic chair
	4. Plastic table
	5. Document wardrobe
5. Gardening, landscape services	1. Outdoor trees and lawn
	2. Indoor trees
	3. Landscape service
6. Printing devices	1. Printer/ Photocopy machine
	2. Ink cartridge
	3. Printing service
7. Indoor light system	1. Incandescent lamp
	2. Fluorescent lamp
	3. LED light
8. Office IT devices	1. Desktop computer
	2. Monitor
	3. Laptop
	4. Tablet
9. Battery	1. Battery
10. Paint	1. Outdoor paint

<sup>1</sup> [http://ec.europa.eu/environment/gpp/eu\\_gpp\\_criteria\\_en.htm](http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm)

	2. Interior paint
11. Textile/garment products	1. Office uniform
	2. Safety uniform
12. Public lighting	1. Public lighting system
	2. Traffic light
13. Transport	1. Car (automobile)
	2. Motor-cycle
	3. Other vehicles
	4. Transportation/express service
14. Office electric appliance	1. Television
	2. Water kettle
15. Fan, air-con	1. Electric fan
	2. Air-conditioner

## 2.2. Products with ecolabel and potential to apply in public procurement

### 2.2.1. Products with ecolabel

According to the Status Assessment Report of SPP in Vietnam<sup>2</sup>, three types of ecolabels are currently active in Vietnam, including the Green Label, the Energy Saving Label (Vietnam Energy Star), and the Green Lotus Label. The latter one is applied for hotels and accommodation service providers, and thus falls out of the scope of public purchases. Hence, it was not used for the prioritisation exercise. The two other national ecolabels were used to score the products and the following scoring methodology was applied:

- a- Products with no ecolabel were excluded;
- b- Products having one national ecolabel were marked with 2 points;
- c- Products not certified by a national ecolabel but with an equivalent international ecolabel were marked with 1 point only.

The products which had 2 points or more in total were selected for the next step.

After applying the scoring, the following products were selected and brought to the next phase:

**Table 2 Products with ecolabel**

Product	Type of ecolabel	Score
1. By-hand dish-washing chemical	Green Label	2

<sup>2</sup>Assessment Report of Sustainable Public Procurement Status In Vietnam, SPPEL, 2015.

2. Soap bar	Green Label	2
3. Office paper	Green Label, FSC, Rainforest Alliance	4
4. Wooden chair	FSC, Rainforest Alliance	2
5. Wooden table	FSC, Rainforest Alliance	2
6. Printer/ Photocopy machine	Green Label	2
7. Ink cartridge	Green Label	2
8. Fluorescent lamp	Green Label, Energy Saving Label	4
9. Monitor	Energy Saving Label	2
10. Laptop	Green Label, Energy Saving Label	4
11. Battery	Green Label	2
12. Interior paint	Green Label	2
13. Public lighting system	Energy Saving Label	2
14. Television	Energy Saving Label	2
15. Electrical fan	Energy Saving Label	2
16. Air conditioner	Energy Saving Label	2

### **2.2.2. Products with potential to apply in public procurement**

Sixteen (16) products with an ecolabel were assessed based on the procurement volume and the frequency of procurement contracts. As the public procurement statistic data is currently not available in Vietnam, the consultant agreed with the Steering Committee to apply an estimation method for scoring them. The following methodology was agreed upon:

- a- For the procurement volume criteria, the amount of purchases ranges from 0 to 3, with (0) corresponding to “not purchased in public procurement”; (1) to “negligible amount”; (2) “medium amount”; and (3) “the amount is significantly higher than for other products”.
- b- The number of contracts (frequency of purchase) was scored with the same approach, from (0) “no contract”; to (1) “small/negligible number”; (2) “medium”; and finally (3) “the number of contract is significant higher than for other products”.

The products which are not purchased in public procurement were excluded. The other products moved to the next scoring phase. The following table shows the results of the assessment led by the Steering Committee in consultation with an expert from the Department of Public Asset Management (MOF).



**Table 3 Amount and frequency of procurement**

<b>Types of products</b>	<b>Total Amount of purchase</b>	<b>Total number of contracts (frequency of purchase)</b>	<b>Score</b>
1. Office paper	1	3	4
2. Laptop	2	1	3
3. Television	2	1	3
4. Wooden chair	1	1	2
5. Wooden table	1	1	2
6. Printer/Photocopy machine	1	1	2
7. Fluorescent lamp	1	1	2
8. Monitor	1	1	2
9. Public lighting system	1	1	2
10. Electrical fan	1	1	2
11. Air conditioner	1	1	2
12. By-hand dish-washing chemical	0	0	0
13. Soap bar	0	0	0
14. Ink cartridge	0	0	0
15. Battery	0	0	0
16. Interior paint	0	0	0

As shown in the above table 5, products which have lowest volume in public procurement were excluded from the list, these include: i) by-hand dish-washing chemical, ii) soap bar, iii) ink cartridge, iv) battery, and v) interior paint. Eleven (11) remaining products moved on to the next step of the prioritisation exercise.

### 2.3. Preliminary market study

The availability of sustainable alternatives for the selected products in the market was assessed through 4 criteria: (1) only available in international market; (2) produced by foreign company but available in domestic market (3) produced by a domestic company and available in domestic market. According to the market study, the Consultant found that all the listed products are available in domestic market. There are 5 products which are currently produced in Vietnam by local companies, including: office paper, wooden desk, wooden chair, fluorescent lamp, and electrical fan. While the other products are produced by international companies in Vietnam or imported by a local company to the domestic market.

To compare the average purchase price between sustainable and conventional products, a qualitative method was also applied through 4 scales: (1) Sustainable products are significantly more expensive than conventional products; (2) more expensive but can be neglected; (3) no difference in price; (4) sustainable products are cheaper than conventional products.

The consultant found that the price of almost all the products with the Green Label was more expensive than the products not having this label; however the difference in price is relatively small and thus can be neglected. For example, the DienQuangCompact Fluorescent Lamp code CFL-20W is certified with Green Label and is sold at 62 thousand VND (2.95 USD), while the Rang Dong Compact Fluorescent Lamp code CFL-20W is sold at 59 thousand VND (2.81 USD) without the Green Label certification.

As the Energy Saving Label is currently compulsory for all electric devices and equipment, the Consultant used the Energy Saving Comparative Label (1-5 stars) to compare the price between the products in the same category, one labelled with 5 stars, while the other labelled with 3 stars. For example, the LG's air conditioner code V10ENC-9000BTU is certified with 5 stars and is sold at the same price as DAIKIN's air conditioner code FTM25-9000BTU which has similar specifications and is certified with 3 stars. The following table shows the result for other selected products.

**Table 4 Preliminary market study**

<b>Type of product</b>	<b>Availability of sustainable alternative on the market for this type of product</b>	<b>Comparing the average purchase price premium in % (sustainable vs conventional products)</b>	<b>Score</b>
1. Office Paper	3	3	6



3. Wooden Chair	1	1	2	2	2	2	2	2	14
4. Printer/ Photocopy Machine	1	1	2	3	3	1	0	0	11
5. Fluorescent lamp	1	1	0	2	2	2	0	0	8
6. Screen/ Monitor	3	3	0	3	3	1	0	0	13
7. Laptop	3	3	2	3	3	1	0	0	15
8. Public light	1	0	0	2	2	2	0	0	7
9. Television	3	3	0	3	3	1	0	0	13
10. Electrical fan	1	1	0	2	2	1	0	0	8
11. Air conditioner	3	3	1	3	2	3	1	0	16

Score scale: 1-3

You will find below the outcomes of the environmental impact assessment for the first product, which is office paper. Detailed information on the environmental impact assessment of the other products can be found in annex 2.

Eco-friendly office paper was scored with 19 points, the highest, due to its high potential impact to the environment. A correlation was found between the amount of paper production and the amount of greenhouse gases (GHG) which was released, i.e. producing 3.4 tonnes paper releases approximately 3 tons GHG (EPA report, 2010), containing NO<sub>2</sub>, SO<sub>2</sub>, and CO<sub>2</sub>. The paper production also wastes a large amount of power, fuel and water. On average, producing 1 ton of paper requires 4000 kWh of electricity, 605 litres of crude oil, 100 thousand litres of water. In addition, 1 ton of paper requires 2-4 tonnes of wood on average (Pulp & Paper Industry Strategy Report, 2006).

## 2.5. Socio-economic impact

According to the 5 year socio-economic development plan for the period 2011 to 2015, the Government of Vietnam aims for the rapid and sustainable economic development of the country. This development plan aimed to redesign the growth model and the restructuring of the economy towards increasing quality, effectiveness and competitiveness. It also aims at ensuring the social utilities and security, enhancing and improving the living condition of people, and creating solid foundations to make Vietnam a modern industrial country in 2020.

Specifically, social inclusion is an essential aspect of economic development in Vietnam for the next 5 years. It covers gender equality, the inclusion of ethnic minorities and

people with disabilities. Thus, those issues were used as criteria for assessing the social impacts of the selected products, together with the “promotion of SMEs” as the economic criterion. The ranking is based on the scale from 1 to 3, where 1 is least relevance, and 3 is most relevance.

**Table 6 Socio-economic impact**

Type of product	Promoting gender equality	Work opportunities for people with disabilities	Work opportunities for people from ethnic minorities	Promoting SMEs	Score
1. Office paper	2	1	2	3	<b>8</b>
2. Wooden table	1	1	2	2	<b>6</b>
3. Wooden chair	1	1	2	2	<b>6</b>
4. Printer/ Photocopy machine	2	0	0	1	<b>3</b>
5. Fluorescent lamp	2	0	0	2	<b>4</b>
6. Monitor	2	0	0	1	<b>3</b>
7. Laptop	2	0	0	1	<b>3</b>
8. Public lighting system	1	0	0	1	<b>2</b>
9. Television	2	0	0	1	<b>3</b>
10. Electric fan	2	0	0	1	<b>3</b>
11. Air-conditioner	2	0	0	1	<b>3</b>

Scoring scale: 1-3

## 2.6. Final ranking

After having allocated a score to the products based on the various criteria, the relative score was calculated by dividing the absolute score by the maximum score and multiplying by 10. The formula is as follows:

$$r - score = \frac{score}{maximum\ score} \times 10$$

In which:

- *r-score* is the relative score of a product in an evaluation table for one aspect (i.e. environment or socio-economic), which consequently put into the master table for final ranking
- *score* is the actual score of a product in an evaluation table (r-score of Fluorescent Lamp for Socio-economic impact is 2+0+0+2=4)

- *maximum score* is the highest score that a product can have according to the scoring scale (maximum score of Fluorescent Lamp for Socio-economic impact is 3+3+3+3=12)

For example, the relative score for socio-economic impact of Fluorescent Lamp was calculated as:

$$r - score = \frac{4}{12} \times 10 = 3.3$$

Then, all the relative scores were put into the final ranking table. The higher score the product had, the higher it stood in the list of prioritisation. If two or more products had the same score, they would have the same ranking.

The Steering Committee agreed on the final list of prioritised products as follow:

1. Printing paper
2. Laptop
3. Fluorescent lamp
4. Wooden table
5. Wooden chair
6. Television
7. Air-conditioner
8. Monitor
9. Printer
10. Electric fan
11. Public lighting system

The emerging needs of more

According to the prioritisation results, the 3 products which have the highest points are 1) eco-friendly office paper, 2) laptops, and 3) fluorescent lamps.

The prioritisation process highlighted the potential environmental, financial and economic benefits that could result from the public purchasing of LED luminaires. Presently Vietnam has a national production of compact fluorescent lights and no LED production. Even though the Green Label Office is in the process of developing criteria for certifying LEDs with Green Label, there is a concern that LED producers would not

be willing to register their products with the Green Label due to the lack of economic incentives and to the burden it may imply. However, further to the consultation with the UNEP's experts and their commitment to support the Vietnam Environment Administration and the Green Label Office in fully developing those criteria for LEDs, and given the promising benefits of LEDs for the national economy and the environment, the consultant team agreed to include LEDs as one additional prioritised product.

Following a discussion among the members of the Steering Committee, the Consultant and the Project Management Board, the final four products proposed for inclusion in the market readiness analysis are **1) office paper, 2) laptops, 3) fluorescent lamps, and 4) LEDs light.**

**Table 7 Final ranking**

<b>Types of products</b>	<b>Eco-labels or certification systems in place (2)</b>	<b>Total amount of contracts value (3)</b>	<b>Market and price (4)</b>	<b>Environmental impact (5)</b>	<b>Socio-economic impact (6)</b>	<b>Total Score (2+3+4+5+6)</b>	<b>Final ranking</b>
<b>1. Eco-friendly paper</b>	10.0	6.7	7.5	7.9	6.7	<b>38.8</b>	<b>1</b>
<b>2. Laptop</b>	10.0	5.0	6.3	6.3	2.5	<b>30.0</b>	<b>2</b>
<b>3. Fluorescent lamp</b>	10.0	3.3	6.3	3.3	3.3	<b>26.3</b>	<b>3</b>
4. Wooden table	5.0	3.3	6.3	5.8	5.0	<b>25.4</b>	<b>4</b>
5. Wooden chair	5.0	3.3	6.3	5.8	5.0	<b>25.4</b>	<b>4</b>
6. Television	5.0	5.0	6.3	5.4	2.5	<b>24.2</b>	<b>6</b>
7. Air-conditioner	5.0	3.3	6.3	6.7	2.5	<b>23.8</b>	<b>7</b>
8. Monitor	5.0	3.3	6.3	5.4	2.5	<b>22.5</b>	<b>8</b>
9. Printer	5.0	3.3	6.3	4.6	2.5	<b>21.7</b>	<b>9</b>
10. Electric fan	5.0	3.3	7.5	3.3	2.5	<b>21.7</b>	<b>9</b>
11. Public lighting system	5.0	3.3	5.0	2.9	1.7	<b>17.9</b>	<b>11</b>



## References

1. Emeli Udell (2008), Your Flat Screen has (Green House) Gas.
2. Environmental Protection Agency (2010), Climate Change Indicators in the United States of America.
3. Environmental Magazine (2014), Collect and Recycle the Old Fluorescent Lamps from DienQuangLighting Company.
4. Environmental Magazine (2015), Saving on lighted activities.
5. National Geographic (2014), Environmental Impact of Laptop.
6. Planet Ark (2006)- The recycling Week Report.
7. Pulp and Paper Industry (2006), Energy Efficiency Improvement and Cost Saving Opportunity.
8. Richard Conniff (2008), The Green House Gas That Nobody Knew.
9. Thomas Schueneman (2012), What effect does ink cartridge waste have on the environment.

## Annex 1: Ecolabels and certification schemes

Objective: Identify the products for which sustainable products have ecolabels, standards or verification schemes that currently be applied in Vietnam.

Type of products	Product	Ecolabel from Vietnam	Equivalent ecolabel (to be specified)	Selected products (P1)
1. Cleaning products and services	1. Office cleaning service	0	0	- By-hand dish-washing chemical - Soap bar
	2. Glass cleaning chemical	0		
	3. By-hand dish-washing chemical	Green Label	0	
	4. Soap bar	Green Label		
2. Printing and photocopy paper	1. Photocopy paper	Green Label	FSC, Rainforest Alliance	- Photocopy paper - Printing paper
	2. Printing paper	Green Label	FSC, Rainforest Alliance	
	3. Cover paper	0	FSC, Rainforest Alliance	
3. Drinks and catering service	1. Fruit	0	0	N/A
	2. Catering service	0	0	
	3. Purified water	0	0	
	4. Drinks auto-machine	0	0	
4. Furniture	1. Wooden chair	0	FSC, Rainforest Alliance	- Wooden chair - Wooden table
	2. Wooden table	0	FSC, Rainforest Alliance	
	3. Plastic chair	0	0	
	4. Plastic table	0	0	
	5. Document wardrobe	0	0	

5. Gardening, landscape services	1. Outdoor trees and lawn	0	0	N/A
	2. Indoor trees	0	0	
	3. Landscape service	0	0	
6. Printing devices	1. Printer	Green Label , Power Efficiency Label	0	- Printer - Photocopy machine - Ink cartridge
	2. Photocopy machine	Power Efficiency Label	0	
	3. Ink cartridge	Green Label	0	
	4. Printing service	0	0	
7. Indoor light system	1. Tube neon light	Green Label , Power Efficiency Label	0	- Tube neon light - Compact neon light
	2. Compact neon light	Power Efficiency Label	0	
	3. LED light	0	0	
8. Office IT devices	1. Desktop computer	0	0	- Monitor - Laptop
	2. Monitor	Power Efficiency Label	0	
	3. Laptop	Green Label , Power Efficiency Label	0	
	4. Tablet	0	0	
9. Battery	1. Battery	Green Label	0	- Battery
10. Paint	1. Outdoor paint	0	0	- Interior paint
	2. Interior paint	Green Label	0	
11. Textile/garment products	1. Office uniform	0	0	N/A
	2. Safety uniform	0	0	
12. Public lighting	1. Public lighting system	Power Efficiency Label	0	- Public lighting system
	2. Traffic light	0	0	
13. Transport	1. Car (automobile)	0	0	N/A
	2. Motor-cycle	0	0	
	3. Other vehicles	0	0	

	4. Transportation/express service	0	0	
14. Office electric appliance	1. Television	Power Efficiency Label	0	- Television
	2. Water kettle	0	0	
15. Fan, air-con	1. Electric fan	Power Efficiency Label	0	- Electric fan - Air-conditioner
	2. Air-conditioner	Power Efficiency Label	0	

## Annex 2: Environmental impacts

Production/ Service type	Greenhouse Effect	Air Pollution	Water Pollution	Solid Waste	Toxic Waste	Energy Consumption (Fuel, Electric)	Water Consumption	Ecosystem Effects	Total
1. Printing Paper	3 -a correlation was found between the quantity of paper production and the amount of greenhouse gases released (GHG) Ex: 3.4 tonnes paper releases approximately 3 tons GHG (EPA report, 2010)	3 - NO2, SO2 and CO2 are released in the paper producing process - NO2, SO2 gases are the main cause for Green House Effects	2	3 - Paper waste accounts for 40% total waste globally - The average amount of paper waste was 200 million tonnes per year (2010)	2 - SOx is a toxic gas which is released during the production process, account nearly 3% of the total amount of SOx produced by all industrial sectors (EIA report, 2006)	2 - On average, 1 tonne of paper powder requires 4000 kWh electricity and 605 litres of crude oil	2 - On average, 1kg paper needs 100 litres water	2 - World demand has already increased dramatically to 400% in over 40 years, with over 35% of the harvested wood being dedicated for paper production. This has effects on deforestation. -In addition, 1 tonne of paper powder needs 2-4 tonnes wood for average (Pulp & Paper Industry Strategy Report, 2006)	19

2. Wooden Desk	1	1	2	2	2	2	2	2	14
3. Wooden Chair	1	1	2	2	2	2	2	2	14
4. Printer/ Photocopy Machine	1	1	2	3 - The number of ink cartridges that is recycled and reused is estimated to 2.5 million per year -The number of discharge production is nearly 10 million (Planet Ark, 2006)	3 - 18 million ink cartridges require 3000 tonnes plastic, 400 tonnes aluminium. - On top of all this, 3000 tonnes of plastic can take over a couple of hundred years to be eliminated? (Planet Ark, 2006)	1	0	0	11
5. Fluorescent lamp	1	1	0	2 - The annual quantity	2 -There are about 4-5 mg mercury in	2 - The Fluorescent lamp has less	0	0	8

				of Fluorescent lamp is 1.5 billion (Environmental magazine, 2011) - The solid waste such as mercury and crystal can be collected for reuse and recycling	every Fluorescent lamp (reach the permissible level) (Environmental magazine, 2011)	exothermal and more performance on light than the incandescent light bulb - The Fluorescent lamp can save 80% electricity (Environmental magazine, 2011)			
6. Screen/ Monitor	3 - Screens are manufactured with a chemicals (NF3) that is 17,000 times stronger than carbon dioxide as a	3 - NH3 gas is released on the discarding process	0	3 - 5 million screens are thrown away every year (2009) - Only	3 - On the discarding process, it released some toxic chemicals including lead in the batteries, brominated flame	1 -The electricity consumption is 1kWh per day (24/24 hour)	0	0	13

	cause of global warming			15% of screens re recycled, and the rest of them was buried in the landfill sites.	retardants (BRFs), and the polyvinyl chloride (PVC) used for coating wires.				
7. Laptop	3 - LCD panels are the most popular for manufacturing screen laptop (create NH3 that is 17,000 times stronger than carbon dioxide)	3 - NH3 gas was released on the discarding process	2 - Laptop battery cannot be recycled therefore it will create the significant electrical waste	3 - For average, the life cycle of laptops 5-7 years with the production is 177 million per year. -For estimated, there was 157 million laptops that were discarded in USA	3 - On the discarding process, it released some toxic chemicals including lead in the batteries, brominated flame retardants (BRFs), and the polyvinyl chloride (PVC) used for coating wires.	1 -The electricity consumption is 50-80 kWh, about 0,05 kg CO2 (less many time than the washing machine-3600W, around 2,4 kg CO2 per hour)	0	0	15



				(EPA, 2007) - There was only 40% laptops that can be reused. (EPA, 2009)					
8. Public light	1	0	0	2	2	2 -The electricity consumption is 300 kWh	0	0	7
9. Television	3 - LCD panels are the most popular for manufacturing screen laptop (create NH3 that is 17,000 times stronger than carbon dioxide)	3 - NH3 gas was released on the discarding process	0	3 - The quantity of electrical waste is nearly 40 million per year. - There is only of electrical waste that can be recycle, the other	3	1 -The electricity consumption is 1kWh per day (24/24 hour)	0	0	13

				is buried in the landfill sites.					
10. Electrical fan	1	1	0	2	2	1 -The electricity consumption is 2kWh per month	0	0	8
11. Air conditioning	3 - This is the main reason to release over 100 million tonnes of CO2 per year (NGC report, 2015) - Beside CFCs , HCFCs and HFCs gases that released by air conditioning is the main impact to deplete ozone. (NGC, report,	3 Air conditioner use results in an average of about 100 million tons of CO2 emissions from power plants every year. It lead to the dramatically air pollution (NGC report, 2015)	1	3 - The production is 120 million per year, it lead to the significant solid waste (NGC report, 2014)	2	3 - The most electricity device in the office (environmental magazine, 2011) -The electricity consumption is 1kWh per hour	1	0	16

	2015)								
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**Annex 3: List of consulted experts/specialists**

<b>No.</b>	<b>Name</b>	<b>Organization</b>	<b>Email</b>
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