GREEN CHOICE PHILIPPINES
NELP-GCP 20170024
COMPUTER MONITORS

I. BACKGROUND

A computer monitor or more technically termed as a visual display unit is a device that transmits information from the computer to a screen. Based on technology computer monitors can be classified into three broad categories: 1) Cathode Ray Tube (CRT), 2) Liquid Crystal Display (LCD), and 3) Light Emitting Diodes (LED).

CRT monitors uses old technology and is slowly being phased out though they are still being used. These monitors are capable of generating a resolution of up to 2048x1536 pixels. Newer CRT monitors are capable of producing thousands of different colors. CRT monitors are also cheaper compared to other available technologies. Newer development in CRT technology has allowed the use of flat screens which reduce the glare and are good to the eyes. However, the major disadvantage of CRT monitors is that they are bulky and heavy compared to the other types of monitors. These devices also consume larger amounts of energy and also release more heat.

LCD monitors is currently the most popular type of monitor being used by consumers. Advantages of these monitors are that they are compact and lightweight. These monitors also do not consume a lot of electricity. Images transmitted by these monitors have little flicker and do distort geometrically. However, image quality of these monitors is not constant when viewed at certain angles. Initially, these monitors were more expensive than CRT monitors, but prices have now declined to the point that LCD monitors have become the primary technology for computer monitors.

LED monitors are the next most popular monitor type after LCD monitors. It is more expensive costing twice as more of an LCD monitor of the same size. It is a flat panel display similar the LCD monitors making use of LED diodes instead of cold cathode fluorescent (CCFL) back-light. LED monitors are more environmentally-friendly since they use less power, produce less heat and they have less environmental impact when disposed because the monitor panels are very thin. They are also supposed to last longer than both CRT and LCD monitors. They also produce images with higher contrast.

Aside from these three types, newer technologies are now entering the market that are thinner, and energy efficient, but at the same time producing vivid color saturation, and adding more pixels thereby increasing the level of image detail and sharpness. These technologies include organic light emitting diodes (OLED) monitors, and ultra-high definition (UHD) monitors (also called 4K technology). However, the current pricing of these types of monitors are prohibitive to the majority of consumers for the moment.

Market Description

For the moment, no specific market data trends were researched specific for computer monitors. Data available were for the product type computers and related peripherals and accessories in which computer monitors fall under. From these, we can infer that the production and sale of computer monitors are increasing albeit at a slow rate.

Information and Communication Technology (ICT) is known to play an important role in a country's economic development. The Philippine government having recognized this has instituted several laws and regulations that aim to promote ICT consciousness and capability, and to provide a

business climate that is favourable to the growth of ICT. In 2014, the International Telecommunications Union (ITU) estimated that 24.3% of Philippine households have a computer. In 2016, ITU estimated that this had grown to 27%. Compare all these to 2010, in which it was estimated that only 13.1% of all households had a computer.

In terms of business establishment, data from the 2010 Survey on Information and Communication Technology show that 97% of businesses involved in the in the Philippines use a computer in their operations. In 2010 there were 2,122 establishments that were classified as ICT related as compared to 2,107 in 2009. However, there were 2,682 in 2008. The decline seems to be due to the Asian Financial Crisis at that time.

In 2012, the computer and other peripherals and accessories ranked fifth in terms of employment with 56,875 workers. Computer and peripheral and accessories came in at third at PHP 246.6 billion (5.5%) in terms of value of output. In terms of value added, electronic components came in first at PHP 321.9 billion or 27.8% of the total. Computers and peripheral equipment came in at second with PHP 114.4 billion or 9.9% of total value added. It also ranked 9th in most labor productive industries.

In 2013, the manufacture of computer and peripheral equipment and accessories ranked third with 55,288 workers. During this year, computer and peripheral equipment and accessories value of output was ranked third with PHP 206.2 billion or 4.8%. In terms of expenses, computers and peripheral equipment and accessories came in third with PHP 191.5 billion.

Table 1 PSA Data for Computers and Other Peripherals and Accessories for 2010, 2012 and 2013

Statistical Indicator	2010	2012	2013
Number of Establishments	40	44	52
Number of Employees	53,182	56,875	55,288
Value of Output (PHP billion)	192.3	246.6	206.2
Value Added (PHP billion)	46.9	114.5	43.6

The 2014 preliminary results for the manufacturing establishments with total employment of 20 and over, the manufacture of computers and peripheral equipment and accessories placed 7th in the top grossers in the value of output for manufacturing establishments accounting for 4% of the total, valued at PHP 167.2 billion. In terms of value added, computers and peripheral equipment and accessories accounted for 2.6% of the total.

From the data gathered from the Philippine Statistics Authority (PSA), it shows that all indicators are growing albeit at a very slow rate. However, this manufacturing industry is very important in the economic growth of the Philippines, ranking in the top 10 of most major statistical indicators of the PSA, except for number of establishments. This may even be more meaningful, as there are very few establishments yet they employ a very large number of workers.

Environmental Impacts

A computer monitor generates many environmental impacts throughout its life cycle. Its manufacturing involves hazardous chemicals and heavy metals. When it is in use it consumes electricity, and when it is finally at the end of its useful life, its components can seriously affect the environment and human health if not disposed of properly.

Strategies to Address Impacts

There are several standards today that affect the use and environmental impact of computer monitors and other computer products. Green computing aims to reduce the use of hazardous materials, maximize energy efficiency during the product's life, and improve the recyclability or biodegradability of non-operational or obsolete products and factory waste. Some industry initiatives include:

- **Climate Savers Computing Initiative (CSCI)** which is an effort to reduce the electric power consumption of computers in active and inactive states. It provides a catalog of green products from member organizations and information on how to reduce PC power consumption.
- **Electronic Product Environmental Assessment Tool (EPEAT)** of the Green Electronics Council aims to assist in the purchase of "greener" computing systems.
- **The Green Grid** aims to advance energy efficiency in data centers and business computing ecosystems.
- **The Green500** is a list that rates supercomputers by energy efficiency, focusing on efficiency rather than on performance.
- **Green Comm Challenge** promotes the development of energy conservation technology and practices in the ICT field.

Energy Star is an international standard for energy efficient consumer products. Devices carrying this mark such as computer products (including monitors), generally use 20-30% less energy than required by US federal standards.

The replacement of CRT monitors with more environmentally friendly LCD or LED monitors is one of the major changes in the computer monitor industry. LCD monitors use about a third less power than CRT monitors. Since CRT monitors use more power, replacing them with LED or LCD monitors reduces its carbon footprint. Additionally, CRT monitors contain lead. LCD monitors use CCFL which contain mercury, while LED monitors do not.

Focus of Criteria

The requirements under this criteria focuses on the recyclability of computer display monitors in order to reduce the amount of waste entering the waste stream, minimize health impacts, and prolong the useful life of the product and its parts to minimize production by promoting reuse and recycling of modules and parts.

II. DEFINITION OF TERMS

1. 3R- Reduce, Reuse, Recycle
2. CRT-Cathode Ray Tube, a vacuum tube used as a display screen in a computer monitor
3. DENR ADMINISTRATIVE ORDER 2005-05 (DENR AO 2005-05)- Toxic Chemical Substances for Issuance of Chemical Control Orders
4. DENR ADMINISTRATIVE ORDER 2005-27 (DENR AO 2005-27)- Revised Priority Chemical List
5. DENR ADMINISTRATIVE ORDER 2015-09 (DENR AO 2015-09)- Rules and Procedures for the Implementation of the Globally Harmonized System of Classification and Labelling of

Chemicals (GHS) in Preparation of Safety Data Sheet (SDS) and Labelling Requirements of Toxic Chemical Substances

6. DISPLAY DEVICES- Refer to output devices, in the form of Cathode Ray Tubes (CRT), Liquid Crystal Displays (LCD), and Light Emitting Diode (LED) displays
7. HAZARDOUS WASTES- are substances that have short-term acute hazards such as acute toxicity by ingestion, inhalation or skin absorption, corrosivity or other skin or eye contact hazard or the risk of fire or explosion; or 2) long-term environmental hazards, including chronic toxicity upon repeated exposure, carcinogenicity (which may in some cases result from acute exposure but with a long latent period, resistance to detoxification process such as biodegradation, the potential to pollute underground or surface waters, or aesthetically objectionable properties such as offensive odors. They are defined as substances that are without any safe commercial, industrial, agricultural or economic usage and are shipped, transported or brought from the country of origin for dumping or disposal into or in transit through any part of the territory of the Philippines.
8. RE-USE- Process of recovering materials intended for the same or different purpose without the alteration of physical and chemical characteristics.
9. RECYCLING- Reprocessing the production process of waste materials for their original purpose or for other purposes, but excluding energy recovery.
10. REPUBLIC ACT 6969 (RA 6969)- Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990
11. REPUBLIC ACT 9003 (RA 9003)- Ecological Solid Waste Management Act of 2000
12. RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE (ROHS)- A European Union Directive which restricts the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) in new electrical and electronic equipments.
13. TAKE-BACK SYSTEM- A system that requires the producers either take back spent products and manage them through reuse, recycling, or remanufacturing, or delegate this responsibility to a third party. It is also known as Extended Producer Responsibility (EPR). The idea underlying EPR is that placing responsibility for waste management with producers creates a strong incentive for them to redesign products with an aim toward less material use and improved recyclability.
14. TRANSPORT- Includes all conveyances used in air, water and land.

III. SCOPE

The scope of these criteria follows the ENERGY STAR scope for displays.

Included are display products that are powered directly from AC mains, an External Power Supply, or Standard DC, with the exception of products listed in the exclusion list. Typical products that would be eligible for certification under this specification include:

1. Monitors;
2. Signage Displays; and
3. Signage Displays and Monitors with Plug-in Modules.

Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification including Televisions and Computers (Thin Clients, Slates/Tablets, Portable All-in-one Computers, Integrated Desktops). The list of specifications currently in effect can be found at www.energystar.gov/products. These products include:

1. Products with an integrated television tuner;

2. Displays with integrated or replaceable batteries designed to support primary operation without ac mains or external dc power, or device mobility (e.g., electronic readers, battery-powered digital picture frames); and
3. Products that must meet Food and Drug Administration specifications for medical devices that prohibit power management capabilities and/or do not have a power state meeting the definition of Sleep Mode
4. Monitors with keyboard, video, and mouse (KVM) switch functionality

IV. GREEN CHOICE PHILIPPINES REQUIREMENTS

Criteria	Evaluation/Validation Method
A. Quality Criteria	
1. The product shall comply with the performance requirements of the most recent relevant Philippine National Standard (PNS) and its future amendments for its intended application and any other internationally accepted standard. The current applicable Philippine National Standards for I.T. Equipment is PNS IEC 60950 - Information Technology Equipment – Safety	The applicant shall submit a certified true copy of the PS Mark Certificate if a PS licensee holder. Otherwise, the applicant shall submit the certified true copy of test results from an independent Bureau of Product Standards (BPS) accredited laboratory that the product is in compliance with the existing PNS. BPS shall evaluate the test results and shall issue the corresponding certification, if they pass the evaluation.
B. Warranty and Repairability	
1. The applicant shall offer a commercial guarantee on the quality of the product, provided the product is used for its intended purpose. The period of this guarantee must be at least two (2) years.	The applicant shall submit a portfolio and be accompanied by the relevant documentations such as warranty certificate.
2. The applicant must guarantee the availability of spare parts for a minimum of three years after production ceases.	The applicant shall submit a portfolio and statement in writing signed by the Chief Executive Officer or counterpart of the company and shall be accompanied by the relevant documentations
C. Environmental Criteria	
1. The applicant is required to comply with relevant environmental legislations. This includes production process, transport and disposal features of the product.	The applicant shall submit all applicable licenses, certificates and/or permits indicating the applicant's compliance with all applicable environmental rules and regulations.
2. The criteria for the design of computer display monitors are established based on its modularity. Each part of the product or module can be separated from the whole, hence can be treated as a single entity for the purpose of recyclability, disassembly and reparability. The following requirements have to be fulfilled: • • The parts of the product shall be recyclable. • There shall be no inseparable joints	The applicant shall submit a portfolio and statement in writing signed by the Chief Executive Officer or counterpart of the company and shall be accompanied by the relevant documentations. The applicant shall present instructions showing/explaining the professional disassembly of the computer monitor. The instructions shall have a special focus on the professional separation of housing parts, chassis, monitor panel, and printed circuit boards. The instructions

<table>
<tr><th>Criteria</th><th>Evaluation/Validation Method</th></tr>
<tr><td>between different materials such as glued or welded joints.
• Modules shall be easily removed.
• Connections between parts must be easily located
• Labels and/or stickers shall be made up of the same material as the part in which they are attached and/or it must not be treated in a manner that would pose difficulty in recycling.</td><td>shall be presented either in writing, by photo documentation, drawing or in video format.</td></tr>
<tr><td>3. The computer monitors shall meet all requirements set forth in the Energy Star Program for Displays, as amended at the time of application, currently the Version 7.1 ENERGY STAR Program for Displays) and labelled with the ENERGY STAR for Displays”</td><td>The applicant shall submit a portfolio and statement in writing signed by the Chief Executive Officer or counterpart of the company and includes a test report by an accredited testing laboratory in accordance with the test method specified in the International Energy Star Program, or certificate in accordance with equivalent standards or higher.</td></tr>
<tr><td>4. Hazardous Substances
• Product’s plastic parts weighing more than 25 g shall not contain the following:
o Cadmium (Cd)
o Lead (Pb)
o Tin (Sn)
o Chromium (Total)
o mercury (Hg)
o polybromominated biphenyls (PBBs), polybromodiphenyl ethers (PBDEs) and short-chain (10-13 carbon atoms per molecule) chlorinated (chlorine content of greater than 50% by weight) paraffins

Measured contents must also be below the regulatory limit. If recycled materials are used in the plastic components, or safety regulations require the addition of glass fiber to the components located in the high temperature area, the lead content of such components shall be less than 20 mg/kg.

The backlight module/unit of the product’s display panel shall not use mercury-containing lamps.</td><td>The applicant shall submit a portfolio and statement in writing signed by the Chief Executive Officer or counterpart of the company and shall be accompanied by the relevant documentations, including relevant laboratory test results.

Laboratory analysis methods are as follows.
<table>
<tr><th>Regulated Substance</th><th>Limit</th><th>Reference Test Method</th></tr>
<tr><td>Lead (Pb)</td><td><30 ppm</td><td rowspan="5">US EPA 3051A
US EPA 3050B
US EPA 3052
US EPA 3060A</td></tr>
<tr><td>Cadmium (Cd)</td><td><0.3 ppm</td></tr>
<tr><td>Tin (Sn)</td><td><30 ppm</td></tr>
<tr><td>Hg</td><td><2 ppm</td></tr>
<tr><td>Cr (Total)</td><td><30 ppm</td></tr>
<tr><td>PBBs, PBDEs</td><td><5 ppm</td><td>US EPA 3540C
US EPA 8081A
US EPA8082A
US EPA /8270D
IEC 62321</td></tr>
<tr><td>Short Chain Chloroparaffins</td><td>< 5 ppm</td><td>US EPA 8270D
US EPA 3540C
GC-MSD</td></tr>
</table></td></tr>
</table>

Criteria	Evaluation/Validation Method
	IEC 62321
5. Packaging Requirements • The packaging material shall be reusable and recyclable. The following requirements have to be fulfilled: • Primary packaging shall have a plastic resin identification code. • Packaging materials shall not be treated or made in a manner that would prevent reusing and recycling. • Corrugated fiber board packaging shall consist of at least 80% recycled content. • The product shall meet the requirements of ISO 11469, in labeling all major plastic components weighing more than 25 g in prominent areas to indicate the composition code. • Packaging materials shall not contain chlorine-based plastics;	Visual inspection of actual packaging and review of supporting documentation and certification provided by applicant company,
6. The applicant shall have an established and validated retrieval or take back system equivalent to not less than 10% of its total units sold.	The applicant shall submit its take back program mechanism. The program shall ensure a 10% retrieval of the annual number of products sold. %Retrieval = no. units retrieved (end of life)/ no. units sold
D. Consumer Information	
1. The following technical information shall be specified in the user's manual: Instructions on the positioning of the machine Information about how and where the used and decommissioned products/parts can be returned for recycling and/or disposal • Consumer information on parts with toxic and hazardous materials and its disposal	The applicant shall submit a portfolio and statement in writing signed by the Chief Executive Officer or counterpart of the company and shall be accompanied by the relevant documentations. Review of actual user's manual during inspection and review.

V. PERIOD OF VALIDITY

The product criteria are valid for three years from the date of its approval unless otherwise revised or withdrawn by the NELP-GCP Board, if proven necessary at any period of time.

VI. REFERENCES

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