UNITED
NATIONS

EP

United Nations
Environment
Programme

Distr.
GENERAL

UNEP/OzL.Pro/ExCom/80/56
13 October 2017

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eightieth Meeting
Montreal, 13-17 November 2017

KEY ASPECTS RELATED TO HFC-23 BY-PRODUCT CONTROL TECHNOLOGIES: PRELIMINARY DATA TO CLOSE HCFC-22 PRODUCTION SWING PLANTS

Background

1. At the 79th meeting, under agenda item 11(d), Matters related to the Kigali Amendment to the Montreal Protocol: key aspects related to HFC-23 by-product control technologies, the Executive Committee considered a document on Key aspects related to HFC-23 by-product control technologies.[1] The document presented information provided in line with decisions 77/59(c) and 78/5(d) and from other sources, including an analysis of data available under the the Clean Development Mechanism (CDM) on HFC-23 by-product destruction. A summary of the information contained in the above-mentioned document and relevant to the present document is contained in Annex I.

2. During the discussion of the document at the 79th meeting,[2] Executive Committee members recognized that a number of challenges were faced when considering of HFC-23 by-product control technologies. It was noted the wide range of incremental operating costs reported by those countries that had provided data, owing to differences in the type of facility, the methods of destruction used, the life span of the facility, and whether destruction was possible on site or not. It was recognized that several countries had already made progress on the matter, and had put in place relevant policies and control measures; and it was also necessary to be cautious to ensure that the application of particular funding modalities did not create perverse incentives that encouraged an increase in by-product output in order to generate additional phase-down financing. The need for a flexible approach was stressed, given the range of different circumstances at national and industry level. The importance of the cost-effectiveness of measures to deal with emissions of HFC-23 by-product as well a consideration of climate benefits were highlighted.

3. Issues related to the closure of HCFC-22 swing plants were discussed, including the provision of relevant funding support, and whether that should be approached from the viewpoint of compliance with control measures under the Kigali Amendment, or from the more specific viewpoint of cost-effectiveness. Other matters requiring further consideration included: the timing of HCFC-22 swing plant closures in

[1] UNEP/OzL.Pro/ExCom/79/48, Add.1, Corr.1 and Corr.2.
[2] Paragraphs 153 to 159 of document UNEP/OzL.Pro/ExCom/79/51.

relation to control obligations of 1 January 2020; the basis for compensation for plant closure; and the timeframe for compensation.

4. The modalities for contracting an independent consultant to undertake a desk study on the cost of HFC-23 destruction and estimation of the necessary budget were discussed, including the scope of the study, the related matter of when the study would be ready, and the cost.

5. The Executive Committee agreed to establish a contact group to further discuss issues related to HFC-23 emission control, the possible scope of further investigation, and the possible terms of reference of and issues to be covered by a desk study.

6. Following the discussions, the Executive Committee decided *inter alia* to consider possible cost-effective options for compensation for HCFC-22 swing plants to allow for compliance with the HFC-23 by-product control obligations of the Kigali Amendment; and requested relevant governments of Article 5 countries wishing to close HCFC-22 production swing plants countries to submit preliminary data[3] to the 80th meeting (decision 79/47(c) and (d)).

Preliminary data submitted by Article 5 countries

7. In response to decision 79/47(d), on 7 September 2017 the Secretariat sent messages to the Governments of Argentina, India, Mexico and the Bolivarian Republic of Venezuela, requesting to submit preliminary data through an implementing agency if they wished to close HCFC-22 production swing plants in their respective countries. Subsequently:

(a) On 8 September 2017 the Government of Argentina, through the World Bank, submitted preliminary data on the HCFC-22 production swing plant Frio Industrias Argentinas (FIASA),[4] in line with decision 79/47(d); and

(b) On 29 September 2017 the Government of India, submitted data on the HCFC-22 production swing plants,[5] without indicating the implementing agency that could assist the country in presenting the preliminary data to the Executive Committee. In reviewing the preliminary data, the Secretariat noted that not all the information requested under decision 79/47(d) had been submitted, and kindly requested the Government of India to indicate the name of the implementing agency with whom the Secretariat could address issues related to the submission.

Scope of the document

8. To facilitate the discussions at the 80th meeting, the Secretariat has reviewed the preliminary data submitted by the Government of Argentina, and prepared comments and a recommendation for consideration by the Executive Committee.

[3] Preliminary data includes *inter alia* a list of HCFC-22 swing plants in the country (providing name; location; production capacity; schedule for closure; date of establishment; name of proprietors; ownership; emissions and ratio of HFC-23 by-product; and maximum production of HCFC-22); HCFC-22 production in the last three years countrywide and for each swing plant; quantity of export of each plant to non-Article 5 countries; total number of employees in the HCFC-22 industry and per HCFC-22 swing plant for the last three years; and the raw material purchases of each HCFC-22 swing plant in the last three years (i.e., hydrogen fluoride, and chloroform).

[4] As per the letter from the Ministerio de Producción of Argentina to the World Bank.

[5] The Secretariat notes that through decision 79/47(f), the Committee invited relevant HCFC-22-producing Article 5 countries to provide to the Secretariat, on a voluntary basis, information on options of HFC-23 destruction from HCFC-22 production facilities, by 30 September 2017. It appears that the Government of India understood that the date for submission the information requested under decision 79/47(d) was also 30 September 2017.

9. Given that the preliminary data for India was submitted two weeks prior to the date of submission of documents to the Executive Committee, the Secretariat will issue an addendum to the present document providing comments and a recommendation, no later than two weeks prior to the 80th meeting, if the missing information is submitted by the Government.

10. The present document contains the following two annexes:

Annex I: A summary of the information contained in the document on Key aspects related to HFC-23 by-product control technologies submitted to the 79th meeting, and relevant to the present document;

Annex II: Preliminary data submitted by the Government of Argentina.

Preliminary data submitted by the Government of Argentina

11. FIASA, the only HCFC producer in Argentina, is 100 per cent locally owned, and produces HCFC-22 solely for domestic ODS use. The enterprise, established in 1986, has an HCFC-22 production capacity of 7,792 mt, and had a maximum production of HCFC-22 of 4,251.46 mt in 2010. Since then, production has fallen to 1,742.09 mt in 2016. The preliminary data for the enterprise is consistent with the data submitted by the Government of Argentina pursuant to Article 7 of the Montreal Protocol as shown in Table 1.

Table 1. HCFC-22 production at FIASA

HCFC-22	2014	2015	2016	Capacity	Maximum production	Baseline*
Metric tonnes	2,285.95	2,445.98	1,742.09	7,792.0	4,251.46	4,082.73
ODP tonnes	125.7	134.5	95.8	428.6	233.8	224.6

* As reported under Article 7.

12. The production process for HCFC-22 uses hydrogen fluoride (HF) and chloroform ($HCCl_3$) as raw materials, and generates approximately three per cent of HFC-23 by-product. The enterprise employed between 33 and 37 employees (Table 2).

Table 2. Raw materials (mt) and labor used by FIASA in the production of HCFC-22

	2014	2015	2016
Hydrogen fluoride (HF)	1,182.39	1,464.61	770.82
Chloroform ($HCCl_3$)	3,145.30	4,099.31	3,140.14
Labor			
Direct labour	12	12	12
Overhead	11	11	13
Laboratories	2	4	4
Maintenance	7	5	6
Packaging	1	4	2
Total	**33**	**36**	**37**

13. The Government of Argentina in its response to decision 77/59(c) reported that under the CDM a destruction facility was set up to destroy HFC-23 by-product. However, the destruction facility is currently not operating and all the HFC-23 by-product is vented.[6] The operating cost of destruction was estimated by the enterprise at approximately US $5.68/kg of HFC-23. The enterprise believes that to start up the operation again, funding would be needed to replace a damaged absorption tower, valves, and to purchase

[6] According to the information on CDM database, the crediting period was from 15 October 2007 to 14 October 2014, http://cdm.unfccc.int/Projects/DB/DNV-CUK1166182519.48/view.

zeolite for the oxygen generator. However, FIASA did not include an estimate of the costs to start up the destruction facility.

Secretariat's comments

Agreement for the CFC production in Argentina

14. FIASA is a swing plant that was the only ODS production facility addressed under Argentina's production sector Agreement with the Executive Committee. At the 38th meeting, the Executive Committee approved the Agreement for the Argentina Production Sector at a funding level of US $3.8 million; and, at the 52nd meeting, the Committee approved in principle an additional US $2.3 million for closing down the CFC production by the end of 2007, two years ahead of the phase-out schedule. The additional funding was disbursed at the 53rd meeting, when the Executive Committee amended the Agreement specifying that "Argentina agrees that the funds being agreed in principle by the Executive Committee at its 38th and 52nd meetings for complete closure of its CFC production capacity is the total funding that will be available to it to enable its full compliance with the CFC production phase out requirements of the Montreal Protocol, and that no additional Multilateral Fund resources will be forthcoming for related activities including the development of infrastructure for the production of alternatives, the import of alternatives, or the eventual closure of any HCFC facilities that use existing CFC infrastructure." At the 53rd meeting, the Government of Argentina confirmed its concurrence with this provision with the understanding that if and when the Executive Committee decided in the future to finance HCFC facilities that used existing CFC infrastructure (i.e., HCFC-22 production swing plants), Argentina would be eligible and would be treated similarly to other Article 5 countries.

Brief analysis of the preliminary data

15. The production of HCFC-22 ($HCClF_2$) is based on the reaction of two molecules of HF with one molecule of $HCCl_3$ to produce one molecule of HCFC-22 (according to the chemical reaction: $2HF + HCCl_3 \rightarrow HCClF_2$). Based on the preliminary data provided, it appears that FIASA typically runs its reactor with an excess of HF (i.e., molar ratio of HF to $HCCl_3$ greater than 2), which is the common industry practice. It appears that some of the HF that was reported for 2015 was stored and used in 2016 as the theoretical yield, which is calculated based on stoichiometric quantities of the raw materials, is greater than 100 per cent, as shown in Table 3.

Table 3. Molar ratio and theoretical yield at FIASA

Year	Molar ratio ($HF/HCCl_3$)[7]	Theoretical yield (%)
2014	2.24	100
2015	2.13	82
2016	1.46	105

16. The number of employees at FIASA increased slightly in 2014-2016 period, notwithstanding the decreased production. The ratio of the number of employees per thousand metric tonnes of HCFC-22 produced, varied between 14.4 and 21.2; this ratio is comparable to that derived from data reported in several other Article 5 countries.

Costs for destruction of HFC-23

17. Based on the information available, the Secretariat is not in a position to identify the most cost-effective option for compensation for the enterprise to enable Argentina to comply with the HFC-23 by-product control obligations of the Kigali Amendment. The break-even point between closure and

[7] The ratio between the amounts in moles of HF (20.01 grams/mole) and $HCCl_3$ (119.38 grams/mole) in the production of HCFC-22.

continued operation of the destruction facility is a function of a number of factors, including the remaining lifetime of the facility, the level of production of HCFC-22 in light of the Montreal Protocol phase-out schedule, the level of compensation provided for closure, the HFC-23 by-product generation rate, the level of incremental costs associated with the start-up of the destruction facility, if any, the level of incremental operating costs (IOCs) for the continued operation of the destruction facility, and other factors:

18. Based on information provided in the CDM monitoring reports:

(a) The average HFC-23 by-product generation rate at FIASA was 3.30 per cent, though the most recent monitoring report (1 January 2013 through 14 October 2013) indicated a generation rate of 1.89 per cent (see paragraph 7 of Annex I). It is unclear whether this was temporary or whether process improvements or other factors might have led to the reduced generation rate;

(b) The average normalized use of natural gas and electricity at FIASA was 0.54 Nm^3/kg of HFC-23 and 0.40 kWh/kg of HFC-23 (see paragraph 3 of Annex I). Assuming nominal costs of US $0.50/$Nm^3$ for natural gas and US $0.10/kWh, suggests incremental costs for those two consumables of US $0.31/kg of HFC-23 destroyed;

(c) The destruction technology used by FIASA does not result in the generation of sludge but instead a commercial liquid solution called HF50% (HF with traces of hydrogen chloride) that is recovered, stored, transported and sold as input for glass, metallurgy, or the chemical and fuel industry. The average quantity of HF50% recovered at FIASA was 1.75 kg/kg of HFC-23 (see paragraph 6 of Annex I); however, the level of revenue from the sale of HF50%, if any, is not clear; and

19. While no information is available of the costs to start up the destruction facility at FIASA, information available for the production facility in the Republic of Korea that had similarly stopped operating its HFC-23 destruction facility, estimated that approximately US $800,000 would be required for the destruction facility to be reactivated (see paragraph 8 of Annex I). The Secretariat has not assessed how the costs to reactivate the destruction facility in the Republic of Korea might compare with the costs to reactivate the destruction facility at FIASA.

20. For reference, Table 4 provides an analysis of the break-even point between closure and continued operation of the destruction facility based on:

(a) The 2016 production of HCFC-22 by FIASA, a three per cent generation rate, the range of IOCs indicated by the TEAP Replenishment Task Force in its 2017 TEAP XXVIII/5 Task Force (Replenishment) Report, assuming comparable costs to restart the destruction facility as in the Republic of Korea, and assuming the same cost effectiveness for closure as for the CFC production phase-out in Argentina (i.e., US $3.86/kg), the break-even point ranges between 76 and 227 years;

(b) Using the cost effectiveness of the China HCFC production phase-out of US $0.86/kg, the break-even point ranges between nine and 27 years; and

(c) Using the IOCs as estimated by FIASA in line with decision 77/59(c), the break-even point is two years for a cost-effectiveness of closure of US $0.86/kg, or 20 years based on a cost-effectiveness of closure of US $3.86/kg.

Table 4. Break-even point between closure and continued operation of the destruction facility*

Assumed CE of closure (US $/kg)	Assumed IOC (US $/kg)	Break-even point (years)
3.86	0.50	227
	1.50	76
	5.68	20
0.86	0.50	76
	1.50	9
	5.68	2

* Assuming (constant) 2016 production of 1,742.09 mt of HCFC-22, 3 per cent HFC-23 by-product generation rate.

21. The preliminary data submitted by the Government of Argentina indicates the schedule of closure is to be defined, possibly starting in 2021. The HFC-23 by-product emission control obligations under the Kigali Amendment commence on the later of 1 January 2020 or upon entry into force of the Amendment for the Party. Should the Executive Committee wish to consider closure of FIASA to allow for compliance with the HFC-23 by-product control obligations of the Kigali Amendment, the Executive Committee may wish to consider an earlier closure schedule (i.e., 1 January 2020) or measures that would allow compliance with the control obligations in 2020, such as restarting the incineration facility until closure, or capture and off-site destruction of the HFC-23 by-product, assuming entry into force of the Amendment for Argentina. Document UNEP/OzL.Pro/ExCom/79/48[8] contains limited information on the estimated costs of off-site destruction, with estimates ranging between US $3.00/kg of ODS destroyed to US $8.00/kg of ODS destroyed. The Secretariat has not assessed whether a suitable off-site destruction facility would be available in Argentina, nor how such costs might compare with those in Argentina.

Procedures of the Multilateral Fund for the production sector

22. To date, the Executive Committee has always provided funding for the production sector on the basis of cessation of production of the controlled substance, which for the circumstances considered was the most cost-effective and efficient option. The cost of closure includes lost profit, compensation to displaced workers, the cost of dismantling production facilities, and other costs.

23. The process by which phase-out projects in the production sector have been reviewed and approved by the Executive Committee has differed from the process used in the consumption sector. In accordance with the practices and procedures in decision 19/36, each Article 5 producer country provides preliminary data and informs the Executive Committee eight months before it is ready to submit its sector phase-out; the Executive Committee then commissions a technical audit of the production sector in conjunction with the preparation of the sector plan prepared by the relevant implementing agency. The results of the technical audit, which should be incorporated into the sector plan, serve as a reference point for reviewing the plan. After review by the Secretariat, the plan is considered by the Production Sector Sub-group. If needed, additional technical audits may be commissioned to address specific questions or issues. The plan is reviewed based on the technical audit, and in accordance with the indicative list of eligible costs.

Guidance by the Executive Committee

24. The Secretariat seeks the guidance of the Executive Committee on whether it wishes to follow the same approach outlined in decision 19/36 and, as a next step, request a technical audit of FIASA,[9] or if it wishes to wait for the evaluation of cost-effective and environmentally sustainable options of HFC-23 destruction from HCFC-22 production facilities that will be submitted to the 81st meeting in line with decision 79/47(e) before deciding whether to request a technical audit.

[8] Paragraphs 9 and 10 of Annex I

[9] The estimated costs for a technical audit, including costs for two experts, international travel, data collection and reporting, is approximately US $50,000.

25. In addition, the Executive Committee may wish to note that the business plan currently does not include funding for project preparation associated with the closure of FIASA in Argentina, and may wish to decide whether to add such project preparation.

RECOMMENDATION

26. The Executive Committee may wish to consider:

(a) Noting the submission by the Government of Argentina of the preliminary data on the HCFC-22 swing plant Frio Industrias Argentinas, S.A. (FIASA) contained in document UNEP/OzL.Pro/ExCom/80/56;

(b) Whether to request a technical audit of FIASA and replenishing the sub-account for technical audits in the amount of US $50,000, and authorize the Fund Secretariat to initiate the related contracting process, accordingly; or to wait for the evaluation by an independent consultant of cost-effective and environmentally sustainable options of HFC-23 destruction from HCFC-22 production facilities that will be submitted to the 81st meeting in line with decision 79/47(e); and

(c) Including in the Consolidated 2018-2020 business plan of the Multilateral Fund funding for project preparation associated with the closure of FIASA in Argentina, to be implemented by the World Bank.

Annex I

SUMMARY OF DOCUMENT ON KEY ASPECTS RELATED TO HFC-23 BY-PRODUCT CONTROL TECHNOLOGIES[10] RELEVANT TO THE PRESENT DOCUMENT

1. At its 79th meeting, the Executive Committee decided to consider possible cost-effective options for compensation for HCFC-22 swing plants to allow for compliance with the HFC-23 by-product control obligations of the Kigali Amendment (decision 79/47(c)).[11]

2. The Secretariat presented an analysis of data available under the CDM on HFC-23 by-product destruction, including at FIASA, in document UNEP/OzL.Pro/ExCom/79/48. In particular, detailed information on the destruction facility and its operation is available in the monitoring reports provided under the CDM. For 13 of the 19 HFC-23 destruction projects registered under the CDM, the Secretariat collected the data from the ten most recent monitoring reports (for which request for issuance of credits was issued); for the remaining six projects, the Secretariat collected data from all the monitoring reports to assess whether using only data from the ten most recent reports affected the analysis. FIASA was one of the six projects for which data from all monitoring reports was collected.

3. For its analysis, the Secretariat normalized the use of the consumables and waste by the amount of HFC-23 that was destroyed in order to estimate the associated costs per kilogram of HFC-23 destroyed. The monitoring reports for FIASA provide the quantity of natural gas and electricity consumed in the HFC-23 destruction process, as well as the amount of HCFC-22 produced and HFC-23 by-product generated. The average normalized use of natural gas and electricity was 0.54 Nm^3/kg of HFC-23 and 0.40 kWh/kg of HFC-23. Assuming nominal costs of US \$0.50/Nm^3 for natural gas and US \$0.10/kWh, suggests incremental costs for those two consumables of US \$0.31/kg of HFC-23 destroyed.

4. As noted in document UNEP/OzL.Pro/ExCom/79/48, while the monitoring reports provide detailed information on the operation of the destruction facility, they do not provide information on the incremental costs to operate the destruction facility. The Secretariat's analysis was therefore necessarily limited by the information provided; as the incremental cost of the reported consumables does not include maintenance, labour, costs associated with monitoring, or other expenses that may affect the incremental operating costs (IOC) of destruction, the incremental costs of the reported consumables likely represents a lower bound on the IOC of destruction. The Secretariat considers that maintenance costs are likely to be significant as incinerators typically operate at 1,200°C and contain corrosive chemicals (e.g., re-bricking of the incinerator approximately every six years is a common industrial practice). Costs associated with labour are likely to be small given that an incinerator can be controlled from the same control room used to control the rest of the HCFC-22 production facility; however, the Secretariat has not analysed such costs. Monitoring costs, depending on the monitoring requirements, are likely to be present but small relative to the cost of consumables such as fuel and electricity.

5. For reference, the Secretariat's analysis of the 19 CDM HFC-23 destruction projects indicated that the incremental cost of consumables and waste was in all cases below US \$1/kg of HFC-23. This value is comparable to the analysis conducted by the Öko Institute for Applied Ecology,[12] which found that the typical marginal technical abatement costs of HFC-23 destruction (i.e., the IOCs) was 0.07 €/tCO_2e (approximately US \$1.17/kg of HFC-23, converted on 4 June 2017), including the cost of maintenance,

[10] UNEP/OzL.Pro/ExCom/79/48, Add.1, Corr.1 and Corr.2.
[11] To date, the Parties have not yet approved any technologies for the destruction of HFC-23 to permit Parties to the Kigali Amendment to comply with the destruction provisions of the Amendment.
[12] European independent research and consultancy organization working for a sustainable future.

labour, monitoring, and other expenses. Similarly, the TEAP Replenishment Task Force estimated a range of US $0.50-1.50/kg of HFC-23 in its 2017 TEAP XXVIII/5 Task Force (Replenishment) Report.

6. The Secretariat did not account for possible revenue streams from the recovery of HF from the destruction process.[13] The CDM monitoring reports indicates that the destruction technology used by FIASA does not result in the generation of sludge but instead a commercial liquid solution called HF50% composed of HF with traces of hydrogen chloride (HCl) that is recovered, stored, and then transported to Buenos Aires to be sold as input for glass, metallurgy, or the chemical and fuel industry. The average quantity of HF50% recovered at FIASA was 1.75 kg/kg of HFC-23.

7. The average HFC-23 by-product generation rate (*w*) was 3.30 per cent at FIASA, though the most recent monitoring report (1 January 2013 through 14 October 2013) indicated a generation rate of 1.89 per cent. It is unclear whether process improvements or other factors might have led to the reduced generation rate.

8. In the information provided by the Government of Argentina in line with decision 77/59(c), the Government did not include an estimate of the costs to start up the destruction facility at FIASA. In response to decision 78/5(d), the Republic of Korea provided information indicating that the HCFC-22 production facility in Republic of Korea had similarly stopped operating its HFC-23 destruction facility, and estimated that approximately US $800,000 would be required for the destruction facility to be reactivated. The Secretariat has not assessed how the costs to reactivate the destruction facility in the Republic of Korea might compare with the costs to reactivate the destruction facility at FIASA.

9. Regarding the collection of HFC-23 for off-site destruction, a producer based in the United States of America emphasized that, depending on the plant set-up, not all the HFC-23 that is generated can be destroyed given limitations in the ability to separate and capture HFC-23 from other streams in the process. In particular, the gas mixture exiting the HCFC-22 reactor typically contains HCFC-22, HCFC-21, HFC-23, HCl and HF. The HFC-23 tends to travel with the HCl stream and is difficult to separate without a liquid absorption system.

10. The estimated cost of off-site destruction of fluorochemicals varies, with one estimate of approximately US $3.00/kg in the United States of America (plus shipping). Proposals for demonstration projects for the disposal of ozone-depleting substances in accordance with decision 58/19 provided varying costs of off-site destruction, as submitted. For example, the project in Mexico[14] estimated a cost of US $3.00/kg for CFC-11 and US $5.50/kg for CFC-12 for off-site destruction in Mexico and in the United States of America, respectively, as submitted; the project in Ghana[15] estimated a cost of US $4.19/kg of CFC-12 for destruction at a facility in the EU, as submitted; the regional project in Europe and Central Asia[16] and the project in Lebanon[17] estimated a cost of US $5.00/kg of ODS at a facility in the EU, as submitted; the project in Georgia[18] estimated a cost of US $8.00/kg for CFC-12 and HCFCs, including transportation, at a facility in the EU, as submitted.

[13] For every molecule of HFC-23 destroyed, three molecules of HF are generated according to the chemical reaction: $2CHF_3 + 2CH_4 + 7O_2 \rightarrow 6HF + 4CO_2 + 2H_2O + 2O_2$.
[14] UNEP/OzL.Pro/ExCom/63/42
[15] UNEP/OzL.Pro/ExCom/63/31
[16] UNEP/OzL.Pro/ExCom/69/32
[17] UNEP/OzL.Pro/ExCom/73/41
[18] UNEP/OzL.Pro/ExCom/69/26

Annex II

PRELIMINARY DATA TO CLOSE HCFC-22 PRODUCTION SWING PLANT OF FRIO INDUSTRIAS ARGENTINAS S.A (FIASA) IN ARGENTINA

(i) A list of HCFC-22 swing plants in the country.

(a) **Name**: Frio Industrias Argentinas S.A.

(b) **Location**: Ruta 7 km 703 y Ruta Provincial 2 – CP: 5730, Villa Mercedes, San Luis, Argentina

(c) **HCFC-22 production capacity**: 7,792 tonnes

(d) **Schedule for closure**: To be defined. Possibly starting in 2021.

(e) **Date of establishment**: 1986

(f) **Name of proprietors**: Alfonso Salvador Silva (22%) and Pancor S.A. (78%)

(g) **Ownership**: 100% Argentine capital

(h) **Emissions and ratio of HFC-23 by-product: Approximately 3% of the HCFC-22 production**

(i) **Maximum production of HCFC-22**: 4,251.46 tonnes in 2010

(ii) HCFC-22 production in the last three years countrywide.

Year	Tonnes
2014	2,285.95
2015	2,445.98
2016	1,742.09

(iii) HCFC-22 production in the last three years for each swing plant.

- Frio Industrias Argentinas S.A.

Year	Tonnes
2014	2,285.95
2015	2,445.98
2016	1,742.09

(iv) Quantity of export of each plant to non-Article 5 countries.

No HCFC-22 export takes place from Argentina.

(v) Total number of employees in the HCFC-22 industry.

(a) In the production sector (direct labour + overheads + maintenance): 35.

(b) In the packaging sectors: 2.

(vi) Total number of employees per HCFC-22 swing plant (one table per plant) for the last three years.

- Frio Industrias Argentinas S.A.

Year	2014	2015	2016
Direct labour	12	12	12
Overheads	11	11	13
Laboratories	2	4	4
Maintenance	7	5	6
Packaging	1	4	2

(vii) The raw material purchases of each HCFC-22 swing plant in the last three years.

- Frio Industrias Argentinas S.A.

(a) **Hydrogen fluoride (metric tonnes)**:

Year	Tonnes
2014	1,182.39
2015	1,464.61
2016	770.82

(b) **Chloroform (metric tonnes)**:

Year	Tonnes
2014	3,145.3
2015	4,099.31
2016	3,140.14