

**GREEN CHOICE PHILIPPINES**

**NELP-GCP 20170036  
REFRIGERATORS AND FREEZERS**

**I. BACKGROUND**

Based on PNS IEC 62552-1 to 3: 2016, there are two main types of refrigerators: 1) compression-type refrigerating appliance in which refrigeration is done by means of a motor driver compressor, and 2) absorption-type refrigerators in which refrigeration is effected by an absorption process using heat as an energy source.

At the moment, there is no available data on the manufacture of refrigerators and freezers. This sub industry falls under the more general category of the electronics industry. The electronics industry has always been the largest contributor to the manufacturing industry in the Philippines. In 2013, it accounted for 41% of total exports, and brought in US\$ 918 million worth of foreign and domestic investments. The industry also leads in employment generation among manufacturing industries.

**A. MARKET DESCRIPTION**

For the purposes of this review, we have limited it to the electronics subgroup: consumer electronics in which consumer refrigerators and freezers fall under. The Table below shows the export and import data of consumer electronics from 2008 to 2013 in terms of value. It shows that the export data is seen to be declining from 2008 to 2012 while imports are continuously increasing. In 2008 exports was higher than imports, but in 2009 this significantly decreased to the point that imports were higher. This can be attributed to the Asian financial crisis at that time. It was only in 2013 when exports increased significantly.

**Figure 1 Export and Import Data for Consumer Electronics from 2008 to 2013 (in US\$ million)**

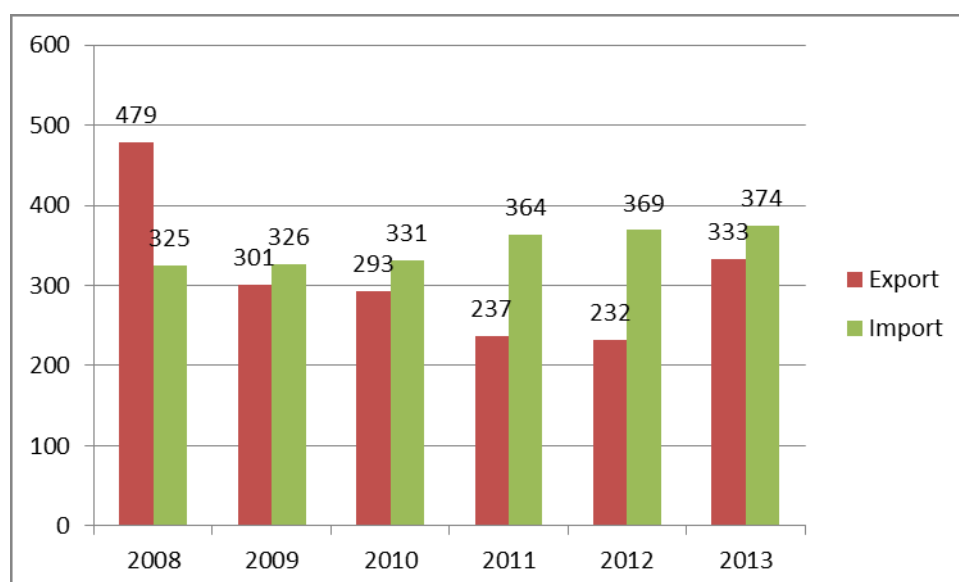


Table 3 below shows that the number of consumer electronic manufacturing establishments have remained more or less the same from 2010 to 2013. However, the number of employees continue to grow although at a slow rate. However, the value of output and the value added indicators show large increase in growth. This may be the reason why import is catching up with export in 2013.

**Table 1 PSA Statistical Indicators for Consumer Electronics for 2010, 2012, and 2013**

<b>Statistical Indicator</b>	<b>2010</b>	<b>2012</b>	<b>2013</b>
Number of Establishments	33	32	33
Number of Employees	10,278	11,577	13,671
Value of Output (billions)	21.3	43.7	57.2
Value Added (billions)	4.9	3.7	12

Reviews of three local appliance vendors (Anson's, Abensons and Robinson's Appliances) show that the largest household consumer refrigerator being sold is 32.9 cubic feet (931.6 liters).

Priceprice.com show that the most viewed household consumer refrigerators/freezers range from 139 liters to 208 liters and that their largest capacity refrigerator/freezer is 776 liters.

## **B. ENVIRONMENTAL INITIATIVES OF THE INDUSTRY**

Most refrigerants used in refrigerators pose a threat to the environment because of their ozone depletion potential (ODP) and global warming potential. Chlorofluorocarbons (CFC) are now banned while hydrochlorofluorocarbons (HCFC) are prohibited in developed countries, while developing countries have until 2030 to phase it out. Hydrofluorocarbons (HFC), another type of greenhouse gas have no ODP. However, they do have the potential to contribute significantly to climate change. Its use is expected to increase twentyfold in the coming decades mostly due to the increased demand in refrigeration and air-conditioning. They are listed under the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) as substances whose emissions are to be limited or reduced. Last year (2016), an amendment was adopted to phase down HFCs under the Montreal Protocol starting 2019 (for Developed Countries).

Unsaturated HFCs (u-HFCs or hydrofluoroolefins (HFO)) are synthetically made HFCs with no ODP and low GWP. Natural refrigerants have zero ODP, a negligible GWP and are part of the natural biochemical cycles and do not form persistent substances in the environment. These are some of the options that the refrigerator manufacturers are looking at to replace refrigerants with high ODP and GWP.

Another initiative that manufacturers are looking at is increasing energy efficiency. Increased energy efficiency in cooling systems and reduced overall cooling needs has the potential to reduce GHG emissions.

The use of natural refrigerants and maximizing energy efficiency are part of "green cooling technologies". Several manufacturing companies are already incorporating these into their product (mostly on energy efficiency). For example, Hitachi uses Dual Fan Cooling to speed up the cooling process, together with Frost Recycling Cooling with Hybrid Defrost and intelligent energy saving will effectively reduce energy consumption.

Appliance manufacturers are also implementing a "take back" policy. This policy involves the manufacturer "taking back" the non-working or obsolete product for proper recycling and disposal.

## **II. DEFINITION OF TERMS**

**Energy Efficiency Factor (EEF)**- The quotient of the total storage volume in liters adjusted according to PNS 396 Part 2: 1997 divided by the energy consumption in kilowatt-hour per 24 hour

**Foaming agent**- A material that facilitates formation of foam such as a surfactant or a blowing agent

**Freezer**- A cabinet designed as a unit for the storage of food at temperature of -18 °C, or below, having the ability to freeze food, and having a source of refrigeration requiring electrical input only

**Frost-free refrigerating appliance** - Refrigerating appliance in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system.

**Global Warming Potential (GWP)**- Is a relative measure of how much heat a greenhouse gas traps in the atmosphere. GWP is expressed as a factor of carbon dioxide, whose GWP is standardized to 1. It is a measure of how much energy the emission of 1 ton of a gas will absorb over a given period of time (usually 100 years) relative to the emission of 1 ton of carbon dioxide.

**Montreal Protocol**- An international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.

**Ozone Depletion Potential (ODP)**- A number that refers to the amount of ozone depletion caused by a substance

**R290**- is a refrigerant grade propane, a natural, or "not in kind", refrigerant suitable for use in a range of refrigeration and air conditioning applications. The use of R290 is increasing due to its low environmental impact and excellent thermodynamic performance. It is non-toxic with zero ODP and very low GWP

**R600a**- is a refrigerant gas that is being increasingly used due to its low environmental impact and excellent thermodynamic performance. It is now the refrigerant gas of choice in domestic and small commercial refrigerators. It is non-toxic with zero ODP and very low GWP.

**Refrigerant**- Fluid used for heat transfer in a refrigerating system, which absorbs heat at a low temperature and a low pressure of the fluid and rejects it at a higher temperature and a higher pressure of the fluid usually involving changes of the phase of the fluid Replace with definition from ISO

**Refrigerating Appliance** - Insulated cabinet with one or more compartments that are controlled at specific temperatures and are of suitable size, cooled by natural convection or a forced convection system whereby the cooling is obtained by one or more energy-consuming means.

**Refrigerator (household or consumer-type)**- Refrigerating appliance intended for the storage of foodstuff, with at least one fresh food compartment.

**Refrigerator-Freezer**- Refrigerating appliance having at least one fresh food compartment and at least one freezer compartment.

## **I. SCOPE**

These criteria are applicable to consumer refrigerator and freezers with up to 1,500 liters.

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**II. GREEN CHOICE PHILIPPINES REQUIREMENTS**

To carry the *Green Choice Philippines* seal, a product must meet the following requirements.

<b>Criteria</b>	<b>Evaluation/Validation Method</b>
<b>A. Packaging</b>	
1. Packaging materials shall not contain chlorine-based plastics	Documentation and certification provided by applicant company
2. All packaging components shall be easily separable by hand into individual materials to facilitate recycling.	Documentation and certification provided by applicant company
3. Where used, corrugated fiber board packaging shall consist of at least 80% recycled material.	Documentation and certification provided by the applicant company
<b>B. Marking and Labeling</b>	
1. Plastic parts heavier than 50 grams shall have a permanent marking identifying the material, in conformity with ISO 11469.	Visual inspection, documentation and certification.
2. The type of refrigerant (including GWP value), recharging refrigerant, and foaming agent used for the insulation shall be indicated on the appliance, on the name plate, to facilitate possible future recovery	Visual inspection, documentation and certification.
3. Information about the noise level of the appliance shall be provided in a way clearly visible to the consumer.	Visual inspection, documentation and certification.
4. The appliance shall be sold with an instruction manual, which provides advice on the correct environmental use. The cover page or first page shall bear the following text: "Information on how to minimize environmental impacts is given in this manual."  Recommendations for optimal use of energy in the operation of the appliance shall also be provided in the manual	Visual inspection, documentation and certification.
<b>C. Consumer Information</b>	
1. The following technical information shall be specified in the user's manual: <ul style="list-style-type: none"> <li>• Instructions on the positioning of the machine</li> <li>• Information about how and where the used and decommissioned products/parts can be returned for recycling and/or disposal</li> <li>• Consumer information on parts with toxic and hazardous materials and its disposal</li> </ul>	<p>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.</p> <p>Review of actual user's manual during inspection and review.</p>

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Criteria	Evaluation/Validation Method		
<b>D. Quality and Energy Efficiency</b>			
1. Product should conform to the rules and regulations in the implementation of PNS 396-2, Household appliances - Energy efficiency factor (EEF) and labelling requirements Part 2: "Refrigerators and freezers" and its future amendments	Data from recognized testing laboratories showing conformity of the products with the specified property standards or the corresponding standards (Philippine National Standards) shall be submitted.		
<b>E. Environmental Criteria</b>			
1. The applicant must meet all government regulations on safety, health and the environment	No documentation is necessary but the Mark may be revoked if the ecolabelling board finds out that it did not meet the regulations through available public information		
2. The product and its manufacturing process shall not contain or use substances controlled and listed in the annexes of the Montreal Protocol	Documentation and certification provided by applicant company which includes a list of chemicals used in the product and its manufacturing process		
3. The refrigerants in the refrigerating circuit and foaming agents used for the insulation of the appliance shall have an ozone depletion potential equal to zero.	Documentation and certification provided by applicant company including a list of refrigerants and foaming agents that are used and a declaration from the supplier of the refrigerants and foaming agents that the criteria is fulfilled.		
4. The refrigerants in the refrigerating circuit and foaming agents used for the insulation of the appliance, shall have a global warming potential (GWP) equal to, or lower than, 15 (rated as CO2 equivalents over a period of 100 years).	Documentation and certification provided by applicant company including a list of refrigerants and foaming agents that are used with their GWPs, and a declaration from the producer/supplier of the refrigerants and foaming agents that the requirement is fulfilled.  A list of GWP can be found at <a href="http://unfccc.int/ghg_data/items/3825.php">http://unfccc.int/ghg_data/items/3825.php</a> and Table B.1 of ISO 5149-1.		
5. Paints shall not contain pigments or additives based on cadmium, lead, chromium, mercury or their compounds. Metals shall not be coated with cadmium, chromium, nickel or their compounds.	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.		
6. Product's plastic parts weighing more than 25 g shall not contain the following: a. Cadmium (Cd) b. Lead (Pb) c. Tin (Sn) d. Chromium (Total) e. mercury (Hg) f. polybrominated biphenyls (PBBs), polybromodiphenyl ethers (PBDEs) and short-chain (10-13 carbon atoms per molecule) chlorinated (chlorine content of greater than 50% by weight) paraffins	<b>Regulated Substance</b>	<b>Limit</b>	<b>Reference Test Method</b>
	Lead (Pb)	<30 ppm	US EPA 3051A
	Cadmium (Cd)	<0.3 ppm	
	Tin (Sn)	<30 ppm	US EPA 3050B
	Hg	<2 ppm	
	Cr (Total)	<30 ppm	US EPA 3052 US EPA 3060A
	PBBs, PBDEs	<5 ppm	
			US EPA 3540C US EPA

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Criteria	Evaluation/Validation Method		
			8081A US EPA8082A US EPA /8270D IEC 62321
	Short Chain Chloroparaffins	< 5 ppm	US EPA 8270D US EPA 3540C GC-MSD IEC 62321
7. The product must be designed so that at least 75% by weight of the apparatus can be recycled. The product must be simple to reuse and the materials must be simple to recycle. This means that joints must be easy to find and access, electronic components must be easy to find and remove, the product must be easy to disassemble using common standard tools, and it must be possible to separate out incompatible and hazardous materials.	<p>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.</p> <p>The applicant shall present instructions showing/explaining the professional disassembly of the product. The instructions shall be presented either in writing, by photo documentation, drawing or in video format.</p>		
<b>F. Noise Management Criteria</b>			
1. No evident noise should be produced when refrigerator is running. Its sound power level should not be higher than 44dB (A).	Documentation and certification provided by applicant company. Noise testing should follow EN28960 or equivalent standards.		
<b>G. Warranty and Take Back System</b>			
1. The applicant shall have an established and validated retrieval or take back system equivalent to not less than 10% of its total units sold.	Documentation and certification provided by applicant company subject to on-site validation. The applicant shall submit its take back program mechanism.		
2. The manufacturer shall offer a commercial guarantee to ensure that the appliance will function for at least two years. This guarantee shall be valid from the date of delivery to the customer.	The applicant shall submit a portfolio and be accompanied by the relevant documentations such as warranty certificate.		
The availability of compatible replacement parts and service shall be guaranteed for 10 years from the time that production ceases.			

**III. PERIOD OF VALIDITY**

The product criteria is 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.

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