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EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Seventy-ninth Meeting  
Bangkok, 3-7 July 2017

**Addendum****KEY ASPECTS RELATED TO HFC-23 BY-PRODUCT CONTROL TECHNOLOGIES  
(DECISION 78/5)**

This document is being issued to:

- **Add** the following paragraphs to Annex III

9. Subsequent to the issuance of document UNEP/OzL.Pro/ExCom/79/48, the Secretariat received additional information from the Governments of Germany, India and the Republic of Korea in response to decision 78/5(d).

Information provided by the Government of Germany

10. A total of 8,118.19 mt of HCFC-22 were produced in 2016 for feedstock at a large production site and a small amount was used in a laboratory for research purposes. The amount of HFC-23 by-product generated by the site is considered confidential; the generated quantity is destroyed at a nearby high-temperature cracking plant. Emissions from this destruction are estimated at less than 50 kg/year.

11. The Government of Germany drew attention to information on research<sup>1</sup> conducted in China on an economically viable process, distillation-pressure swing adsorption, to concentrate HFC-23 by-product in the vent gas of an HCFC-22 production facility to 99.999 per cent purity. Information was also provided on an industrial demonstration plant in Germany with 500 mt capacity that can depolymerize fluoropolymers (like polytetrafluoroethylene) back to monomers as new feedstock material, resulting in a reduction in the amount of HCFC-22 that is needed as feedstock for production. The project proponents indicate<sup>2</sup> that this process can significantly reduce energy consumption, minimize the generation of unwanted by-product, and close the fluorine cycle.

<sup>1</sup> <http://pubs.acs.org/doi/pdf/10.1021/acs.iecr.6b03701>.

<sup>2</sup> <https://www.invertec-ev.de/en/projects/environmental-care/ptfe-recycling>.

Information provided by the Government of India

12. India is the second largest HCFC-22 producer in the world with six production lines at five enterprises. One of those lines only produces HCFC-22 for feedstock uses. Total production of HCFC-22 in 2015 was 53,314 mt, with an estimated HFC-23 by-product generation of 1,674 mt (3.13 per cent generation rate). Each production line is equipped with an HFC-23 destruction facility as reflected in Table 1.

**Table 1. HCFC-22 production facilities and HFC-23 by-product generation in India**

Enterprise	HCFC-22 production (mt)	HFC-23 generation (mt)	Lines	HFC-23 destruction facility
Chemplast Sanmar Limited	752.51		1	1
SRF Limited	10,447.47		1	1
Navin Fluorine International Limited	8,350.06		1	1
Gujarat Fluorocarbon Limited	32,576.00		2	2
Hindustan Fluorocarbons Limited	1,207.70		1	1
<b>Total</b>	<b>53,333.73</b>	<b>1,674</b>	<b>6</b>	<b>6</b>

13. Five production lines were funded to destroy HFC-23 under the Clean Development Mechanism (CDM). Currently HCFC-22 producers are destroying HFC-23 at their own cost.

14. The Government of India issued an order on 13 October 2016<sup>3</sup> noting that the production of HCFC-22 for feedstock use will continue beyond 2030, and directing the five HCFC-22 producers and any other producers that may be covered by the on-going or anticipated phase-out management plan for the accelerated phase-out of HCFCs to take the following measures urgently and immediately:

- (a) To destroy HFC-23 produced as a by-product of HCFC-22 through incineration using an efficient and proven technology such as thermal oxidation;
- (b) To ensure proper upkeep and maintenance of HFC-23 incineration facility so that their down time is maintained below 10 per cent;
- (c) To create and maintain sufficient storage capacity to ensure that all HFC-23 is stored during any authorized shutdown, so that no venting occurs. Under no circumstances HFC-23 shall be vented in the atmosphere;
- (d) When reporting the production of ODS under Ozone Depleting Substances rules 2000, to certify the amounts of HFC-23 that were incinerated, used as a feedstock or used for any other purpose on an annual basis;
- (e) HFC-23 maybe used as feedstock for production of other chemicals; and
- (f) The State Pollution Control Boards shall ensure compliance with the order while renewing Consent to Operate to the producers or through their regular inspections; additionally, the Central Pollution Control Board shall also ensure compliance with the order.

15. In terms of India's approach to management of HFC-23, the Government noted the urgency to develop a sustainable, environmentally friendly approach to mitigating HFC-23 by-product on a long-term basis, and highlighted the pitfalls of previous approaches, including the potential for perverse incentives. The Government is of the view that HFC-23 should be controlled through incineration by the producers of HCFC-22 on their own cost as a negative environmental externality both in non-Article 5 and Article 5 countries.

<sup>3</sup> Order F. No. 10/29/2014-OC.

Information provided by the Government of the Republic of Korea

16. The HCFC-22 production facility in the Republic of Korea had reduced its HFC-23 generation rate from 3.0 per cent in 2014 to 2.4 per cent in 2016 by adjusting the mixing ratio between hydrogen fluoride and trichloromethane. This optimization did not require capital investments and had little impact on HCFC-22 production costs. The production facility had stopped operating its HFC-23 incineration facility in November 2012. For the destruction facility to be reactivated, the enterprise estimates that it will cost approximately US \$800,000 to renovate the destruction facility and US \$400,000 per year to operate the destruction facility, which includes the cost of maintaining the facility (excluding depreciation), including repair costs and the costs of purchasing spare parts.

17. Equipment and manufacturing and purchasing costs for the HFC-23 destruction facility include components purchasing and examination cost (e.g., refractories repair, condenser, pipes, absorber); and plumbing and steel-frame construction (e.g., plumbing repair, valves purchasing, steel-frame repair, painting). Electric installation and instrumentation manufacturing and purchasing costs include electric installations (i.e., uninterruptible power supply) and instrumentation (e.g., gauges and transmitters). Other costs include calibration costs (e.g., electronic meters and temperature sensors), analytical instruments (e.g., analyzer, standard gas, gas collector, vacuum pump) and reserve expenses.

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