



Policy Report for the Philippines' Cold Chain Sector

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Global Partnership for Improving the Food Cold Chain in the Philippines

**Creating an Enabling Policy Environment for Sustainable and Climate-friendly
Cold Chains in the Philippines through Refrigerant and Energy Efficiency
Standards**

Table of Contents

Abbreviations	4
List of Tables and Figures.....	5
Introduction	6
Background of the project	6
Rationale.....	6
Objectives of the study.....	7
Cold chain industry: An overview	8
Cold Chain Industry: A look at its policy environment.....	9
<i>Pursuing the Montreal Protocol, Kigali Amendment and Sustainable Development Goals through Climate-friendly and Sustainable Cold Chains</i>	12
Cold Chain and GHG Emission Reduction Policies in the Philippines.....	14
Cold Chain International and National Standards	15
Philippine Cold Chain Industry Roadmap	17
International benchmarks for climate-friendly and sustainable cold chains	19
Towards sustainable and climate-friendly cold chains in the Philippines	25
Policy measures and support for adoption	26
References.....	28

Abbreviations

BFAR	Bureau of Fisheries and Aquatic Resources
BOI	Bureau of Investments
BPS	Bureau of Philippine Standards
COMI	Certificate of Meat Inspection
CFCs	Chlorofluorocarbons
CCAP	Cold Chain Association of the Philippines
CCI-Hub	Cold Chain Innovation Hub
CCLS	Cold Chain Logistics Services
CSW	Cold Storage Warehouses
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOE	Department of Energy
DOH	Department of Health
DOLE	Department of Labor and Employment
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
FAO	Food and Agriculture Organization
GCCA	Global Cold Chain Alliance
GWP	Global Warming Potential
GHG	Greenhouse Gas
HACCP	Hazard Analysis of Critical Control Points
HVAC	Heating, ventilation and air-conditioning
HFC	Hydrofluorocarbon
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
LGU	Local government unit
LFL	Lower Flammability Limit
MARINA	Maritime Industry Authority
MEPP	Minimum Energy Efficiency Performance for Products
MEPS	Minimum Energy Performance Standards
NCCAP	National Climate Change Action Plan
NC3	National Cold Chain Committee
NDC	Nationally Determined Contributions
NMIS	National Meat Inspection Service
ODS	Ozone-depleting substances
TESDA	Technical Education and Skills Development Authority
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization

List of Tables and Figures

Table 1. Cold Chain Business Models

Table 2. Regulations and Regulatory Instruments in the Philippine Tuna Industry

Table 3. Standards applicable for commercial and industrial refrigeration

Table 4. Published Philippine National Standards relevant for commercial and industrial refrigeration

Table 5. Implications of standards to the mandates of regulatory agencies

Table 6. Philippine Cold Chain Industry goals and action agenda

Table 7. Relevant energy efficiency regulations and programs in selected countries

Figure 1. Other standards relevant for commercial and industrial refrigeration

Introduction

Background of the project

The Global Partnership for Improving the Food Cold Chain in the Philippines (FCC) project aims to identify, develop and stimulate the application of low-carbon, energy efficient refrigeration innovation technologies and business practices in the Philippines, for use throughout the food cold chain whilst increasing food safety and security. It is implemented by the United Nations Industrial Development Organization (UNIDO), shecco, Department of Environment and Natural Resources (DENR) and Technical Education and Skills Development Authority (TESDA), with funding from the Global Environment Fund (GEF). The project components include: 1) Policy and Regulatory Assessment; 2) Awareness and Capacity Building; 3) Technology Transfer; and, 4) Monitoring and Evaluation.

As part of the project's Component 1, this paper has been done to scope and assess the policy landscape for low-GWP and energy efficient refrigeration systems.

Rationale

Refrigeration makes modern life convenient, but hundreds of millions of people in nations with the hottest climates do not have access to this service. A 2018 report ¹ has estimated that there are 470 million rural poor people worldwide who live in areas where farmers' produce leads to spoilage and vaccination rollouts cannot be done in clinics due to lack of refrigeration.

In agriculture, lack of refrigeration has compounding negative effects. The Food and Agriculture Organization (FAO) estimates that one third of all the food produced worldwide are lost and wasted², and this is greater among smallholder farmers in Africa and Asia where cold chain infrastructure is inadequate or non-existent. Cold chain refers to the food supply logistics chain that uses refrigeration technology to continuously maintain a suitable temperature and humidity environment for perishable products such as fruits, vegetables, dairy, meats, and fish (Mercier, et. Al., 2017). Thus, it is a system starting at post-harvest up until display at retail stores which includes pre-cooling, refrigerated transport, cold storage, food retail and food services.

Access to cold chains plays a significant role in inclusive economic development by prolonging the shelf life of agriculture produce from rural areas and linking them to a wider market, thereby, increasing the income of farmers and raising their quality of life. Aside from preventing food spoilage and losses, it also ensures the availability of buffer stocks in times of crisis or disasters.

It's worth to note though, that cold chains are also a substantial and growing contributor to climate change due to hydrofluorocarbon (HFC) use and high energy consumption. HFCs replaced chlorofluorocarbons (CFCs) as most used refrigerants due to the latter's ozone depleting potential which was addressed through the Montreal Protocol, however, they are considered "super Greenhouse Gases (GHGs)" that is up to 4000 times more potent than carbon dioxide when it comes to its Global Warming Potential (GWP).

¹ https://www.seforall.org/system/files/gather-content/SEforALL_CoolingForAll-Report.pdf

² <http://www.fao.org/platform-food-loss-waste/en/>

In 2016, the Kigali Amendment linked the HFC phaseout with climate action. It is expected to limit warming from HFCs from a baseline of 0.3–0.5°C to 0.06°C by 2100. A 2020 study³ cited that without the Kigali Amendment, HFC emissions would add the equivalent of an additional 78 to 90 gigatons of carbon dioxide in the atmosphere for all cooling sectors by 2050. This could set back the goal set by the Paris Agreement which seeks to limit warming to 1.5 degrees by mid-century. This should compel nations to ensure that cooling sectors, including the cold chain industry, will transition into more climate-friendly and energy efficient systems that do not add to global warming.

Developing climate-friendly and sustainable cold chains not only prevent emissions at source, but also the emissions due to food loss and waste. Approximately 1 gigatons of carbon dioxide in 2011 is attributable to insufficient cold chain infrastructure. The potential impact of improved cold chains could account for 19–21 gigatons of carbon dioxide of avoided emissions cumulatively through 2050.

The Philippines has a robust policy framework for climate action although implementation remains a challenge. The RA 9729 or the Climate Change Act of 2009 serves as its legislative framework providing for the development of the National Climate Change Action Plan (NCCAP) covering eight (8) priority areas including food security, water sufficiency, ecological and environmental stability, human security, climate-friendly industries and services, sustainable energy, and knowledge and capacity development. The country also communicated its Nationally Determined Contribution (NDC) in support of the Paris Agreement to curb global warming. To achieve its GHG reduction goal of 75% (2.71% unconditional and 72.29% conditional) by 2030, the Philippines' industries should be able to have a radical low-carbon transition.

Objectives of the study

The cold chain industry is crucial for a just transition towards a low carbon economy. Therefore, a coherent policy environment is vital as new low carbon innovations and technologies will be available in the market in the coming years. In this regard, this paper seeks to address the following question: *What policy measures can the government implement to provide an enabling environment to create sustainable and climate-friendly cold chain in the Philippines?* This will be done by:

- Understanding the status and projected demand of the cold chain industry
- Understanding energy efficiency and low-GWP potential of the cold chain industry
- Understanding existing policy measure and analyzing issues of each measure
- Analyzing possible policy measures and support for adoption
- Recommendations on low-GWP refrigerants and energy efficiency policies for the commercial and industrial refrigeration

³ Dreyfus, G., Borgford-Parnell, N., Christensen, J., Fahey, D.W., Motherway, B., Peters, T., Piccolotti, R., Shah, N., and Xu, Y. (2020) Assessment of climate and development benefits of efficient and climate-friendly cooling. Molina, M., and Zaelke, D., Steering Committee Co-Chairs. Available at: <https://ccacoalition.org/en/resources/assessment-climate-and-development-benefits-efficient-and-climate-friendly-cooling>

Cold chain industry: An overview

In 2018, the Global Cold Chain Alliance (GCCA) reported that the global total capacity of refrigerated warehouse was estimated to be 616 million cubic meters with India, the United States and China having the largest country markets with about 60% of the global total of refrigerated space⁴.

In the Philippines, an assessment conducted by the Cold Chain Innovation Hub (CCI-Hub) described that the cold chain infrastructure in the country are mostly owned by big companies, malls, supermarket and retail store chains⁵. The Cold Chain Association of the Philippines (CCAP) estimates that there are 500,000 pallet positions in the country; 320,000 of which are located in Luzon, and more than half of its capacity used to store meat and poultry. An additional 50,000 pallet spaces are expected to be commissioned in 2021 as food will continue to be the primary expenditure item in the coming months and demand for imported frozen meat will continue to increase in response to the country's limited supply.

There is no single law or government agency mandated to develop and regulate the cold chain industry. Policies often pertain to the components, purpose and location of the cold chain infrastructure. Since it is often used for agriculture products, accreditation of cold storage facilities are mostly done by the Department of Agriculture (DA) through its attached bureaus and agencies – the Bureau of Animal Industry (BAI), National Meat Inspection Service (NMIS) and Bureau of Fisheries and Aquatic Resources (BFAR). In terms of substances and energy performance used in its operations, the Department of Environment and Natural Resources (DENR), the Department of Energy (DOE) and the Department of Trade and Industry (DTI) through its Bureau of Philippine Standards (BPS) has respective regulations according to their agency's function.

In January 2021, the Department of Trade and Industry's (DTI) Bureau of Investments (BOI) released a summary of the Philippine Cold Chain Industry Roadmap which characterized the business models of major cold chain infrastructure operating in the country as follows.

Table 1. Cold Chain Business Models

Business Model	Equipped with	Main Features
Extensive Business Model	(a) Blast Freezers at -40°C (b) Cold Rooms at -20 °C to -25 °C (c) Chilled Rooms at 0°C (d) Air-Conditioned Rooms at 22 °C (e) Dry goods rooms at ambient temperature	<ul style="list-style-type: none"> • Ammonia and/or CFC compressors with standby diesel power generators. • Plugin service for reefer container trucks waiting to be unloaded. • Its power rate is estimated at 40-50% of operating cost. • Cold storage facilities are less vulnerable to the planned phase-out of CFCs by 2025. They can

⁴ <https://www.gcca.org/sites/default/files/2018%20GCCA%20Cold%20Storage%20Capacity%20Report%20final.pdf>

⁵ https://cci-hub.org/wp-content/uploads/2020/09/Evaluating-the-Philippines-Food-Cold-Chain-Energy-Efficiency-and-Environmental-Impact_Online.pdf

		always extend their ammonia system to the cold rooms running on CFCs.
Less Extensive Business Model	(a) Cold rooms at -18 °C to -27 °C (b) Chilled rooms at 0 to 4 °C (c) Dry goods rooms at ambient temperature	<ul style="list-style-type: none"> • Plug-in service for reefer container trucks waiting to be unloaded. • HFC compressors and ammonia/glycol system with stand-by diesel generators. • Power rate runs to only 35-40% of operating cost. • Panned phase-out of HFC refrigerants will not happen in the next 15 years.
Limited Business Model	(a) Cold Rooms at -20 °C to -25 °C (b) Dry goods rooms at ambient temperature	<ul style="list-style-type: none"> • Plug-in service for reefer container trucks waiting to be unloaded. • CFC compressors and stand-by diesel power generators. • Power rate runs to about 60% of operating cost. • Cold storage facilities face some challenges to the planned phase-out of CFCs by 2025⁶.

It also presented an assessment of the current challenges that needs to be addressed by its proposed strategies and actions. Among the constraints identified are: 1) Difficulty in complying with required documentation for accreditation; 2) High energy costs; 3) Unstable power supply; 4) Insufficient NMIS manpower (inspector); 5) Lack of coordination within government agencies involved in shipments.

Cold Chain Industry: A look at its policy environment

Since the cold chain industry is part of the food distribution system, there are several policies on food safety that it must also comply with. The Philippine Institute of Development Studies' paper entitled "Reducing Unnecessary Regulatory Burden: The Philippine Tuna Industry"⁷ released in 2017, provided a comprehensive review and assessment of the regulatory compliance of an industry that utilizes the cold chain, and found that:

⁶ According to DENR, CFCs were phased out in 2010. Source: <https://www.denr.gov.ph/index.php/news-events/press-releases/714-cimatu-ph-never-wavered-in-commitment-to-phase-out-ozone-depleting-chemicals>

⁷ https://serp-p.pids.gov.ph/publication_detail?id=5800

“the challenges mainly lie on the type and structure of the domestic regulations and on how those regulations are enforced. Enforcement of regulations is relatively inefficient because of the following reasons: (i) inadequate staffing on the side of the regulator; (ii) lack of proper and effective communication and consultation mechanism between regulators and regulated entities, (e.g., creating new regulations); (iii) inadequate understanding and appreciation of regulatory intent; and (iv) inconsistent application of regulations.” (Llanto, et. Al., 2017).

The following excerpt from the said study that lists the regulations that industry players must comply provides a picture of the entire regulatory framework for the cold chain industry that will have implications on alignment and harmonization.

Table 2. Regulations and Regulatory Instruments in the Philippine Tuna Industry

Regulation Instruments	Regulation	Description/Objectives	Regulator
Fishing Vessels, Freezer/Carrier Vessels, and Fishing Boats			
1. Certificate of Philippine Registry (CPR) and Certificate of Ownership (CO)	MC No. 2013-02	Rules that govern the registration and documentation of ships entitled to fly the Philippine flag	MARINA
2. Commercial Fishing Vessel/Gear License	FAO No. 198 s. 2000	License that allows a vessel to conduct fishing operations in Philippine waters	BFAR
3. Fishing Gear Registration	FAO No. 198 s. 2000	Fishing gear allowed in fishing operations in Philippine waters	BFAR
4. International Fishing Permit	FAO No. 198 s. 2000	International fishing permit and Certificate of Clearance that the fish caught by such registered vessels shall be considered as caught in Philippine waters and therefore, not subject to all import duties and taxes, and only when the same are landed in duly designated fish landings and fish ports in the Philippines.	BFAR
5. Fishworker's License	FAO No. 198 s. 2000	Permit to seek employment as fish worker or pearl diver	BFAR
6. Certificate of Eligibility	FAO No. 198 s. 2000	Certificate issued to a qualified commercial fishing vessel operator for tax and duty-exempt importation of fishing equipment and paraphernalia	BFAR
7. Clearance to Import Fishing Vessels	FAO No. 198 s. 2000	Approval needed prior to the importation of fishing vessels and the construction of new fishing vessels	BFAR
8. Certificate of Hazard Analysis of Critical Control Points (HACCP) Recognition/ Accreditation	FAO No. 212 s. 2001	Guidelines on the implementation of the Hazard Analysis Critical Control Point system	BFAR

9. Certificate of HACCP Approval, Certificate of Recognition for HACCP Implementation and Certificate of Inspection	FAO No. 212 s. 2001	Guidelines on the implementation of the Hazard Analysis Critical Control Point system	BFAR
Buying Stations/Auction Markets and Ice Plant and Cold Storage			
1. Certificate of Hazard Analysis of Critical Control Points (HACCP) Recognition/Accreditation	FAO No. 212 s. 2001	Guidelines on the implementation of the Hazard Analysis Critical Control Point system	BFAR
2. Certificate of HACCP Approval, Certificate of Recognition for HACCP Implementation and Certificate of Inspection	FAO No. 212 s. 2001	Guidelines on the implementation of the Hazard Analysis Critical Control Point system	BFAR
3. Cold Storage Warehouse Accreditation	AO No. 21 s. 2011 and AO No. 23 s. 2013	Mandatory Accreditation of Cold Storage Warehouse (CSW) for Agricultural and Fisheries Products	DA
Fish Processing Plants and Importer of Fresh/Chilled Fishery Products			
1. License to Operate	AO 2014-0029	Requirement to ensure food safety through the imposition of food quality standards that are aligned with the mandated issuances of regulatory agencies	FDA
2. Certificate of Product Registration (Medium and High Risk Food)	AO 2014-0029	Certificate to ensure food safety through the imposition of food quality standards that are aligned with the mandated issuances of regulatory agencies	FDA
3. Certificate of Hazard Analysis of Critical Control Points (HACCP) Recognition/Accreditation	FAO No. 212 s. 2001	Guidelines on the implementation of the Hazard Analysis Critical Control Point system	BFAR
4. Certificate of HACCP Approval, Certificate of Recognition for HACCP Implementation and Certificate of Inspection	FAO No. 212 s. 2001	Guidelines on the implementation of the Hazard Analysis Critical Control Point system	BFAR
5. SPS Clearance to Import Fresh/Frozen/Chilled Fishery Products (Old Clients)	FAO no. 195 s. 1999 and 195-1 s. 2003	Rules and regulations governing the importation of fresh/chilled/ frozen fish and fishery/aquatic products to ensure food safety on imported fish and fishery/aquatic products	BFAR
6. SPS Clearance to Import Fresh/Frozen /Chilled Fishery Products (New Applicants)	FAO no. 195 s. 1999 and 195-1 s. 2003	Rules and regulations governing the importation of fresh/chilled/ frozen fish and fishery/aquatic products to ensure food safety on imported fish and fishery/aquatic products	BFAR

7. Inspection and Clearance of Imported/Incoming Fish and Fishery Products via the MDA/NAIA	FAO no. 195 s. 1999 and 195-1 s. 2003	Rules and regulations governing the importation of fresh/chilled/ frozen fish and fishery/aquatic products to ensure food safety on imported fish and fishery/aquatic products	BFAR
8. Chemical and Microbiological Testing	FAO no. 213 s. 2001	Establishment and maintenance of BFAR's quality control laboratories and collection of fees and charges for examination services	BFAR
Exporters of Fish and Fishery Products			
1. SPS/HC for Accredited Exporters to International Markets	FAO no. 228, s. 2008	Rules and regulations governing the organization and implementation of official controls on fishery and aquatic products intended for export to the EU market for human consumption	BFAR
2. Export Permit for Fresh/Frozen/Chilled Fishery Products (New Applicants)	FAO no. 210 s. 2001	Rules and regulations on the exportation of fresh, chilled or frozen fish and fishery/aquatic products	BFAR
3. Export Permit for Fresh/Frozen/Chilled Fishery Products (Old Clients)	FAO no. 210 s. 2001	Rules and regulations on the exportation of fresh, chilled or frozen fish and fishery/aquatic products	BFAR
4. Export Commodity Clearance	FAO no. 210 s. 2001	Rules and regulation on the exportation of fresh, chilled or frozen fish and fishery/aquatic products	BFAR
5. Clearance for Outgoing Fish and Fishery Products Via the MDA/NAIA	FAO no. 210 s. 2001	ules and regulation on the exportation of fresh, chilled or frozen fish and fishery/aquatic products	BFAR

Source: Reducing Unnecessary Regulatory Burden: The Philippine Tuna Industry, Llanto, et. Al., 2017

Aside from tedious requirements, cold chain industry regulators have not been able to adopt actions to cut down its emissions. As an industry that produces high levels of GHG through its energy intensive operations and refrigerant use prone to leakage without proper disposal, a comprehensive and unified policy environment addressing these issues should be implemented by all regulatory agencies concerned.

Pursuing the Montreal Protocol, Kigali Amendment and Sustainable Development Goals through Climate-friendly and Sustainable Cold Chains

The Philippines pursues global Sustainable Development Goals through the Ambisyon Natin 2040, the national government's long-term development strategy. For the short to medium term (2017-2022), key SDG targets have been embedded in the Philippine Development Plan. The Partnership Framework for Sustainable Development signed between the Philippine Government

and the United Nations, also identified key outcomes and focus areas to achieve goals under pillars of “people, prosperity and planet”.

As a member of the Conference of Parties that ratified the Paris Agreement, the Philippines has ongoing efforts to firm up its nationally determined contributions (NDC) as part of the global effort to stabilize GHG concentrations in the atmosphere. The Philippines’ share of GHG emission is a small fraction comprising an approximate of 0.39%⁸ of the overall total. However, it bears the brunt of climate change impacts, as an island nation with high vulnerability. It ranks second among countries most affected by climate change in terms fatalities and economic losses⁹. The NDC seeks to strike a balance between mitigation and adaptation, with *common but differentiated responsibilities*, equity, fair share, and climate justice at its core.

The Philippines, together with 197 nations, supports the Kigali Amendment to phase down the production and consumption of HFCs following various schedules. As part of the A5 list, the Philippines is expected to implement the phase down starting 2024, gradually reducing consumption from 2029 to 20245. The Philippine Ozone Desk of the Department of Environment and Natural Resources (DENR) facilitates the implementation of the Montreal Protocol, and the ratification of the Kigali Amendment. In 2021, the Department of Foreign Affairs has started the ratification process of the Kigali Amendment.

Although the country has a robust legal framework for climate action lauded by the UN as among the best in the world¹⁰, alignment and harmonization have always been a challenge. With a tripartite, decentralized government system, a law is subject to be implemented by executive agencies, of which most have a regulatory mandate. Local government units (LGUs) also have a major role in ensuring regulatory compliance of entities within their jurisdiction. Nevertheless, the country continues to improve its climate governance by exploring synergies and inter-agency collaborations to deliver its targets and commitments. Thus, it supports the transition of the Montreal Protocol towards climate action through the 2016 Kigali Amendment which seeks to limit the use of substances with high Global Warming Potential (GWP) including HFCs. This is envisioned to create more synergy among government agencies mandated to implement the NDC targets and the HFC phasedown.

Development of inclusive and climate-friendly cold chains will be a realization of these international agreements, as *“meeting cooling demand with far more efficient solutions creates a direct intersect between three internationally agreed goals for the first time: the Paris Agreement; the Sustainable Development Goals; and the Montreal Protocol’s Kigali Amendment, which calls for major reductions in production and use of high-GWP hydrofluorocarbons (HFCs).”* (Sustainable Energy for All)¹¹

Improving access to energy-efficient and climate-friendly refrigeration through enhanced cold chains would deliver more economic, environmental, and health benefits through reduced food loss and waste. It helps the country achieve SDG goals on food security through reduced food loss and availability of fresh and nutritious food and produce, especially for people in urban centers. It also contributes to addressing social inequality by linking the rural food producers to a

⁸ Hannah Ritchie and Max Roser (2020) - "CO₂ and Greenhouse Gas Emissions". Published online at OurWorldInData.org. Retrieved from: '<https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>' [Online Resource]

⁹ https://germanwatch.org/sites/germanwatch.org/files/2019-12/climate_risk_index_2020_table_1999-2018.jpg

¹⁰ <https://globalnation.inquirer.net/35695/un-lauds-philippines-climate-change-laws-world-s-best>

¹¹ https://www.seforall.org/system/files/gather-content/SEforALL_CoolingForAll-Report.pdf

wider market and increasing their income and quality of life. It also helps in achieving goals on health, especially with the vaccination rollout needed to address the Covid-19 pandemic.

Cold Chain and GHG Emission Reduction Policies in the Philippines

According to the United Nations Environment Programme (UNEP), more than 80% of the global impact of RACHP (Refrigeration, Air Conditioning and Heat Pumps) systems is associated with the indirect emissions of electricity generation to drive the cooling appliances (UNEP TEAP, 2017a). Cold chains, including commercial, industrial and mobile refrigeration systems, are among the most energy intensive sectors worldwide. The most commonly operated component of the cold chain are retail stores that have a sales area of 10 m² to 20,000 m² using commercial refrigeration systems with a temperature ranging from 0°C for fresh food and beverages, to -18°C for frozen food such as meat and ice cream. According to a study¹² 35%–45% of the total electricity consumption of a typical supermarket is used for refrigeration, and around 70% of this refrigeration energy is used to store and display frozen and chilled food products at suitable temperatures (Alzuwaid et al., 2016). This empathizes the importance of energy efficient refrigeration systems in cold chain combined with low-GWP refrigerants in driving down emissions from this growing sector. Moreover, energy efficiency in cold chains should be addressed using a holistic approach to maximize all energy savings opportunities, reduce costs for end users, and to reduce environmental impacts.

UNEP has also identified policy instruments that would reduce CO₂ emissions which includes minimum energy efficiency performance standards applied through national regulation; use of renewable energy sources; better energy management related to smart grid technologies, adoption and enforcement of policies aiming to reduce refrigerant emissions through ban on venting and other measures; and, environmentally sound end-of-life procedures in response to the growing demand of national and regional regulations.

In the Philippines, the National Climate Change Action Plan (NCCAP) serves as the blueprint for climate adaptation/mitigation and GHG reductions reflecting priority thematic areas including food security, and climate smart industries. In terms of food security, the NCCAP highlights the importance of climate smart agriculture but it fails to account the value chain needs that will link the agricultural products to urban centers. This disconnect reflect how the logistics and food cold chain sector has been neglected over the years and how the country's climate efforts across sectors need to be harmonized.

Laws have been enacted to drive the shift towards renewable energy and energy and energy efficiency. One is the RA 9513, also known as the Renewable Energy Act of 2008, which aims to accelerate the exploration and development of renewable energy resources through the provision of incentives such as tax holidays for carbon credits, reduced income tax, and tax reduction for equipment purchase. It also provides for the implementation of a feed-in-tariff (FIT) system which guarantees a stable price for the sale of renewable energy into the national grid, among others. Another landmark legislation is the RA 11285 - An Act Institutionalizing Energy Efficiency And Conservation, Enhancing The Efficient Use Of Energy, And Granting Incentives To Energy Efficiency And Conservation Projects was enacted in 2019. It provides for setting energy efficiency targets for establishments with high energy consumption classified as Designated Establishments 1 and 2. It also provides for minimum energy performance standards for transport

¹² <https://www.sciencedirect.com/science/article/abs/pii/S0306261916310285?via%3Dihub>

and appliances, as well the key sectors in the country. Under this law, energy efficiency projects may avail incentives, such as tax and duty free importation and income tax holiday.

In addition, the DENR issued a policy, DAO 2021-31, controlling the importation of HFCs aligned with the Kigali Amendment’s scheduled phasedown. Provisions of these laws supports the shift of the cold chain industry to decrease its direct and indirect GHG emissions, whilst providing energy savings and lesser cost to end users. At the national level, these measures are envisioned to contribute significantly to the country’s nationally determined contribution (NDC) targets.

Cold Chain International and National Standards

To promote climate-friendly cold chains aligned with the goals of the Montreal Protocol and Kigali Amendment, the Philippines need to shift to low GWP refrigerants such as natural refrigerants (e.g. CO₂, ammonia and hydrocarbons). However, these present safety issues that need to be addressed through safety standards. Current international standards have been restrictive on the use of hydrocarbons and ammonia due to their flammability, but to align with the goals of the Kigali Amendment these are under review and are set to be updated. Nevertheless, updated charge limits of said refrigerants need to be optimized to ensure safety without compromising energy efficiency.

Standards may be classified as either “general” (horizontal) or “product” (vertical). Product standards should take precedence over general standards, if the former is available. Countries may mandate compliance to standards through legislation, otherwise, it is voluntary.

With regards to the cold chain sector, the International Standardization Organization (ISO) and the International Electrotechnical Commission (IEC) are two international standardization bodies that publish relevant safety standards. In Europe, the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) publish such standards at the regional level. Most countries adopt ISO and IEC standards as national standards as is, or with country specific modifications. The following table provides an overview of standards applicable to the cold chain sector.

Table 3. Standards applicable for commercial and industrial refrigeration

Sector	Vertical (Product Standards)	Horizontal (Group Standards)
	IEC 60335-2-89	ISO 5149-1,-2,-3,-4
	EN 60335-2-89	EN 378-1,-2,-3,-4
Commercial refrigeration	x	x
Industrial systems		x
Transport refrigeration		x
Chillers		x

Source: "International Safety Standards in Air Conditioning, Refrigeration & Heat Pump", Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

There are other relevant safety standards that may affect the cost and convenience of using natural refrigerants which includes:

Figure 1. Other standards relevant for commercial and industrial refrigeration

- General safety of compressors and pumps (e.g., IEC 60225-2-34, EN 809, IEC 60204-1, EN 1012, EN 12693)
- Pressure safety of system vessels and components (e.g. ISO 4126, EN 1736, EN 12178, EN 12263, EN 12284, EN 13136, EN 13445, EN 14276)
- Tightness of components and connections (e.g. ISO 14903, EN 16084) n Competence of personnel (e.g. EN 13313)
- Electromagnetic compatibility (e.g. EN 61000-series)
- General safety of machinery (e.g. ISO 12100, EN ISO 13849-1)
- Risk assessment of equipment using flammable gases (e.g. EN 1127-1) n Safety characteristics of refrigerants (e.g. ISO 817, IEC 60079-20-1)
- Gas detection (e.g. EN 14624, IEC 60079-29-series, EN 50402)
- Classification of hazardous areas (e.g. EN 60079-10-1)
- Electrical equipment for use in potentially flammable areas (e.g. IEC 60079-0, IEC 60079-1, IEC 60079-2, IEC 60079-5, IEC 60079-6, IEC 60079-7, IEC 60079-11, IEC 60079-13, IEC 60079-14, IEC 60079-15, IEC 60079-17, IEC 60079-18, IEC 60079-19, IEC 60079-25, IEC 60079-26, IEC 60079-32, IEC 60079-33)

Source: "International Safety Standards in Air Conditioning, Refrigeration & Heat Pump", Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

In the Philippines, the Bureau of Philippine Standards (BPS) of the Department of Trade and Industry serves as the national standards body. Some standards are mandatory, but often they are treated as reference for policies or safety codes implemented by regulating agencies. Standards also serves as reference for compliance, accreditation and certification. The following table presents relevant cold chain standards published by the BPS.

Table 4. Published Philippine National Standards relevant for commercial and industrial refrigeration

Standard	Description	ISO published
PNS ISO 817	Refrigerants - Designation system and safety classification	2014
PNS ISO 5149-1	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Definitions, classification and selection criteria	2014; with Amd1: 2015
PNS ISO 5149-2	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation	2014
PNS ISO 5149-3	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site	2014
PNS ISO 5149-4	Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery	2014
IEC 60335-2-89	Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant unit or compressor	2015

Source: Standards Development for the Safe Introduction of Low Global Warming Potential (GWP) Alternatives in the Refrigeration and Air Conditioning (RAC) Sector in the Philippines, GIZ

The abovementioned standards may have implications with the mandates of the following regulatory agencies:

Table 5. Implications of standards to the mandates of regulatory agencies

Standards	Regulatory Agencies
ISO 817	Philippine Ozone Desk, Environmental Management Bureau, DENR Bureau of Philippine Standards, DTI Occupational Health and Safety Center, DOLE Occupational Prevention and Control Bureau, DOH Oil Industry Management Bureau, DOE
ISO 5149-1	Bureau of Fire Protection, DILG Bureau of Design, DPWH Occupational Health and Safety Center, DOLE
ISO 5149-2	Bureau of Philippine Standards, DTI Metals Industry Research and Development Center, DOST Bureau of Fire Protection, DILG Bureau of Design, DPWH Occupational Health and Safety Center, DOLE
ISO 5149-3	Technical Education and Skills Development Authority Environmental Management Bureau, DENR Fair Trade Enforcement Bureau, DTI Technical Services, DPWH Occupational Health and Safety Center, DOLE
ISO 5149-3	Technical Education and Skills Development Authority Environmental Management Bureau, DENR Fair Trade Enforcement Bureau, DTI Technical Services, DPWH Occupational Health and Safety Center, DOLE

Adoption of the PNS standards into the respective policies of the said regulatory agencies would require a review and update of existing policies and codes. Harmonization of policies within the cold chain may be ensured by the newly formed National Cold Chain Committee (NC3) whose membership comprises of various regulatory agencies and stakeholder association. The Board of Investment serves as the secretariat of the NC3.

Philippine Cold Chain Industry Roadmap

In 2021, the Board of Investments launched the National Cold Chain Industry Roadmap which also established the National Cold Chain Committee, an inter-agency and multi-sectoral body tasked to implement and monitor the said Roadmap. This recent development is deemed an opportunity for industry regulators to simplify, align and update its policies.

The mission of the Philippine Cold Chain Industry Roadmap is “A cohesive, functional and collaborative network of cold chain stakeholders imbued with the highest operating principles and standards, compliant with government policies and regulations, and responsive to the needs of the Filipinos”. It also identified the following goals and action agenda.

Table 6. Philippine Cold Chain Industry goals and action agenda

Industry goals	Action Agenda
<p>1) An organized Cold Chain Industry with synergistic partnership among all stakeholders working in unison for the good of all.</p> <p>2) A strong logistics provider (transports, ports, and road networks) to implement continuous cold chain protocol in transit and handling</p> <p>3) Availability of more efficient, skilled and fairly-compensated labor force – experienced refrigeration technicians and engineers, and skilled manpower on heating, ventilation and air-conditioning (HVAC), driver, NMIS inspector.</p> <p>4) Favorable government and public support that would encourage increase in investments in the cold chain industry towards countryside development that will generate jobs and help alleviate poverty and improve the lives of the Filipinos.</p> <p>5) Increase awareness on food safety</p>	<p>1) Investments in cold chain facilities</p> <ul style="list-style-type: none"> - Established cold storage warehouses (CSWs) - Established rendering facilities - Investment in renewable energy i.e. solar power plants, and generators <p>2) Investments in cold chain logistics</p> <ul style="list-style-type: none"> - Established cold chain logistics services (CCLS) – reefer trucks, container vans, plug-ins - Improved road network and new access roads - Upgraded internet connectivity <p>3) Demand enhancement – increase demand for cold chain services</p> <ul style="list-style-type: none"> - Broadened cold chain service availability - Increased value-added services - Strong hold of current markets and market development <p>4) Food safety education</p> <ul style="list-style-type: none"> - Increased awareness in food safety <p>5) Policies and regulations</p> <ul style="list-style-type: none"> - Policy on delivery time - Compliance on accreditation (CSWs, CCLS) - On time issuance of Certificate of Meat Inspection (COMI) - Improve industry data and information access - Others <ul style="list-style-type: none"> - Availability of reliable energy supply - Strict implementation of import policies - LGU regulations in cold chain investments - Investment in slaughterhouses

International benchmarks for climate-friendly and sustainable cold chains

Many countries have initiated policy measures to enable the entry of low GWP refrigerants into the market as a step to phase down HFCs and make cold chains more sustainable. This could serve as a reference for other countries that aims to prepare for the shift to low GWP refrigerants in light of the Kigali Amendment's scheduled phase down of HFCs.

The United States' Environmental Protection Agency (EPA) implements the Significant New Alternatives Policy (SNAP) by virtue of Section 612 of its Clean Air Act. It seeks to identify and evaluate substitutes for ozone-depleting substances (ODS) by assessing the overall risks to human health and the environment of existing and new substitutes. It also publishes lists, promotes the use of acceptable substances, and provides the public with information regarding acceptable substitutes.

*"The SNAP program does not provide a static list of alternatives but instead, evolves the list as EPA makes decisions that are informed by its overall understanding of the environmental and human health impacts as well as its current knowledge about available substitutes. Section 612 also provides that EPA must prohibit the use of a substitute where EPA has determined that there are other available substitutes that pose less overall risk to human health and the environment."*¹³
(EPA website)

Due to its flammability and safety issues, adoption of low-GWP refrigerants is restricted by current policies. However, the SNAP sets a good example for a policy measure that enables the adoption of low-GWP refrigerant systems at par with the speed of ongoing innovations and new technologies.

India's strategy presents a more holistic approach reflected in their national cooling plan which serves as a blueprint for the sustainable transition of all their cooling sectors. The directions stated in the plan are grouped as short-, medium- and long-term recommendations which would shape government priorities. For the cold chain sector, these include the following:

- Link the incentives being provided for development of cold-chain infrastructure with adoption of energy-efficient design, construction and maintenance practices and low GWP refrigerant and renewable technologies
- Develop Management Information System through inter-ministerial collaboration, to track relevant information on infrastructure development and e-performance monitoring to improve overall efficiency of the cold-chain system.
- Development of safety standards for flammable and toxic refrigerants for cold storage and other segments of the cold chain
- Provide capacity building for technicians with national level certification schemes. Training should cover aspects such as installation and maintenance of refrigeration plant, energy efficient operation, and safe installation, management and recycling of equipment and refrigerant.

The most important element of India's national cooling plan pertaining to cold chains is the intent to link the incentives for energy efficient design and low-GWP refrigerant technology. In the

¹³ <https://www.epa.gov/snap/overview-snap>

Philippines, there are incentives provided for energy efficiency but linking that with low-GWP refrigerant technology has yet to be realized. Although the Philippines is one step ahead in the development of a management information systems which is being implemented by the NC3. This initiative spearheaded by the BOI is envisioned to have B2B functions for cold storage operators and users, as well as monitoring functions for planning, investment programming and policy making for cold chain regulatory agencies.

In Australia and New Zealand, the AS/NZS 60335.2.89:2020 standard for commercial refrigerating appliances was adopted in 2020. This is identical to the IEC 60335-2-89 published by the International Electrotechnical Commission in June 2019 which raised the charge limit for A3 (flammable) refrigerants in self-contained cases to 13 times the lower flammability limit (LFL) of the refrigerant) which increased the charge limit for propane from 150g to 500g. This is an important milestone for the entry of low-GWP natural refrigerants in the market.

Adoption of the latest version of the IEC 60335-2-89 will open opportunities for the Philippine cold chain industry to advance the shift to low-GWP refrigerants which will allow more savings and better return on investments.

Table 7. Relevant energy efficiency regulations and programs in selected countries

Countries/ Continents	Regulations and Programs
EU	<ul style="list-style-type: none"> • Energy Efficiency Directive establishes a framework of measures mainly to ensure that the EU's 2020 and 2030 energy efficiency targets are met, including energy efficiency in cooling sector. • Renewable Energy Directive sets a target of 32% energy from renewable sources at EU level for 2030. Encouraging use of renewable energy sources in cooling sector. • Governance Regulation defines how member states will cooperate both with each other and with the European Commission to reach the ambitious objectives of the Energy Union, including the renewable energy targets, the energy efficiency targets, and the GHG emissions goals⁸. • Commission Delegated Regulation (EU) 2019/826 focuses on comprehensive assessments of the potential for efficient heating and cooling. • EU Heating and Cooling Strategy provides a framework for integrating efficient heating and cooling into EU energy policies. It focuses action on stopping the energy leakage from buildings, maximizing the efficiency and sustainability of heating and cooling systems, supporting efficiency in industry and reaping the benefits of integrating heating and cooling into the electricity system. The Strategy includes five main initiatives: 1) Making renovating buildings easier; 2) Integrating electricity systems with heating and cooling systems; 3) Increasing the share of renewables; 4) Reusing energy waste from industries; 5) Getting consumers and industries involved. It relies on the EU member states' accountabilities to put it into practice. Under the guidance of the

	<p>strategy, each nation issued their own policies and regulations to ensure the realization of the targets. ¹⁴</p> <ul style="list-style-type: none"> • Fluorinated gases (F-gas) Regulation (No 517/2014) limits the total amount of the most important F-gases sold in the EU from 2015 onwards and phases them down in steps to one-fifth of 2014 sales in 2030, bans the use of F-gases in many new types of equipment where less harmful alternatives are widely available, prevents emissions of F-gases from existing equipment by requiring checks, proper servicing and recovery of the gases at the end of the equipment's life, and requires a quota for producers and importers placing at least 100 tonnes of CO2 equivalent of HFCs in bulk on the market in a calendar year. • Mobile Air Conditioning (MAC) Directive aims to reduce emissions of F-gas from mobile air-conditioning systems. It introduces a gradual ban on these gases in passenger cars. F-gases with a global warming potential higher than 150 is not allowed to be used in MAC systems. • The European Commission is currently reviewing the F-gas Regulation and planning to propose changes to the regulation by the end of 2021. The changes will incorporate policy options in line with the European Green Deal and European Climate Law, and aim to comply with recent international obligations on HFCs under the Montreal Protocol¹⁵.
US	<ul style="list-style-type: none"> • Energy Policy and Conservation Act (EPCA) is to increase energy production and supply, reduce energy demand, provide energy efficiency, and ensure energy security. It established the Energy Conservation Program for Consumer Products that gives the Department of Energy the authority to develop, revise, and implement minimum energy conservation standards for appliances and equipment including small, large, and very large air-cooled commercial package air conditioning¹⁶. • The Clean Air Act (CAA) is a comprehensive law that regulates air emissions from stationary and mobile sources, including Ozone-Depleting Substances (ODS) refrigerants (including CFCs and HCFCs) and their substitutes (such as HFCs). • Significant New Alternatives Policy (SNAP), a program under CAA, identifies and evaluates substitutes for ODS to reduce overall risk to human health and the environment. <p>California</p> <ul style="list-style-type: none"> • California's Building Energy Benchmarking Program mandates owners of commercial and multifamily buildings to report energy use to the state annually. • California's Home Energy Rating System (HERS) tests and rates the energy performance of a home to addresses construction defects and poor equipment including HVAC systems.

¹⁴ <https://ec.europa.eu/energy/en/topics/energy-efficiency/heating-and-cooling>

¹⁵ European Commission. EU legislation to control F-gases. https://ec.europa.eu/clima/policies/f-gas/legislation_en

¹⁶ <https://www.congress.gov/bill/94th-congress/senate-bill/622>

	<ul style="list-style-type: none"> • California’s Energy Conservation Assistance Act (ECAA) offers two loan programs for energy efficiency and energy generation projects, with one at zero-interest rate and another at 1%. • The California Energy Commission (CEC) is responsible for developing the Appliance Energy Efficiency Standards. Being updated frequently over years, these standards have become the most stringent energy efficient standards in the US. Central/noncentral air conditioners and refrigeration products are regulated by the standards. To be sold or offered for sale in California it is the responsibility of appliance manufacturers to test them at CEC-approved laboratories and receive third-party certification. Once certified, manufacturers are required to submit their documentation and data to the CEC to be uploaded into the agency’s online Modernized Appliance Efficiency Database System (MAEDS). • California’s Senate Bill 1383 requires the state to reduce HFC emissions by 40% below 2013 levels by 2030. • California Senate Bill 1013 (a.k.a California Cooling Act) prohibits manufacturers from selling equipment or products that use prohibited HFCs after their respective prohibition dates and establishes an incentive program for encouraging low-GWP refrigerants. • California Air Resources Board (CARB)’s HFC Regulation prohibits the use of high-GWP refrigerants in new and retrofit stationary refrigeration equipment. • CARB new regulation proposal sets the most stringent HFC refrigerant regulations by banning the use of: greenhouse gas refrigerants with a GWP \geq 750 in new residential/commercial air conditioning starting in 2023, sale or installation of new systems containing refrigerants with a GWP \geq 150 starting in 2022, and sale, distribution, or import for use in California of new refrigerants (not reclaimed or recycled from other systems) with a GWP \geq 1500 starting in 2022. • California Air Resources Board (CARB) recently adopted new regulations to minimize emissions of super pollutant HFC refrigerants in a variety of industries that use cooling equipment, including supermarkets and air conditioners. New approved rules are: 1) The 750 GWP limits will be pushed back to 2025 for new residential and commercial air conditioning; 2) All California retailers with a refrigeration system containing over 50 lbs of refrigerant will have to comply with one of two new options by 2030: a) reduce company-wide average refrigerant GWP to 1400, or b) reduce their baseline refrigerant GHG potential by 55%; 3) Larger businesses with at least 20 stores will have an interim target to achieve by 2026. • CARB launched the F-Gas Reduction Incentive Program (FRIP) to promote the adoption of new refrigerant technologies in stationary refrigeration, air conditioning, and other end-uses. The California Cooling Act (SB 1013) authorized the FRIP program to address higher upfront costs associated with converting to lower GWP refrigerants. The first FRIP grants would cover a portion of the cost of installing new or upgrading existing supermarket and grocery store commercial systems with new refrigerants of much lower GWP, as well as the introduction of new refrigeration technologies. Funding for FRIP comes from the California Climate Investments program. 50% percent of the FRIP
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	<p>projects will be located in low-income and disadvantaged communities¹⁷.</p> <ul style="list-style-type: none"> • CARB is implementing a new Refrigerant Recovery, Recycle, and Reuse (R4) Program, which requires that manufacturers shipping new equipment for use in California must calculate the projected refrigerant charge of that equipment for the years 2023 and 2024. Under the program, it's required that AC manufacturers recycle 10% of R410 refrigerant recovered from old equipment¹⁸. <p>Other states</p> <ul style="list-style-type: none"> • Washington, New Jersey, Colorado, New York, Vermont, Massachusetts, Maryland, and Virginia (these are states in the US Climate Alliance) have all passed to implement SNAP Rules 20 and 21¹⁹. Start dates differ by state. • Virginia Air Pollution Control Board approved a final regulation prohibiting the use of certain HFCs in specific end uses on April 23, 2021. The regulation will come into effect on June 1, 2021²⁰. • The Delaware Department of Natural Resources and Environmental Control announced a new rule to phase down HFCs will publish in the state's register on March 1. The new regulation, to be effective on September 1, 2021, establishes a schedule for the state to phase down specific HFCs used in air conditioning/refrigeration equipment, aerosols and foams²¹.
Australia	<ul style="list-style-type: none"> • The National Energy Productivity Plan (NEPP) is a package of measures to improve Australia's energy productivity by 40% between 2015 and 2030. In Australia, energy efficiency is dealt together with economic growth under the concept of energy productivity. The National Framework for Energy Efficiency, a main mechanism by which all governments in Australia coordinate national action on energy efficiency and delivers a range of policy measures. • National Strategy on Energy Efficiency (NSEE) is to accelerate energy efficiency efforts, streamline roles and responsibilities across levels of governments, and encourage and support innovation in energy efficient technologies. • The Greenhouse and Energy Minimum Standard (GEMS) Act established national legislation to regulate energy efficiency and labeling standards and set mandatory minimum efficiency requirements for appliances and equipment including cooling equipment.

¹⁷ California Air Resources Board (CARB), 2021. New CARB investment program awards first \$1 million for large, cutting-edge refrigeration systems <https://ww2.arb.ca.gov/news/new-carb-investment-program-awards-first-1-million-large-cutting-edge-refrigeration-systems>

¹⁸ 13J.R. Turpin, 2021. HFC Phasedown Regulations Take Shape. Available at: <https://www.achrnews.com/articles/144652-hfc-phasedown-regulations-take-shape>

¹⁹ The US Climate Alliance. <http://www.usclimatealliance.org/recent-leadership/tag/HFCs>

²⁰ Virginia Department of Environmental Quality, 2021. State Air Pollution Control Board Approves Phase Out of HFCs in Virginia. <https://www.deq.virginia.gov/Home/Components/News/News/90/16>

²¹ DELAWARE NEWS, 2021. New Regulation Requirements Aimed at Reducing Greenhouse Gas Emissions Effective Sept. 1. <https://news.delaware.gov/2021/02/26/new-regulation-requirements-aimed-at-reducing-greenhouse-gas-emissions-effective-sept-1/>

	<ul style="list-style-type: none"> • The Heating, Ventilation and Air-Conditioning High Efficiency Systems Strategy, a ten-year strategy under NSEE to drive long-term improvements in energy efficiency of HVAC systems nationwide. The goal of the Strategy is to deliver reductions in annual greenhouse emissions of four million tonnes and energy savings of around \$350 million per annum. It has been designed to addresses many non-technical barriers to efficiency and create the environment in which energy efficiency gains are valued, measurable and sustainable while identifying and promoting highly efficient technical solutions and systems optimization processes. The Strategy also takes a whole life perspective in targeting HVAC efficiency improvement, encompassing the design, manufacture, installation, operation and maintenance stages of the HVAC lifecycle²².
Japan	<ul style="list-style-type: none"> • The Act on the Rational Use of Energy is the foundation of Japans' energy efficiency and conservation policies. It went through a series of major revisions in 1993, 1998, 2002, 2005, 2008, 2013 and 2018, with regulations strengthened each time. It has created energy efficiency standards for equipment and appliances, such as vehicles, refrigerators and air conditioners. • The Top-Runner Program is a regulatory standard program targeting the improvement of energy efficiency of electrical appliances, including air conditioners and refrigerators. A target standard is set at the weighted-average energy efficiency of each manufacturer's and importer's shipment to achieve the level of the most energy-efficient model in each category of the current market²³. On a regular basis, the government test all the products currently available in a category, determine the most efficient model, and make that model's level of efficiency the new baseline. Manufacturers have the obligation to make efforts to achieve the new baseline within four to eight years²⁴. The regulator can disclose the companies that fail to meet the targets, as well as issue recommendations, orders and fines. This drives companies to avoid negative publicity²⁵. • Ozone Layer Protection Law to fulfill obligation to Montreal Protocol and phase down the production and consumption of HFCs as required by Kigali Amendment • Fluorocarbons Recovery and Destruction Law to limit emissions of fluorocarbons by providing guidance for recovery and destruction of these substances • The Act on Rational Use and Proper Management of Fluorocarbons to implement comprehensive measures throughout the life cycle of fluorocarbons from production to destruction • Two major initiatives for the period 2018-2022 to promote technologies of low-GWP refrigerant and equipment, including Development Project on the Next Generation Refrigeration and Air Conditioning Technologies and Assessment Methods and Project on Accelerate

²² <https://www.energy.gov.au/government-priorities/energy-productivity-and-energy-efficiency>

²³ International Energy Agency, 2017. <https://www.iea.org/policies/573-act-on-the-rational-use-of-energy-energy-efficiency-act>

²⁴ <https://sustainabledevelopment.un.org/partnership/?p=2020>

²⁵ <https://www.futurepolicy.org/ecologically-intelligent-design/japans-top-runner-programme/>

	<p>Introduction of Energy Saving-Type Natural Refrigerant Equipment to Build Fluorocarbon-Free and Low Carbon Society</p> <ul style="list-style-type: none"> • Japan is further strengthening the obligations of equipment managers by providing financial assistance to accelerate implementation of a strengthened system introduced under the Revised Act on Rational Use and Proper Management of Fluorocarbons in 2019²⁶. • Later in 2019, Japan launched the Fluorocarbons Life Cycle Management Initiative to properly dispose of fluorocarbons. The initiative was joined by other countries as well as international organizations including the World Bank²⁷.
South Korea	<ul style="list-style-type: none"> • Third Energy Master Plan that established a national energy blue print up to 2040 with the first and foremost task being to innovate the energy consumption structure through energy efficiency improvement • Energy Efficiency Label & Standard Program, High Efficiency Equipment Certification Program, and e-Standby Program, a series of energy labelling and standard programs adopted to increase energy efficiency of equipment and appliance that include ones for cooling.

Source: Bo Shen, Feng An, Jingliang Chen, Yu Liu, et. Al., Developing a Climate-Friendly Cooling Sector through Market and Financing Innovation, Asian Development Bank

Towards sustainable and climate-friendly cold chains in the Philippines

Creating sustainable and climate-friendly cold chains is a goal that cuts across sectors. Policy measures should reflect the various aspects of the cold chain and ensure the optimal use of resources in a manner that multiplies social, economic and environmental benefits of the industry. To have this holistic approach, it is essential to ensure that actions leading to sustainable and climate-friendly cold chain development are reflected in the Philippine Development Plan. Firming up the country’s NDC by specifying baselines and targets will also lead to identifying strategic actions that will attain the GHG reduction goals communicated to the United Nations Framework Convention on Climate Change (UNFCCC). An assessment and update of the NCCAP, as well as development of a national cooling plan, will complement efforts to ensure that the cold chain industry will develop aligned with country’s climate and SDG agenda. Developing appropriate standards and policy measures are key to jumpstart the cold chain industry’s shift to low-GWP and energy efficient systems.

The country has to anticipate the forthcoming phasedown of HFCs and the transition to low-GWP refrigerant technologies in the development and adoption of standards. As international standardization bodies such as ISO and IEC publish updates on their respective standards, BPS may initiate the process of updating the country’s national standards to adopt its modifications. Furthermore, cold chain regulatory agencies should also update their respective policies, guidelines and accreditation requirements to reflect the newer versions of standards published by the BPS.

²⁶ Ministry of the Environment, n.d. 2021 Work Plan for the Initiative on Fluorocarbons Life Cycle Management. Available at: https://www.env.go.jp/earth/ozone/fluorocarbon_initiative/attach/%28EN%29%202021%20Work%20Plan%20for%20the%20IFL_clean.pdf

²⁷ 22 IEA, 2020. IEA: additional efforts on cooling needed to reduce buildings-related emissions. <https://coolcoalition.org/iea-additional-efforts-on-cooling-needed-to-reduce-buildings-related-emissions/>

In terms of energy efficiency, there is already legislative framework that supports the adoption and mainstreaming of energy efficient technologies in major industries including the cold chain. Rule 11, Section 55 of the Implementing Rules and Regulations of RA 11258 provides for the development of minimum energy performance standards (MEPS) for commercial, industrial and transport sectors which could be developed in collaboration with the cold chain industry, together with minimum energy efficiency performance for products (MEPP).

Incentives for energy efficiency projects may also be linked with low-GWP refrigerant technologies through the Republic Act (RA) No. 11534, otherwise known as the Corporate Recovery and Tax Incentives for Enterprises (CREATE) Act. This law seeks to amend several provisions in the old Tax Code, with a central focus on lowering corporate income tax rates and rationalizing fiscal incentives to better attract local and foreign investments in the Philippines.

The Philippine Cold Chain Industry Roadmap is a timely and very relevant development which has the potential to harmonize existing policies and programs of all cold chain regulatory agencies through the NC3. In terms of its action agenda, it can also explore the inclusion of environmental management aspect (e.g. disposal/capture/recycling of refrigerants), ensuring subsidies for low-GWP and energy efficient technologies and exploring synergies with national climate change action plan, nationally determined contribution (NDC) targets, national cooling plan.

Policy measures and support for adoption

1) Standards for low-GWP refrigerants

- *Updating of PNS IEC 60335-2-89 version 3.0*
- *Support for adoption of the PNS IEC 60335-2-89 version 3.0 in accreditation processes of cold storage facilities*

Standards need to be updated to align with the anticipated phasedown of HFCs and with the available technology in the market. As the national standards body, BPS should be able to adopt IEC 60335-2-89 version 3.0. This is done by a technical panel including industry experts and stakeholders. Once reviewed and approved by the panel, the standard is published as a Philippine National Standard which serves as a basis for other regulations.

Once published, regulatory agencies may conduct a review of their respective cold chain accreditation process and incorporate the updates within their respective administrative guidelines and requirements. One example is the issuance of the Environmental Compliance Certificate by the DENR subject to its Environmental Impact Assessment (EIA) policy. DENR may conduct a review of the guidelines required for cold chain facilities and adjust their requirements according to the provisions of IEC 60335-2-89, particularly on the increase in charge limits of flammable natura refrigerants.

2) Energy efficiency

- *Minimum energy performance standards (MEPS) for the cold chain industry*
- *Minimum energy efficiency performance for products (MEPP)*

EUMB should explore the development of minimum energy performance standards with other cold chain regulatory agencies. The National Cold Chain Committee has already provided a venue for this type of inter-agency collaboration; thus, it can be tapped for the development of the MEPS.

As provided by the Energy Efficiency and Conservation Act, a cost-benefit analysis must be undertaken to determine the appropriate level of energy efficiency to be targeted by the cold chain industry. The cost-benefit analysis should be able to explain the nuances of industrial, commercial and transport refrigeration energy efficiency options. It should also present GHG reduction and industry growth scenarios for the industry to aid the policy makers in decision making. This should also be complemented by an institutional and political assessment which will look into how the MEPS will be implemented considering the mandates of agencies. It will also look into capacity needs in terms of knowledge, expertise, equipment and other resources for energy efficiency testing. Presently, the DOE has a testing laboratory for household refrigeration appliances. The assessment should be able to explore what investments are required for operationalizing energy efficiency standards for the cold chain industry.

3) *Other policy instruments*

- *Incentives for energy efficiency projects may also be linked with low-GWP refrigerant technologies through the CREATE Law*
- *Inclusion of environmental management aspect (e.g. disposal/capture/recycling of refrigerants), ensuring subsidies for low-GWP and energy efficient technologies in the Philippine Cold Chain Industry Roadmap*
- *Exploring synergies with national climate change action plan, nationally determined contribution (NDC) targets, national cooling plan*

Aside from refrigerant and energy efficiency standards, there are other policy instruments that may be pursued in order to create more sustainable and climate-friendly cold chains. One is the granting of incentives that links low-GWP refrigerant and energy efficiency. This may be done under Republic Act (RA) No. 11534, otherwise known as the Corporate Recovery and Tax Incentives for Enterprises (CREATE) Act which grants incentives to 'green' projects.

To further minimize direct emissions of the cold chain industry, it is important to prioritize policies on disposal, capture and recycling of refrigerants. DENR should be able to identify and establish programs that will implement schemes on environmental management of refrigerants.

It will also be beneficial to align sustainable and climate-friendly cold chain strategies with the national climate change action plan, nationally determined contribution (NDC) targets and national cooling plan to ensure its mainstreaming into national action plans, programs and budgets.

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Standards Development for the Safe Introduction of Low Global Warming Potential (GWP) Alternatives in the Refrigeration and Air Conditioning (RAC) Sector in the Philippines, GIZ