GREEN CHOICE PHILIPPINES

NELP-GCP 20250039
ROOM AIR CONDITIONERS

I. BACKGROUND

The increasing demand for HVAC systems, driven by their crucial role in building comfort and health, necessitates a focus on sustainability in their design and retrofitting. In the Philippines, the environmental impacts of air conditioners are significant across their phases.

Production involves high energy consumption and emissions from manufacturing components, while the use phase contributes substantially to global electricity consumption and greenhouse gas emissions.

The use phase can be seen as risky especially if the unit is not properly maintained and that refrigerant leakage can happen emitting harmful chemicals to the atmosphere, with the addition of energy consumption. The end-of-life phase poses challenges with solid waste and e-waste management, leading to harmful chemical leaks and environmental degradation.

Despite existing laws and initiatives, the Philippines continues to struggle with effective waste management, underscoring the need for enhanced sustainable practices in the HVAC–particularly, the air conditioning industry.

The National Ecolabelling Programme - Green Choice Philippines aims to develop a criteria for air conditioners that caters to sustainability and promote practices that combat key environmental issues in the life cycle of air conditioners from acquisition of raw materials up to its end of life stages.

II. MARKET DESCRIPTION

Modern heating, ventilation, and air conditioning (HVAC) appliances are seen as a critical appliance for daily human activities as it is being utilised in an assortment of activities and is used by a variety of industries whether in airlines, business infrastructures, and residential areas (McDowall, 2007). McDowall also presents the idea that there is a great convenience brought by these types of products as HVACs are used to control humidity and temperature in enclosed or confined indoor spaces–buildings, offices and residential buildings as stated by Eldridge (2024). To further support this, Domanski et., al. (2017) notions that HVAC appliances are a staple in residential areas–primarily for its convenience. The continuous growth of the global temperature increases the overall demand for air conditioners. The heat waves that are racing on a global level are breaking records. Most of the countries saw an increase or rise in temperature as presented by the ASEAN Post Team (2020).

The demand for AC units in the Philippines has seen a steady growth up until the pandemic. In the year 2019 alone, sales numbered at 980,000 units sold, but slightly dropped to 870,000 units sold in 2022 (Statista, 2023).

Air conditioner's current status in the market remains in a steady, growing state. This growth has been seen since 1990–especially for residential areas. It was predicted that there will be a growth in both developed and underdeveloped countries when it comes to acquisition of air conditioning units (for residential areas/households), and that this demand per household will have a significant increase from 26% in the year 2010, up to 43% in the 2030 (Davis, 2021). In addition, the continuous global population growth implies that more households will acquire air conditioning units. It has been recognised globally that air conditioners are not used as a luxury but rather a necessity due to the increasing global temperature. Globally, Schleicher et. al. (2018) states that air conditioners pose a threat in terms of significant Greenhouse Gas Emissions (GHG) due to leakage issues that are observed throughout its use.

The market demand for air conditioners in the Philippines is predicted to have a gradual growth for years including 2024 and 2025 due to the tropical weather and rise in heat and humidity in the country (IndustryArc, 2024). Furthermore, the average temperature in the Philippines during summer rises dramatically in 2015-2019, ranging from 26 to 33 deg Celsius. This said heatwave further increases the demand for air conditioners, especially room air conditioners. In addition, population growth and urbanisation is also a factor when it comes to the increasing number of room air conditioners usage in the market.

In a local context, Table 1 shows the inventory of the Department of Energy (DOE) for the registered air conditioner products in the Philippine Energy Labeling Program (PELP) for the year 2021 and 2022. The refrigerants used in the Philippines for air conditioning units are R410a and R32 for both split type and window type. Local manufacturers decreased their output from 2021 to 2022 due to limited workforce amidst the pandemic of Covid-19. The high number of imported products in the Philippine market has been visible since 2021 but also decreased in 2022.

Category	Refrigerant	2021 Inventory (Local)	2021 Inventory (Imported)	2022 Inventory (Local)	2022 Inventory (Imported)
Split Type	R32	19,902	583, 882	0	538,205
	R410a	20, 709	70,958	6,202	52,975
Window Type	R32	21,219	537, 978	3,250	386, 320
	R410a	271, 609	12,012	189,912	25, 842
Total		333,439	1,204,830	199,374	1,003,342

Table 1. Inventory of Registered Air Conditioners Product from 2021-2022
Source: Department of Energy - Philippine Energy Labeling Program

Table 2 shows the refrigerant amounts used in the market for the year 2021 and 2022. R32 and R410a has been used in the market since 2021 for both split type and window type air conditioning units. The locally produced AC units for split and window type are dominated by R410a refrigerants and the imported air conditioning unit is dominated by the R32 refrigerants. Meanwhile, there is no record of locally produced split type with R32 refrigerants in the market for the year 2022.

Category	Refrigerant	2021 Local x Refrigerant Amount (Kg)	2021 Imported x Refrigerant Amount (Kg)	2022 Local x Refrigerant Amount (Kg)	2022 Imported x Refrigerant Amount (Kg)
Split Type	R32	12,042	385, 830	0	337,646
	R410a	43,703	125, 907	15, 396	92, 517
Window Type	R32	7, 585	185, 787	1,162	134, 213
	R410a	138, 484	8, 564	89,545	10, 515
Total		201, 813	706, 088	106,013	574, 291

Table 2. Inventory of Registered Refrigerating Appliances multiplied by Refrigerant Amount from 2021-2022
Source: Department of Energy - Philippine Energy Labeling Program

The Philippine market for air conditioners is mainly dominated by window type AC units. In the inventory of the DOE for the year 2021 and 2022 there are 1, 448,142 registered units in the country in the last two (2) years. These window type AC units dominate the Philippine market because these units are cheaper compared to other types and are considered to be low maintenance in nature.

However, the window type units are deemed to not perform well in terms of efficiency in comparison to split-type air conditioners which are more energy efficient. Companies like Daikin and Carrier raise public awareness about the benefits of split type ACs rather than the window type air conditioners. With split-type in place, an individual can save up to 25% of operating cost (IndustryArc, 2019).

In terms of cooling capacity, brands that are available in the Philippines have a wide range in terms of their performance. Registered brands in the PELP have air conditioning units ranging from 1.39 kW to 14 kW depending on the size of the unit (Department of Energy, PELP December 31, 2024). As of December 31, 2024, the Department of Energy has approved the product registration of 2,293 air conditioner models. Additionally, the DOE has issued a total of 4,177 new and renewed energy labels for air conditioners.

III. ENVIRONMENTAL INITIATIVES

The Philippines committed a 75% reduction of greenhouse gas (GHG) emissions in the Nationally Determined Contribution (NDC) by 2030 prioritizing the sectors of transport, energy, agriculture, wastes and industrial processes and product use (IPPU), in contribution to the goals of the Paris Agreement. This 75% commitment is composed of 2.71% unconditional (using the nation's resources) and 72.29% conditional (using Means of Implementation to be provided by Developed Countries).

Reinforcing the laws and regulations concerning the energy sector has been one of the numerous initiatives of the Philippine government to contribute to NDC. One of these is the strong implementation of RA 11285 or Energy Efficiency and Conservation Act to improve energy efficiency and to grant incentives to energy efficiency and conservation (EE&C) projects in the country. In this particular law, the Philippine Energy Labeling Program (PELP) of the Department of Energy was established to enforce a mandatory energy efficiency rating and labeling system for identified energy-consuming products like room air conditioners, refrigeration units and television sets.

The use of natural refrigerants as alternatives to hydrofluorocarbon (HFC) refrigerants such as R410a or R32, is being recommended in the country as one of the first steps to transition to climate-friendly refrigerants which can help in achieving the NDC commitments. As these natural refrigerants are flammable in nature, proper installation procedures must be practised. In 2018, RAC trainers were trained in proper installation and safe use of alternative refrigerants with the assistance from GIZ through the Cool Contributions Fighting Climate Change (C4) project in partnership with the Technical Education and Skills Development Authority (TESDA).

In managing refrigerants, through the Philippine Ozone Desk under EMB, the ozone-depleting substances (ODS) and HFC refrigerants are being monitored for its phase out and phase down plans, respectively. This is in alignment with the Montreal Protocol on Substances That Deplete the Ozone Layer and the Kigali Amendment. In addition, a Memorandum Circular No. 2021-11: Registration of Service Providers of ODS Using Equipment was issued to properly handle and manage those substances.

For disposal, the Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB) monitors the e-waste movement in the country through the registration of transport, storage, and disposal (TSD) facilities under the DENR Administrative Order 2013-22: Revised Procedures and Standards for the Management of Hazardous Wastes. This particular order classified e-waste as Waste Electrical and Electronic Equipment (M506 category) and special waste (M507 category) and ozone-depleting substances under L403 category. Also, the bureau released the Technical Guidelines for Specific Categories of TSD Facilities in 2015 to provide minimum protocols and standards on the categorization of TSD facilities.

Although there are established e-waste management facilities accredited by DENR, most e-waste are being taken care of by the waste pickers and junk shop operators, which may not have adequate knowledge on the adverse impacts of handling organic pollutants (e.g. polybrominated diphenyl ethers (PBDEs) found in plastic casing) and hazardous substances (e.g. lead, cadmium, mercury, hexavalent chromium) from the electrical and electronic equipment on human health and environment. DENR-EMB drafted a policy entitled “Guidelines on the Environmentally Sound Management (ESM) of Waste Electrical and Electronic Equipment (WEEE)” in 2022 to provide a framework for the appropriate management of e-waste.

The accumulation of e-waste in the country is not only the issue to deal with but also the toxic emissions of organic pollutants. There are initiatives that can be done to address the specific issues as prescribed in the DAO No. 2021-14: Amendment on Some Provisions of DAO 2010-06: Guidelines on the Use of Alternative Fuels and Raw Materials in Cement Kilns in which the dismantled and segregated PBDE-containing plastics wastes are acceptable in the cement kilns co-processing.

Local industry players like Concepcion-Carrier Airconditioning Company (CCAC) focuses on environmental compliance and offers after-market services to cater the needs of the customers. Other local and international air conditioning companies stated their commitments and priority areas in their sustainability report and materiality assessment, however, no specified e-waste management programs such as take back policies and waste recovery programs in their business operations in the Philippines.

While there are numerous initiatives and commitments from the government and private sector concerning the environmental issues, the lack of governing policies and inadequate waste management facilities both remain a challenging aspect prior to the proper implementation. On the other hand, informing and educating the consumers plays a vital role in making environmental solutions more feasible.

IV. DEFINITION OF TERMS

Blowing (foaming) agent - A substance (gas, liquid, chemical) that is able to produce cells in the plastic structure of a foam. This process can vary according to the property of the substance: a liquid may develop cells when changing into gas, a gas may expand when pressure is released, a chemical may react under certain conditions to form a gas. *(Proklima International, Natural Foam Blowing Agent).*

Compatible Replacement Parts - Compatible Spare Part is a replacement part of the original part identified by the manufacturer for the appliance to work and function as intended.

Cooling Seasonal Performance Factor (CSPF) - Cooling Seasonal Total Load (CSTL) in (kWh) divided by the Cooling Seasonal Energy Consumption (CSEC) in (kWh). Also stated under the COPE as the measurement of efficiency (DOE, 2020).

Energy Efficiency Performance Rating (EEPR) - refers to the product's star rating which is based on the ranges of CSPF and is indicated in the energy label *(PELP Implementing Guidelines for Air Conditioners, 2024)*

Global Warming Potential (GWP) - A relative measurement used to estimate, compare, and collate the relative radiative effects of different greenhouse gases *(UNFCCC, 2004)*.

HVAC - HVAC (heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality *(AIREDALE INTERNATIONAL AIR CONDITIONING LTD., 2024).*

Kigali Amendment - An amendment between parties to the Montreal protocol to actively phase down and regulate Hydrofluorocarbons (HFCs). *(United Nations environment Programme)*

Montreal Protocol - A multilateral environmental agreement among different states and organisations that modulates the production and consumption of almost 100 man-made chemicals that are categorised as ozone depleting substances. *(United Nations Environment Programme)*

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

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.

R32 - is a refrigerant gas that is being increasingly used due to its low environmental impact. It is now the refrigerant gas of choice in air conditioning units. 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 *(ISO 817:2014)*

V. SCOPE

The criteria is applicable to room air conditioners with a cooling capacity of up to 50,400 kJ/hr or 14 kW.

VI. GREEN CHOICE PHILIPPINES REQUIREMENTS

To carry the Green Choice Philippines Seal of Approval, a product must meet the following requirements.

CRITERIA	VALIDATION METHOD
A. Packaging	
1. The packaging materials shall not use materials that pose unreasonable risk to human health and environment, and do not release harmful substances. Unreasonable risk is defined in RA 6969.	Documentation and certification provided by applicant company
2. All packaging components shall be easily separated from individual materials without using special tools to facilitate recycling.	Documentation and certification provided by applicant company
3. Where used, corrugated fiberboard packaging shall consist of at least 80% recycled material.	Documentation and certification provided by applicant company
B. Marking and Labelling	
1. Plastic parts heavier than 50 grams shall have a permanent marking identifying the material, in conformity with the latest version or new reference standard of PNS ISO 11469 Plastics — Generic identification and marking of plastics products.	Documentation and certification provided by applicant company
2. The type of refrigerant (including GWP value), charge weight, and noise level shall be indicated on the appliance, on the nameplate, to facilitate possible future recovery.	Visual inspection, documentation and certification.
C. Instruction and Manual	
1. In addition to the instructions and markings specified in the applicable PNS, air conditioning appliances shall be sold with guidelines on proper environmental usage. The user manual shall provide information on	Visual inspection, documentation and certification. The applicant shall submit a portfolio and statement in writing signed by the

minimizing environmental impact. 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 - Information on disposing the waste as a whole unit - Information on chemical used and hazardous components of the unit. - Servicing of the unit shall be conducted by an authorized technician. - Information on the optimal use of energy in the operation of the appliance	Chief Executive Officer or authorized representative of the company and shall be accompanied by the relevant documentations. Review of actual user's manual during inspection and review.
D. Energy Efficiency	
1. The product should conform to the rules and regulations set in the latest edition of the Implementing Guidelines of the Philippine Energy Labeling Program for Air Conditioners.	The applicant shall present the issued energy label from the Department of Energy.
2. The product shall meet a 5-star Energy Efficiency Performance Rating (EEPR) from the Department of Energy - Philippine Energy Labeling Program.	The applicant shall present the issued energy label from the Department of Energy.
E. Safety	
1. Air conditioning products shall comply with the following DTI-BPS technical regulations and any future amendments: a. DAO 18-03, Series of 2018 Mandatory Philippine National Standard (PNS) for Household and Similar Electrical Appliances b. Department Administrative Order (DAO) No. 22-01, Series of 2022 The New Technical Regulation concerning the Mandatory Product Certification of Energy-Consuming Products c. Department Administrative Order (DAO) No.	The applicant shall present the Philippine Standards (PS) license or Import Commodity Clearance (ICC) Certificate from the DTI-BPS.

22-02, s. 2022 Updating of the Reference Standards Used in the BPS Mandatory Product Certification Schemes; and d. Memorandum Circular (MC) 22-09 Series of 2022 Supplemental Guidelines for the Implementation of DAO 22-01, Series of 2022	
F. Environmental	
1. The manufacturing process shall comply with applicable regulations on the use of controlled substances and must meet all government regulations on safety, health and the environment.	Documentation and certification showing compliance to the requirement with a list of chemicals used in the product and its manufacturing process shall be submitted by the applicant. Valid safety, health and environmental government permits shall be submitted by the applicant company.
2. The refrigerants in the refrigerating circuit as cooling agents used for the appliance shall have an ozone depletion potential equal to zero (ODP = 0).	Documentation and certification of the used refrigerant and/or other used chemicals with their corresponding ODP value. This documentation and certification is supported by evidence such as but not limited to proof of purchase, gas chromatography identifier result, and among others.
3. The refrigerants in the refrigerating circuit as cooling agents for the appliance shall have a global warming potential equal to or lower than 750 *(rated as CO2 equivalents over a period of 100 years)* (GWP ≤ 750).	Documentation and certification of the used refrigerant and/or other used chemicals with their corresponding ODP value. This documentation and certification is supported by evidence such as but not limited to proof of purchase, gas chromatography identifier result, and among others. The GWP Values shall be based on the latest Intergovernmental Panel on

	Climate Change (IPCC) Assessment Report.
4. All parts and components of the product shall be RoHS-compliant. Parts and components are specified in Annex A.	Documentation, certification provided by the applicant company..
G. Take Back System	
1. The applicant shall have an existing take back program for the retrieval of its product from end-users.	The applicant shall submit its take back program mechanism.
H. Noise Management	
1. No evident noise should be produced when the air conditioner is running. Its sound power level should not be higher than 52dB(A) at the indoor side and 62dB (A) at the outdoor side.	The applicant shall submit a copy of the sound power level test report using test method according to PNS ISO 4871:2004 Acoustics — Declaration and verification of noise emission values of machinery and equipment, PNS IEC 61672-1 Electroacoustics - Sound level meters - Part 1: Specifications; and/or Other Equivalent Standards
I. Recyclability, Repairability & Reusability	
1. The product must be designed so that at least 75% by weight can be recycled. It must be simple to reuse/repair 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 using common standard tools. Prior to disassembly of the product, the hazardous materials must be recovered.	Documentation, certification provided by the applicant company, and inspection.
J. Warranty	
1. The manufacturer shall offer a commercial guarantee to ensure that the appliance will	The applicant shall submit a portfolio and be accompanied by the relevant

<table>
<tr>
<td>function for at least two years. This guarantee shall be valid from the date of delivery to the customer.

The manufacturer shall guarantee the following:

<table>
<tr><th colspan="2">Warranty (Years)</th></tr>
<tr><td>Parts and Labor</td><td>1</td></tr>
<tr><td>Printed Circuit Board</td><td>3</td></tr>
<tr><td>Compatible replacement parts</td><td>1</td></tr>
<tr><td>Compressor</td><td>10</td></tr>
</table>
</td>
<td>documentations such as warranty certificate.</td>
</tr>
</table>

VII. PERIOD OF VALIDITY

The product criteria is valid for three (3) 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.

VIII. TECHNICAL COMMITTEE MEMBERS

Institution	Member and Alternative
International Institute for Energy Conservation (IIEC)	Engr. Arturo Zabala
Department of Energy - Energy Utilization Management Bureau (DOE-EUMB)	Engr. Aaron Premacio Engr. Daniel Vincent De Guzman
Department of Energy - Energy Research and Testing Laboratory (DOE-ERTLS)	Engr. Isagani Soriano Engr. Jomar Landicho
DENR-Environmental Management Bureau (DENR-EMB)	Mr. Gilbert Maximo Mr. Onofre Escota
DENR-Climate Change Services (DENR-CCS)	Mr. Rolando Abad Jr
Department of Trade and Industry - Bureau of Philippine Standard (DTI-BPS)	Engr. Avelino Molina Jr.
OMNI SOLID SERVICES, INC.	Mr. Johnny Quinto
Philippine Appliance Industry Association (PAIA)	Mr. John Paulo Barbosa

Annex 1. Parts and Components of Room Air Conditioners

1. Electrical components such as printed circuit board, wirings and valves.
2. Metal Enclosure
3. Plastic Parts
4. Paints in the Enclosure
5. Inks used in the Rating Plate

REFERENCES

ASEAN Post Team, 2020. The Rising Demand for Air Conditioners. In the ASEAN Post, Spotlights. Retrieved from https://theaseanpost.com/article/rising-demand-air-conditioners

6WResearch (2024). Philippines Refrigerators & Freezers Market (2024-2030). Retrieved from https://www.6wresearch.com/industry-report/philippines-refrigerators-freezers-market-2020-2026

Cuñado, W. P. (2020). National policy, regulatory framework already in place for e-waste management, EMB announced. In Department of Environment and Natural Resources. https://emb.gov.ph/wp-content/uploads/2020/12/NATIONAL-POLICY-REGULATORY-FRAMEWORK-ALREADY-IN-PLACE-FOR-E-WASTE-MANAGEMENT-EMB-ANNOUNCED.pdf

Davis, L., Gertler, P., Jarvis, S., & Wolfram, C. (2021). Air Conditioning and Global Inequality. In Science Direct. [pdf Download]. Acquired from https://www.sciencedirect.com/science/article/pii/S0959378021000789

Department of Energy (2023). PELP Registration and Energy Label Issuance as of December 31, 2023. Retrieved from https://doe.gov.ph/pelp?q=pelp/pelp-database

Department of Energy, (2021). List of Certified Room Air Conditioners as of December 2021. [pdf download]. Downloaded from partment of Energy (2021). List of Certified Split Type Room Air Conditioners as of March 2021. [pdf download]. Downloaded from https://doe.gov.ph/sites/default/files/pdf/energy_efficiency/certified_rac_split_2021_1st_quarter.pdf

Department of Environment and Natural Resources (2013, December 26). Administrative Order No. 2013-25. Retrieved from https://apidb.denr.gov.ph/infores/uploads/rmdd/dao-2013-25.pdf

Department of Environment and Natural Resources (2021, October 13O. Administrative Order No. 2021-31. Retrieved from https://pod.emb.gov.ph/wp-content/uploads/2021/10/DAO_2021-31_Chemical-Control-Order-for-HFCs.pdf

Department of Environment and Natural Resources (2013, December 04). Administrative Order No. 2013-22. Retrieved from https://emb.gov.ph/wp-content/uploads/2018/06/dao-2013-22.pdf

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (2019). Refrigeration and Air Conditioning Greenhouse Gas Inventory for the Philippines. Retrieved from https://www.green-cooling-initiative.org/fileadmin/Publications/2019_C4_Inventory_Philippines.pdf

---

Eldridge, S. (2024). HVAC. In Science & Tech, Encyclopedia Britannica. https://www.britannica.com/technology/HVAC

IndustryArc, (2019). Philippines Air Conditioning Market Forecast (2024-2030). Retrieved from https://www.industryarc.com/Report/19051/philippines-air-conditioning-market

OEC World (2022). Refrigerators in the Philippines. Retrieved from https://oec.world/en/profile/bilateral-product/refrigerators/reporter/phl

Philippines' Kigali Amendment to the Montreal Protocol Ratification Enter into Force effective February 2, 2023. (2023, February 8). Department of Environment and Natural Resources (DENR). Retrieved May 29, 2024, from https://pod.emb.gov.ph/?p=1581

Philippine Statistics Authority (2023). 2021 Annual Survey of Philippine Business and Industry (ASPBI) - Manufacturing Section: Final Results. Retrieved from https://psa.gov.ph/statistics/manufacturing/aspbi

Philippine Statistics Authority (2024). Highlights of the Philippine Export and Import Statistics March 2024 (Preliminary). Retrieved from https://psa.gov.ph/statistics/export-import/monthly

Schleicher, T., Liu, R., Gröger, J., Heubes, J., & Radermacher, P. (2018). The Blue Angel for Stationary room Air conditioners–Market Analysis, Technical Developments and Regulatory Framework for Criteria Development: Background report. Environmental Research of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.

Statista. (2023). Air conditioning Demand in the Philippines. 2012-2022. Retrieved from https://www.statista.com/statistics/909967/philippines-ac-demand-units/

Statista. (2024). Air Conditioners - Philippines. Market Insights. Acquired from https://www.statista.com/outlook/cmo/household-appliances/major-appliances/air-conditioners/philippines

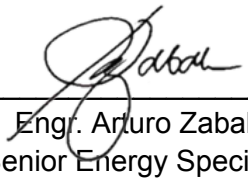
United Nations Environment Programme. (n.d.). About Montreal Protocol. Ozonaction. From, https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol

United Nations Environment Programme Ozone Secretariat (2018) Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee Assessment Report. Retrieved from https://ozone.unep.org/sites/default/files/2019-04/RTOC-assessment-report-2018_0.pdf

United Nations Framework Convention on Climate Change (2004). Information on Global Warming Potentials: Technical Paper. United Nations, Distr. General. [pdf download]. From https://unfccc.int/resource/docs/tp/tp0403.pdf

NATIONAL ECOLABELLING PROGRAMME - GREEN CHOICE PHILIPPINES
GCP 20250039 - Room Air Conditioners

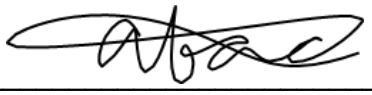
Signed by:



Engr. Arturo Zabala
Senior Energy Specialist
IIEC

Engr. Isagani Soriano
Chief Science Research Specialist
DOE- ERTLS

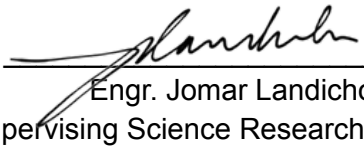
Engr. Daniel Vincent De Guzman
Science Research Specialist II
DOE-EUMB



Mr. Rolando Abad Jr.
Climate Change Specialist
DENR-CCS

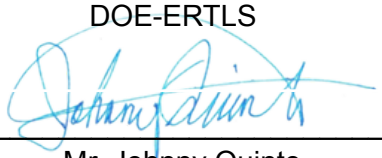
Mr. Gilbert Maximo
Sr Environmental Management Specialist
DENR-EMB-CMS

Mr. John Paulo Barbosa (†)
Senior Manager
PAIA

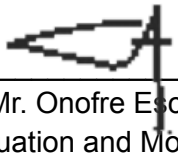


Engr. Jomar Landicho
Supervising Science Research Specialist
DOE-ERTLS

Engr. Avelino Molina Jr.
Sr. Trade Industry Development Specialist
DTI-BPS



Mr. Johnny Quinto
Consultant
Omni Solid Services



Mr. Onofre Escota
Project Evaluation and Monitoring Officer
DENR-POD