

# Policies to Limit Emission of HFCs, PFCs, and SF6 in Japan

May 31, 2002

## *Introduction*

The Japanese Government developed the new “Guideline for Measures to Prevent Global Warming”, which presents a whole picture of measures to be taken in a wide variety of sectors to ensure achievement of the 6% reduction commitment under the Kyoto Protocol, on March 19, 2002. The Guideline also sets concrete goals for each sector.

Emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) are predicted to increase to 107 MT CO<sub>2</sub> eq in 2010 on the business as usual basis mainly because they are used as substitutes for ozone depleting substances (ODSs). The Guideline sets a target to limit emissions of those three gases up to around 73 MT CO<sub>2</sub> eq by reducing 34 MT CO<sub>2</sub> eq through various measures. The following summarizes basic principles and concrete measures to limit emissions of HFCs, PFCs and SF6 in accordance with the Guideline.

## *Basic Principles*

Basic principles with regard to measures to reduce emissions of greenhouse gases in general are included in the Guideline: consideration of both the environment and economy, step-by-step approach, combined effort by all the parties concerned and international coordination. Whereas those general policies are applicable to measures to limit HFCs, PFCs and SF6, there are several basic principles specific to those fluorinated gases as follows.

### **1. Harmonization with Ozone Layer Protection Policy**

Japan has been implementing phase out of consumption and production of the ODSs according to the schedule under the Montreal Protocol, in order to protect the ozone layer. HFCs are essential as one of the major substitutes for ODSs. So, when taking measures to limit emissions of HFCs for the purpose of preventing global warming, it is necessary to harmonize them with the ozone layer protection policy in

order not to impede phase-out of ODSs.

## **2. Importance of R&D of Substitutes and Alternative Technologies**

HFCs, PFCs and SF6 are indispensable in various industrial processes. Unless substitutes or alternative technologies are available, they have no choice but to continue using HFCs, PFCs and SF6. In this regard, it is necessary to continue R&D of substitutes and alternative technologies for the fundamental resolution.

## **3. Recognizing Widely Varying Emission Processes and Sources**

HFCs, PFCs and SF6 are used for various purposes, and are emitted through such a wide variety of processes as production of these gases, manufacture of equipment containing these gases, and use and disposal of equipment. Furthermore, not only industrial sectors but also households are involved in the emission process. It is necessary to adopt suitable measures taking account of each widely varying process and source.

## **4. Consideration of Comprehensive Energy Efficiency**

In order to minimize net impact on climate change, it is necessary to take into account not only direct emissions of HFCs, PFCs and SF6, but also indirect emissions, e.g., CO2 emissions associated with energy consumption during all life cycle processes of greenhouse gases and equipment using them, through manufacture, use, and disposal, based on the idea of TEWI (Total Equivalent Warming Impact) and LCCP (Life Cycle Climate Performance).

## **5. Responsible Use Principles**

In order to minimize emissions of HFCs, PFCs and SF6, responsible use principles should be promoted.

They include:

- select those gases for applications where they provide safety, energy efficiency and benefit in view of environment, economy and health;
- minimize emissions throughout the life cycle from production of gases to disposal of equipment by such means as improved containment, recovery and destruction; and
- select the compound with the minimal GWP that still meets the application requirements.

## **6. Long-term Perspective, Including the Second Commitment Period**

HFCs, PFCs and SF<sub>6</sub> are emitted not only during manufacture of these gases, but also throughout their lifecycle over a long time, particularly when they are used as refrigerant or foam blowing agent. Accordingly, there may be a significant time lag between the policy making and the reduction of emissions as its result. In this regard, it is necessary to have long-term perspective taking account of the second commitment period when making policies to limit emissions.

## **7. International Collaboration**

Some industry sectors have voluntarily taken worldwide coordinated actions to limit emissions of HFCs, PFCs and SF<sub>6</sub>. A good example is the agreement by the World Semiconductor Council, which set a voluntary emission reduction target for the semiconductor sector. Considering that business is border-less in terms of trade and investment, international collaboration by industry sectors on a voluntary basis will be one of the ways to effectively limit emissions of HFCs, PFCs and SF<sub>6</sub> without distortion of competition.

### *Measures which have been implemented*

Japan has been implementing various measures to limit emissions of HFCs, PFCs and SF<sub>6</sub> through close cooperation between the government and industry since the Kyoto Protocol was adopted in 1997. As a result of the measures, Japan successfully reduced emissions of those gases by 26.2 percent from 48.2 million tons CO<sub>2</sub> eq. in 1995 to 35.6 million tons CO<sub>2</sub> eq. in 2000. Measures, which have been implemented, are as follows.

## **1. Voluntary Action Plans of Industries**

In April 1998, nineteen industrial associations in ten industrial sectors<sup>1</sup> developed voluntary action plans to limit emissions of HFCs, PFCs and SF<sub>6</sub> in accordance with the guidelines issued by the Ministry of International Trade and Industry (MITI). Since then, the progress in implementation of these plans has been monitored by the Industrial Structure Council of Ministry of Economy Trade and Industry (METI<sup>The present name of MITI</sup>). Details of those plans are shown in the 1999 submission of Japan (FCC/SBSTA/1999/MISC.6 /Add.1/Paper No.1).

Low interest treasury loan and tax incentives are available to some of measures taken by industries.

## **2. Research and Development**

METI and other institutes have been conducting various research and development programs in close cooperation with industries, which includes research of alternative substances and development of technologies of HFC recovery and destruction.

### *Future policies and measures*

Although emissions of HFCs, PFCs and SF<sub>6</sub> have been decreased so far, they are expected to increase with full scale conversion from ODSs to HFCs and PFCs in accordance with the schedule of Montreal Protocol. In order to ensure the achievement of 34 million tons CO<sub>2</sub>-eq. reduction in emissions, Japan will take further measures in addition to the present measures in the future.

### **1. Promotion of Voluntary Plans of Industries**

The Industrial Structure Council of METI will encourage industries to further improve their voluntary plans through annual follow-up of their implementation in terms of their transparency, accountability and effectiveness. The Council also stressed the need for involvement of more companies to existing voluntary plans as well as development of a voluntary action plan by industrial associations concerned which have not yet developed one.

The METI is considering how to strengthen support measures for industries that make investments in R&D or plant and equipment to limit emissions of HFCs, PFCs and SF6.

## **2. Research and Development of Substitutes, Alternative Technologies and Recovery and Destruction technologies**

The METI and other institutes will continue to conduct following R&D programs in cooperation with industry.

- ? Development of new refrigerants, cleaning solvents and blowing agent harmonious with global environment
- ? Research and development of alternative substances to PFCs used as etching gases in the manufacturing process of electronic devices, and alternative technologies
- ? Research and development of semiconductor CVD chamber cleaning systems for electronic device

manufacturing using new alternative gas instead of SF6 and PFCs

?Development of technologies to synthesize alternative substances with effective use of energy

?Development of technologies to recycle or incinerate fluorinated substances economically with a compact equipment

????Development of effective insulating foams without using high GWP gases

## **3. Information Dissemination of Products Using Alternative Substances**

?The Government will, having considered practical availability in terms of safety, economy and energy efficiency, provide information and promote public awareness of products using alternative substances or products using HFCs, PFCs or SF6 compound with less impact on global warming.

## **4. Mandatory Recovery of Refrigerant HFCs at Disposal of Equipment**

? ?Recovery of refrigerant fluorocarbons at disposal equipment was implemented by voluntary initiatives by related industries and local governments in the past. However, mandatory recovery systems have been introduced by recent legislation.

One is the Law for Recycling of Specified Home Appliances, which has been enforced since April

2001. This law requires manufacturers of such home appliances as refrigerators and air conditionings to recycle the end-of –use appliances and to recover CFCs, HCFCs and HFCs as refrigerants.

The other is the Fluorocarbons Recovery and Destruction Law. The law requires end-users of commercial refrigerators, chillers and air conditionings to have refrigerant CFCs, HCFCs and HFCs recovered by licensed recovery operators since April 2001. Furthermore, end-users of mobile air conditionings will be required by the law, to have their conditionings collected by licensed operators and accordingly to have CFC or HFC refrigerants recovered by licensed recovery operators after October 2002. Recovered fluorocarbons will be destroyed by licensed operators, or will be reused.

<sup>1</sup> Japan Fluorocarbon Manufacturers Association, Japan Chemical Industry Association, Association of Polyurethane Form Industry, Japan Urethane Raw Materials Association, Japan Phenolic Foam Association, Extruded Polyurethane Foam Industry Association, High Expanded Polyethylene Foam Industry Association, Aerosol Industry Association of Japan, Japan Automobile Manufacturers Association, Inc., Japan Auto Parts Industries Association, Japan Automobile Dealers Association, Japan Used Car Dealers Association, Japan Automobile Importers Association, The Japan Refrigeration and Air Conditioning Industry Association, Japan Association of Refrigeration & Air-Conditioning Contractors, Japan Vending Machine Manufacturers Association, The Japan Electrical Manufacturers' Association, Japan Electronics and Information Technology Industries Association, The Federation of Electric Power Companies