

Training Program for Fluorocarbons Life-cycle Management and High Energy Efficiency non-Fluorocarbons Appliances

Organized by the Ministry of the Environment, Japan

Handled by the Overseas Environmental Cooperation Center, Japan, Institute for Global Reduction of Fluorocarbons and other GHG Emissions, and EX Research Institute Ltd.

1. Background and purpose

In today's world, the cooling sector, especially in the developing countries, are rapidly growing along with the establishment of cold chains, due to improvements in quality of life, health condition, and food security. In recently published "Cooling Emissions and Policy Synthesis Report" of IEA/UNEP, it is pointed out that seventeen per cent of world's entire electricity is consumed in the cooling sector and that refrigerants used for recharging existing appliances are three times more than refrigerants used to pre-charge new appliances.

In the cooling sector, not only conversion of refrigerants is required by the Kigali Amendment, but also life-cycle management of fluorocarbons is needed, including energy efficiency achieved by high efficiency appliances. Currently, the emission of HCFCs and CFCs is around 1 billion CO₂ equivalent tons per year, and the emission of HFCs will increase from 900 million CO₂ equivalent tons to 2 billion CO₂ equivalent tons in year 2030 despite the effort by all nations to meet the Kigali Amendment's requirements. In the developing countries, measures to prevent leakage during usage and measures to recover and destroy/reclaim refrigerant from retired appliances are not adequate, and there is a good possibility of large-scale emission into atmosphere. Moreover, these developing countries must meet the Kigali Amendment's requirements in the midst of the cooling sector's rapid growth. As a result, the cooling sector might not function at all unless high efficiency appliances will be prevailed and unless proper prevention of leakage and proper recovery of used refrigerants are in place.

Japan has many technologies, such as high energy efficiency appliances (non-fluorocarbons or low GWP refrigerant) and remote-controlled leakage detection system effective to both prevention of leakage and energy efficiency. And Japan has adopted and improved life-cycle management of fluorocarbons, including collection, reclamation and destruction since 1990s. The measures to prevent leakage and the measures to collect and reclaim/destroy fluorocarbons have been updated to reflect the actual circumstance of usage and distribution routes of home appliance, automobile air-conditioners and commercial appliances. In addition, Japan launched the Initiative on Fluorocarbons

Life Cycle Management (IFL) at the 25th Conference of the Parties to the UNFCCC in 2019.

The purpose of this training program is to enhance understanding of life-cycle management of fluorocarbons and high-efficiency appliances, by sharing Japanese experiences and technology information and to contribute to fluorocarbons' emission reduction in Asia by incorporating these knowledges into future actions of the participating countries.

2. Expected participants

Government officers and industry stakeholders in Cambodia, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Viet Nam.

3. Training format

Originally, 2-day training in Japan was planned; however, due to the spread of COVID-19, three of 3 hours online training sessions are planned for this year's program.

4. Schedule of 3 sessions

First session will take place on January 7, 2021, Thursday 15:00-18:00 (JST)

Second session will take place on February 24, 2021, Wednesday 15:00-18:00 (JST)

Third session will take place on March 2, 2021 Tuesday 15:00-18:00 (JST)

Times are the same for all 3 sessions:

Cambodia (ICT) 13:00-16:00

Indonesia (WIB) 13:00-16:00

Malaysia (MYT) 14:00-17:00

The Philippines (PST) 14:00-17:00

Sri Lanka (SLST) 11:30-14:30

Thailand (ICT) 13:00-16:00

Viet Nam (ICT) 13:00-16:00

5. Details of Training

This training program consists of lectures, discussions, and introductory videos.

Objectives of this fiscal year's training program is as follows:

1. To understand the difference between the developing country's existing system and Japanese system by learning Japanese regulatory framework, such as Act on Rational Use and Proper Management of Fluorocarbons.
2. With understanding of No.1, to formulate measures to prevent leakage, to recover and reclaim/destroy fluorocarbons, and to properly manage temperature, which are the pre-

- conditions for introduction of high-efficiency and low-GWP appliances.
3. After No.1 and No.2, to formulate a future action plan (starting from next fiscal year) for each country through discussion among the participants.
 4. To increase policy and technological knowledge by communicating with each country officers and industry stakeholders and to make the most of this opportunity to increase cooperation among participating countries (under IFL)

Updated Curriculum

	Contents	Presenters
First session: January 7, 2021, Thursday (3 hours)		
(1)	Welcome remark from the Ministry of the Environment, Japan 5mins	- <u>Mr. Hiroshi TSUJIHARA</u> , Director for International Strategy on Climate Change, Ministry of the Environment, Japan (MOEJ)
(2)	Training objectives and orientation 10 mins Self-introduction of participants 10 mins	- <u>Mr. Makoto KATO</u> , Member, Board of Directors, Overseas Environmental Cooperation Center (OECC)
(3)	<u>Lecture</u> : Global Trend of the Cooling Sector & Fluorocarbons and significance of the emission reduction in the developing countries (keynote address) 25 mins (including 5 mins Q&As)	- <u>Mr. Toshihiko KASAI</u> , President, Institute for Global Reduction of Fluorocarbons and other GHG Emissions
(4)	<u>Lecture</u> : Introduction of the Initiative on Fluorocarbons Life Cycle Management and regulatory experiences in Japan 25 mins (including 5 mins Q&As)	- <u>Ms. Yurie OSAWA</u> , Deputy Director, Office of Fluorocarbon Control Policy, Ministry of the Environment, Japan
(5)	<u>Lecture</u> : Prospect of the achievement of the Montreal Protocol's objectives by six Asian countries 25 mins(including 5 minutes Q&As)	- <u>Mr. Masanori KOBAYASHI</u> , Director, New Energy and Industrial Technology Development Organization (NEDO)
(6)	<u>Presentation</u> : Introduction of current status and activities for fluorocarbons management in the participating countries Viet Nam, Philippines, Cambodia, Sri Lanka <i>Other countries may observe in this session and consider presentation in later sessions.</i>	- Representatives of participating countries
(7)	Q&As and Discussion 20 mins	All participants

Conduct bilateral communications and initiate coaching on the action plans of the participating countries between first and second sessions.		
Second session: February 24, 2021 (3 hours)		
(1)	<u>Lecture</u> : Overview of fluorocarbons management from upstream to downstream and menu of control measures 20mins	- <u>Mr. Makoto Kato, OECC</u>
(2)	Lecture: Incentivizing fluorocarbon management – experiences with Japan’s green purchase scheme 20 mins	- <u>Mr. Sanshiro Maehama, INTAGE Research Inc.</u>
(3)	<u>Introduction to technologies (video)</u> : High efficiency non-fluorocarbons refrigeration appliances Questions and answers 20 mins	- MAYEKAWA MFG. CO., LTD (MYCOM)
(4)	<u>Introduction to technologies (video)</u> : High efficiency lower GWP air-conditioning appliances Questions and answers 20 mins	- DAIKIN INDUSTRIES, LTD.
(5)	<u>Introduction to technologies (video)</u> : Appropriate recovery and reclamation of fluorocarbons refrigerants from refrigerators and air conditioners Questions and answers 20 mins	- TAIYO SHOJI co., ltd.
(6)	<u>Introduction to technologies (video)</u> : Leakage detection system Questions and answers 20 mins	- NANBA CO., LTD.
(7)	Discussion and networking between participating countries and Japanese technology experts and industries 60 mins	- Participating countries - Technology experts and industries from Japan
Conduct coaching on the action plans of the participating countries between second and third sessions if necessary		

Third session: March 2, 2021 (3 hours)		
(1)	<u>Lecture</u> : overview of the past two sessions	- Mr. Makoto Kato, OECC
(2)	<u>Discussion 1</u> : Discussion on the action plans of the participating countries created between the sessions and on the details of the plan for year 2021 40 mins (10 mins x 4 countries) + 20 mins	- Representatives of participating countries - Facilitator: Mr. Makoto Kato, OECC - Mr. Toshihiko Kasai, President of Institute for Global Reduction of Fluorocarbons and other GHG Emissions
(3)	<u>Lecture</u> : Introduction of methodology to compile emission amount by using leakage reports from installers, ledger recording of collectors, issuance of confirmation slips, and report to the governors 30 mins	- Mr. Shiro Kasai Japan Association of Refrigeration and Air-Conditioning Contractors (JARAC)
(4)	<u>Discussion 2</u> : Discussion on the action plans of the participating countries created between the sessions and on the details of the plan for year 2021 30 mins (10 mins x 3 countries) + 20 mins	- Representatives of participating countries - Facilitator: Mr. Makoto Kato, OECC - Mr. Toshihiko Kasai, President of Institute for Global Reduction of Fluorocarbons and other GHG Emissions
(5)	Summary of the training 20 mins	- OECC

6. Future Plan

In order to share the progress of each country's action plan and to continuously enhance understanding of life-cycle management of fluorocarbons including High Efficiency Appliances introduction, an annual training program is proposed. Government officers and relevant industry stakeholders will be invited to Japan to attend a 2-day training program in FY2021. Follow-up activity of each country's action plan is also planned prior to the training program.

7. Reference:

First Session

(1) Training objectives

Importance of the Cooling Sector in the counter measures to the global warming is increasing due to its large emission potential and electricity consumption. The objectives of this training program are to contribute to future actions of preventing emissions in the participating countries by examining Japanese emission controlling measures to prevent leakage, to collect and reclaim/destroy fluorocarbons, and to properly manage temperature, which are the pre-conditions for introduction of high-efficiency and low-GWP appliances into markets.

(2) Global Trend of the Cooling Sector and Fluorocarbons and significance of the emission reduction in the developing countries (Keynote address)

The report of IPCC and the Secretariat of the Montreal Protocol states that one third of the entire world emission comes from other than energy-origin and that the emission of CFCs and HCFCs is 1 billion CO₂ equivalent tons per year outside of UNFCCC counting, and if HFCs are counted, the emission will be 2.5 billion CO₂ equivalent tons per year, which is more than 8 hundred million CO₂ equivalent tons from ships traveling overseas, or 6 hundred million CO₂ equivalent tons from international airplanes, and no international measure has been taken. Taken these facts under consideration, significance of reduction in the developing countries is emphasized by showing the trend of fluorocarbons destruction amount in Japan, the large emission from the servicing sector pointed out by the IEA/UNEP report, the fact that the cooling sector accounts for 17% of total electricity consumption, and the relationship between leakage and energy efficiency. It is still possible to estimate the reduction potential since there should be import data of CFCs and HCFCs, and the measures to prevent the emission of CFCs and HCFCs is the same measures to prevent the emission of HFCs.

(3) Introduction of the Initiative on Fluorocarbons Life Cycle Management and regulatory experiences in Japan

The background of the Initiative on Fluorocarbons Life Cycle Management (IFL), merits to join IFL, the progress of the policy dialogue between Japan and Viet Nam, and Fluorocarbons destruction projects under the Joint Crediting Mechanism (JCM) will be introduced. Regarding the development of regulatory framework in Japan, first, the Home Appliance Recycling Law was enacted to deal with ferrous metal waste, in which recovery of fluorocarbons from disposed home refrigeration and air-conditioning appliances is required. Then, Fluorocarbon Recovery and Destruction Law was established for commercial refrigeration and air-conditioning appliances and automobile ACs. It defined the roles of collectors and destructors. And the way to share costs. Regarding commercial appliances, it is defined that the collectors could charge the recovery cost to the owners of commercial refrigeration and air-conditioning appliances. In addition, End-of-life Vehicle Recycling Law was

enacted, and it defines not only the recycling of the End-of-life vehicles but also refrigerants in these vehicles. As a result, the part of automobile ACs of Fluorocarbons Recovery and Destruction Law moved to End-of-life Vehicle Recycling Law. Afterwards, these laws have been amended gradually to incorporate controlling slip system to manage the process after the disposal of commercial refrigeration and AC appliances, to reinforce measures to prevent leakage during the usage, to promote replacement with lower GWP appliances, and to introduce a system to ensure recovering fluorocarbons from building demolitions. The participating countries in IFL have a possibility to leap upward while Japan spent 20 years to build such systems.

(4) Prospect of the achievement of the Montreal Protocol's objectives by six Asian countries

The study of 6 Asian countries (Thailand, Indonesia, Malaysia, Viet Nam, the Philippines and Cambodia) by New Energy and Industrial Technology Development Organization (NEDO) in 2019 will be introduced. The study conducted a future estimation of refrigerants demand in these countries and produced policy suggestions.

(5) Introduction of current status and activities for fluorocarbons management in the participating countries

Participants will introduce current status and activities for fluorocarbons management in their countries with prepared country presentations. In advance, questionnaire is distributed to compare each country's situation

Second Session

The second session consists of Introductory videos of high-efficiency/non-fluorocarbons products and technologies.

(1) High efficiency non-fluorocarbons refrigeration appliances

Introduction of appliances that uses ammonia and CO₂ as refrigerants.

(2) High efficiency air-conditioning appliances

Energy efficiency of AC appliances is achieved both by proper temperature management with inverter controllers and by reduction of electricity usage with proper temperature management of AC appliances.

(3) Remote management system for air-conditioning appliances

(4) Leakage detection system

Introduction of leakage detection systems utilizing IoT technology to repair quickly.

<Coaching on the action plans of the participating countries between sessions>

Consultants will conduct a coaching on the action plans by showing an action plan example, including implementation of awareness-raising seminars and training for industry stakeholders, study on actual emission situation, preparatory survey on regulatory framework, preparation for enactment of laws and regulations, implementation of demonstration projects, etc.

If any country wishes to know more about recovery, reclamation, and destruction of fluorocarbons, information will be provided.

Draft program for introduction of products and technologies between 2nd and 3rd session

Introduction of products and technologies:

- (1) Fluorocarbons recovery: recovery from room ACs after pump-down
- (2) Fluorocarbons recovery: recovery from the building before demolition
- (3) Reclamation of fluorocarbons
- (4) Fluorocarbons destruction: facilities especially designed for fluorocarbons
- (5) Fluorocarbons destruction: treatment at cement kilns
- (6) Fluorocarbons destruction: treatment at waste incinerators

Third Session

(1) Introduction of methodology to compile emission amount by using leakage reports from installers, ledger recording of collectors, issuance of confirmation slips, and report to the governors

Introduction of Japanese system, in which relevant stakeholders report transaction amounts of fluorocarbons and cross-check with each other. Each collector keeps records on ledger; however, integration of reporting and utilization of IoT technology will make it possible to simplify the current reporting practices.

(2) Discussion on the action plans of the participating countries created between the sessions and on the details of the plan for year 2021