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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eighty-fifth Meeting
Montreal, 25-29 May 2020
Postponed to 19-22 July 2020*

**KEY ASPECTS RELATED TO HFC-23 BY-PRODUCT CONTROL TECHNOLOGIES:
ARGENTINA (DECISION 84/90)****

Background

1. At its 84th meeting, the Executive Committee considered project proposal options to control and phase out HFC-23 emissions at Frio Industrias Argentinas (FIASA), at a total cost between US \$10,867,000 and US \$59,667,000, plus agency support costs,¹ as originally submitted in line with decisions 82/85(e) and 83/66(b).
2. During the 84th meeting, Executive Committee members highlighted a number of considerations,² including *inter alia* the importance of: basing the level of financial support on the most cost-effective option in situations where HFC-23 by-product emissions were not already being controlled; basing incremental operating costs (IOCs) on HCFC-22 production from prior rather than future years; taking into account production process improvements that would reduce generation rates over time; ensuring the sustainability of the HFC-23 emissions phase-out; considering the role played by domestic policies and regulations in ensuring sustained HFC-23 destruction; and considering the eligibility of back-up systems, if they were needed at all.
3. The Committee agreed to establish a contact group whose mandate included the project to control

* Due to coronavirus disease (COVID-19)

** Subsequent to the issuance of document UNEP/OzL.Pro/ExCom/85/64 on 8 May 2020, the Secretariat sought the advice of an independent consultant on an appropriate methodology to account for FIASA's interest on working capital, resulting in a correction to the methodology used in that document, and requested an update to the independent technical audit of FIASA undertaken by the consultant at the 83rd meeting; and additional information on the decree by the Ministry of Justice and Human Rights of Argentina that doubles the compensation for workers that are dismissed without just cause became available. Therefore, the present document has been issued. For ease of reference, paragraphs that have been modified are in bold characters.

¹ UNEP/OzL.Pro/ExCom/84/71

² Paragraphs 354-355 of UNEP/OzL.Pro/ExCom/84/75

HFC-23 by-product in Argentina, the project to control HFC-23 by-product in Mexico, at Quimobásicos,³ and the document that presented the policy issues⁴ related to control of HFC-23 by-product emissions in Article 5 countries that arose from the Secretariat's review of those projects.

4. Subsequently, the convener of the contact group reported that the group had been unable to conclude its deliberations on the proposal to control HFC-23 by-product in Argentina. Accordingly, the Committee *inter alia* decided to defer to the 85th meeting its consideration of the project proposal to control HFC-23 by-product emissions in Argentina, and requested the Secretariat to provide further analysis of the project to the 85th meeting based on any additional information provided by the Government of Argentina through UNIDO (decision 84/90).

Additional information submitted to the 85th meeting

5. Noting the urgency of approving the project proposal to control HFC-23 by-product emissions in Argentina given the 1 January 2020 control obligation of that Party to the Kigali Amendment, the Secretariat requested information from UNIDO related to the 2019 production of HCFC-22 at FIASA, the potential impact of the August 2019 economic crisis with regard to FIASA, and on the management of the HFC-23 by-product by FIASA.

6. The present document presents the additional information provided by UNIDO, an updated analysis by the Secretariat, the views expressed by the Government of Argentina, conclusions and a recommendation. For reviewing and updating the analysis, the Secretariat sought technical and economic advice from the independent consultant who had previously assisted in the review of the project; **advice was sought, in particular, on an appropriate methodology to account for the interest on working capital given the devaluation of the ARS relative to the US dollar. In addition, the Secretariat requested the independent consultant to provide an updated technical audit of FIASA given the 2019 economic crisis and the information on FIASA's 2019 HCFC-22 production, sales and price of HCFC-22.** In order to facilitate the Executive Committee's consideration of the additional information and further analysis, the Secretariat has appended the project document from the 84th meeting to the present document.

Update on the status of HCFC-22 production and HFC-23 by-product control at FIASA

7. FIASA produced 1,606 metric tonnes (mt) of HCFC-22 in 2019, representing a 35 per cent increase from 2018; sales in 2019 increased 14 per cent relative to 2018. Relative to 2018, the average price of HCFC-22 sold by FIASA increased by 121 per cent in Argentine peso (ARS) (i.e., more than double) in 2019, and by approximately 200 per cent (i.e., approximately a factor of three) in January 2020.

8. Based on production and sales⁵ data from 2014 through 2019, FIASA's end-of-year stocks of HCFC-22 in 2019 was approximately 353 mt, which represented approximately 25 per cent of its total 2019 sales. Notwithstanding those stockpiles, FIASA has continued to produce HCFC-22 in 2020. Accordingly, HFC-23 by-product generated continues to be vented to the atmosphere.

9. In 2014, FIASA's HCFC-22 production line operated most days of the year (approximately 78 per cent of days); by 2018, FIASA HCFC-22 production line was in operation on approximately 41 per cent of days; in 2019, the number of operating days increased 38 per cent relative to 2018. While there has been

³ UNEP/OzL.Pro/ExCom/84/72

⁴ UNEP/OzL.Pro/ExCom/84/70

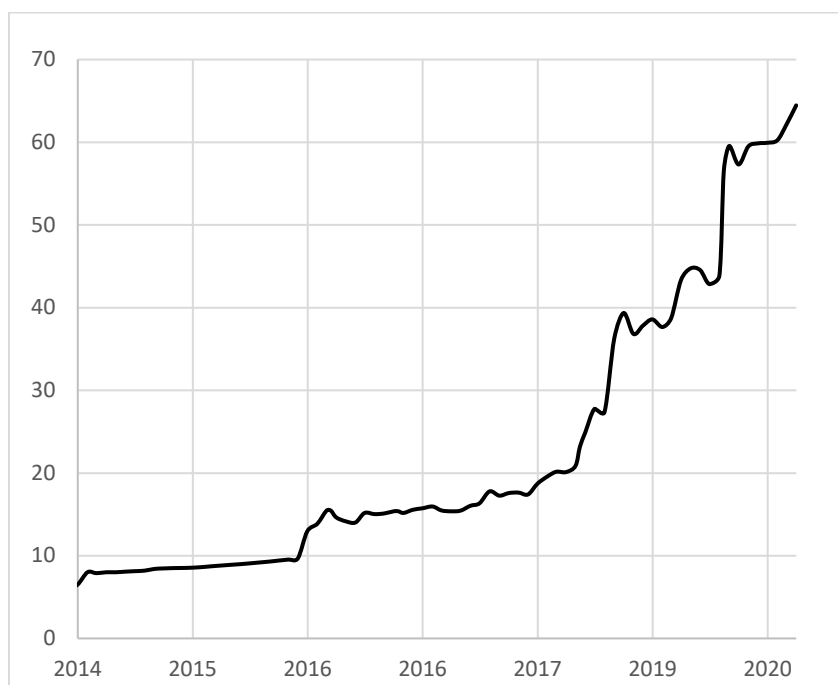
⁵ Information is considered confidential. Executive Committee members wishing to review that information may request it from the Secretariat on the understanding that the information is only for the evaluation of the project and not to be disclosed to a third party.

some turnover in staff, the number of staff working on FIASA's HCFC-22 production line remains unchanged relative to 2018.

Update on the economic situation in Argentina

10. A 2019 publication issued by the World Bank Group reported that Argentina was in a precarious economic balance.⁶ ARS devalued significantly in 2019, annual inflation was 54 per cent, and the gross domestic product (GDP) had contracted 2.5 per cent in 2018 and another 2.5 per cent in the first half of 2019. As of 1 May 2020, the Argentina peso had lost 60 per cent of its value relative to the average 2018 exchange rate (Figure 1), while the inflation rate has decreased, reaching 50 per cent in February 2020.

Figure 1. Rate of Exchange: ARS to US dollar (US \$)



11. In light of the economic situation prevailing in the country, on 13 December 2019 the Ministry of Justice and Human Rights issued a decree related to a public emergency on occupational matters,⁷ through which workers that are dismissed without just cause will have the right to receive double the corresponding compensation in accordance with current legislation; the decree was issued for a period of 180 days.

12. Based on the information from the Central Bank of the Republic of Argentina, the annual nominal rate of interest for private sector loans in national currency (i.e., the interest rate an enterprise can expect to pay for a loan) varied between 60.7 and 84.7 per cent in 2019, with an average rate of 70.9 per cent; that nominal interest rate has decreased to 53.1 per cent in February 2020. The deposit interest rate (i.e., the rate of return an enterprise can expect when depositing money) in 2019 varied between 34.6 and 59.5 per cent, with an average of 47.6 per cent; the most recent rate (on 30 December 2019) was 38.1 per cent.

Changes proposed by the Government of Argentina to the project proposal submitted at the 84th meeting

13. The Government of Argentina, through UNIDO, requested that for the option of closure, severance of workers would be US \$3,805,567 (instead of US \$1,189,000 requested at the 84th meeting) based on the

⁶ <https://www.worldbank.org/en/country/argentina/overview>. Accessed on 24 March 2020.

⁷ <http://servicios.infoleg.gob.ar/infolegInternet/anexos/330000-334999/333435/norma.htm>

following:

- (a) Double the compensation of the employees in accordance with the decree issued by the Ministry of Justice and Human Rights currently in force;
- (b) Updated workers' salaries reflecting increased wages and the number of years each worker was employed by FIASA, two factors that are used to determine eligible severance;
- (c) An exchange rate of 65 Argentina peso per US dollar; and
- (d) Compensation for 65 employees instead of 48 included in the project proposal submitted to the 84th meeting, as the relocation of 20 employees was no longer available, and noting that three employees had left FIASA.

14. UNIDO further clarified that the Government cannot oblige FIASA to close the HCFC-22 production line; closure would be based on a compensation contract with FIASA.

Further analysis based on the additional information

15. Based on the additional information provided, the Secretariat undertook further analysis of the option of closure of the HCFC-22 production facility (Option 1) and restarting the incinerator for continued production of HCFC-22 (Option 2). No additional information was provided to suggest that the regulatory constraints that prevent the option of off-site destruction had changed; accordingly, the Secretariat did not update the analysis for that option.

Further analysis of Option 1: closure of HCFC-22 production at FIASA

16. The project proposals submitted to the 83rd and 84th meetings considered two models to estimate lost profits associated with the closure of FIASA: the model based on the technical audit undertaken by an independent consultant, and the model developed by UNIDO⁸ and endorsed by the Government.

17. However, both models no longer accurately reflect the production economics of FIASA under the economic situation currently prevailing in the country. Accordingly, the Secretariat **sought the advice of an independent consultant on how to modify UNIDO's model to take into account the 2019 economics of production for the enterprise, resulting in** the following modifications:

- (a) The 2019 sales⁹ of HCFC-22 until 2024 and 1,300 mt/yr between 2025 and 2029, instead of an increased sales from 2,000 mt/yr in 2020 to 2,600 mt/yr in 2024, and 1,300 mt/yr between 2025 and 2029 used by UNIDO;
- (b) Price of chloroform and anhydrous hydrogen fluoride (AHF) (purchased from the international market) as submitted by UNIDO, while the price of all other raw materials, variable and fixed costs (e.g., labor, electricity, natural gas), which are locally purchased, were decreased by 18 per cent, relative to the price submitted by UNIDO, based on the average 2019 exchange rate and one year of inflation; all prices after 2019 are assumed to remain constant throughout the project;
- (c) The average 2019 price¹⁰ of HCFC-22 throughout the duration of the project (consistent

⁸ In order to develop that model, UNIDO collected financial data through a questionnaire, completed missing data, asked clarifications, crosschecked the information and collected hard copy evidence regarding all FIASA financial data used.

⁹ Information considered confidential.

¹⁰ Ibid.

with the practice used by the Sub-group on the Production Sector), instead of an increased price of HCFC-22 presented by UNIDO;

- (d) The calculation of the net present value (NPV) of the lost profits, based on the most recent deposit interest rate in Argentina of 38.1 per cent, instead of a 10 per cent discount rate used by UNIDO;¹¹
- (e) **A rate of interest on working capital of 53 per cent (based on the average 2019 nominal rate of interest of 70.9 per cent for private sector loans in ARS, and the devaluation of the Argentine Peso from its 2019 average value of 49.88 ARS per US dollar to its May 2019 average value of 66.69 ARS per US dollar),¹² instead of 7.5 per cent used by UNIDO;¹³ and**
- (f) **Accounting for the increased working capital in 2019 given the increased stocks of HCFC-22 held by the enterprise in 2019 relative to the 2014-2018 average.¹⁴**

18. Based on the above, the production of HCFC-22 at FIASA is no longer financially viable, with zero lost profits due to closure. This finding was confirmed by the independent consultant. While a number of factors contribute to the enterprise's loss of financial viability, the following factors were particularly important:

- (a) **The effective US dollar interest rate of 53 per cent on working capital that FIASA paid in 2019, combined with the increased working capital for that year, are prohibitive.** In 2019, FIASA's end-of-year stocks were about one quarter of the enterprise's total annual sales, **and more than double the average 2014-2018 end-of-year stocks.** The raw materials and other inputs necessary to produce the HCFC-22 are purchased and paid for upfront, while income derived from the product is delayed pending the sale of stocks, thus contributing to FIASA's substantial cost of working capital. Moreover, chloroform and AHF must be imported in bulk containers **and paid for in US dollars;** given the enterprise's relatively low level of production, this further contributes to the enterprise's high level of working capital;
- (b) Additional information provided by UNIDO at the 85th meeting indicates that between July 2018 and February 2020 the annual inflation rate on workers' wages at FIASA was approximately 66 per cent. The model keeps prices after 2019 constant and therefore does not include the effect of inflation on future prices, which would further worsen FIASA's HCFC-22 production economics;¹⁵ and
- (c) Sales of HCFC-22 are assumed to remain constant between 2020 and 2024, and fall to

¹¹ In 2019, the median inflation rate in non-Article 5 countries was 1.5 per cent and in Article 5 countries was 2.6 per cent, while in Argentina it was 54 per cent. Interest rates in a country are related to the rate of inflation in that country, with banks lending money at interest rates above the rate of inflation and paying interest on deposit accounts at rates that are typically below the rate of inflation.

¹² **In line with the advice of the independent consultant.**

¹³ UNIDO considered an interest rate of 7.5 per cent because FIASA was well-established and had been operational for a long time, has the capacity to continue producing HCFC-22 for more than 15 years, is the only HCFC-22 producer in the country, and has diversified its business through the commercialization of other refrigerant gases. The Secretariat noted, however, that irrespective of how well-established an enterprise in a country may be, and how low a risk it may represent, a bank can only lend money at a rate higher than the inflation rate in the country concerned.

¹⁴ **Information considered confidential.**

¹⁵ The further devaluation of the Argentina peso may mitigate the effect of such inflation; however, in such case, the price of raw materials necessary to produce HCFC-22 (i.e., chloroform and AHF) would increase in ARS; that increase that would need to be passed on to Argentine consumers.

1,300 mt/yr between 2025 and 2029. However, as noted in the technical audit presented to the 83rd meeting,¹⁶ **and confirmed by the updated technical audit undertaken for the present meeting**, demand for HCFC-22 is likely to fall between 2020 and 2025. This decrease is consistent with the phase-out activities that have been implemented under the HCFC phase-out management plan (HPMP) for Argentina (which included the conversion of the HCFC-22-based air-conditioning manufacturing sector in 2014); the introduction of new non-HCFC-22-based equipment into the country; and the increased price of HCFC-22 sold by FIASA.

19. As requested by the Secretariat, the consultant provided an updated technical audit of FIASA.¹⁷ In line with the terms of reference for the technical audit of HCFC production in Article 5 countries, the independent consultant updated the supply-demand analysis that had been conducted at the 83rd meeting, and found that sales of HCFC-22 by FIASA would decrease after 2020. The independent consultant modified the model developed by UNIDO for the 83rd meeting based on that updated supply-demand analysis; the price of HCFC-22 to the average of 2017-2019; the cost and consumption of catalyst as provided by FIASA; accounting for the cost of electricity, gas and water as a fixed rather than a variable cost, and basing the total direct variable costs on production (vice sales) of HCFC-22, while revenue is based on sales, in line with standard cost modeling practice; and the interest on working capital of 53 per cent for 2019 through 2024. On that basis, FIASA's HCFC-22 production in 2019 operated at a loss; annual losses are expected to increase from 2020 to 2024.

20. The independent consultant further noted that in the first four months of 2020, inflation and the lending rate decreased (falling to 44 per cent and 21 per cent, respectively, by April 2020), while the ARS continued to devalue relative to the US dollar. Notwithstanding that the independent consultant did not assess whether those trends would continue, nor how the Argentine economy would respond to the global financial situation brought about by the COVID-19 pandemic, the finding that FIASA is no longer profitable in 2020 and beyond is independent of the interest on working capital, i.e., FIASA would continue to operate at a loss even if interest rates fell to zero. The continued devaluation of the ARS further deteriorates FIASA's financial outlook.

Alternative scenario based on more stable economic conditions

21. Noting that the economic situation prevailing in Argentina in 2019 impacted the profitability of the production of HCFC-22 by FIASA, the Secretariat considered meaningful to undertake an alternate scenario for 2020 under a more favourable and stable economic conditions as follows:

- (a) A reduction of the inflation rate to 37.8 per cent in 2020 (calculated as the 2017-2019 average inflation), to zero in subsequent years; an effective US dollar lending rate of 33.1 per cent (based on the average of the 2017-2019 nominal lending rate in ARS and the yearly devaluation of the ARS relative to the US dollar); and a decrease of the working capital to the average of 2014-2018;
- (b) A 7 per cent increase in the price in US dollars of HCFC-22 (in line with the price reported by the enterprise in January 2020) and a 4 per cent increase in sales (based on the average of the 2017-2019 sales), relative to 2019;
- (c) The price of chloroform and AHF are kept constant while the price of all other raw materials and inputs increased by 5.8 per cent relative to 2019, based on the 37.8 per cent

¹⁶ UNEP/OzL.Pro/ExCom/83/44

¹⁷ The (confidential) updated technical audit of FIASA is available to Executive Committee members upon request.

inflation rate and an exchange rate of 65 ARS per US dollar; and

- (d) No decrease in sales of HCFC-22 with time, and no impact on HCFC-22 demand due to COVID-19,¹⁸ nor FIASA's production economics.

22. Based on the above, FIASA would be financially viable through 2029. Assuming FIASA were to close **by 31 December 2020**, the NPV of lost profits between **2021** and 2029 **would amount to US \$2,658,220. This scenario does not take into account the updated technical audit, including the adjustments to UNIDO's model to be in line with standard cost modeling practice nor the forecasted reduction in sales. Based on the updated technical audit, FIASA's lack of profitability is independent of the interest on working capital; the enterprise could return to profitability if the price of HCFC-22 were to increase, sales were to increase, or some combination thereof.**

Replacement of production by increased imports of HCFC-22

23. Given FIASA's high cost of producing HCFC-22, it would make more profit importing HCFC-22 from the international market than producing it domestically. However, according to the Government of Argentina, an enterprise could not exchange production for import quotas and, therefore, this option is not available to FIASA. As noted in document UNEP/OzL.Pro/ExCom/85/63, the Executive Committee may wish to consider the extent to which the profitability of an HCFC-22 production line should depend on the local versus international market price.

Severance for workers

24. The project proposal submitted to the 85th meeting includes a request for severance for 65 employees. However, preliminary data submitted by the Government of Argentina at the 80th meeting¹⁹ indicated that FIASA employed between 33 and 37 workers on its HCFC-22 production line; the data provided by the enterprise at the 82nd meeting indicated 29 workers; and the data provided by UNIDO at the 84th meeting indicated 48 workers. UNIDO's model, which the Secretariat used at the 85th meeting to estimate lost profits, did not consider the cost of labour based on 65 employees; if it did, lost profits would be lower.

25. The Secretariat further noted that the enterprise had diversified its business through the commercialization of other refrigerant gases (i.e., importing HFC-125 and HFC-32 for in situ blending of R-410A; and importing HFC-134a and R-404A for sale); the establishment of a nitric acid plant; and the distribution of these products with its own transport fleet. In the case of closure, severance for workers of FIASA's HCFC-22 production line is eligible, while severance for workers employed by FIASA for operations other than the production of HCFC-22 is not. In 2018, FIASA's HCFC-22 production line was in operation for less than half of the year; UNIDO reported that workers may assist in the operation of the nitric acid plant or perform maintenance on the site when the HCFC-22 production line was not in operation.

26. After further consideration of the expansion of the business operation of FIASA, and the respective eligibility of workers that are related to the production of HCFC-22 and those that are not, the Secretariat considered the 48 workers identified by UNIDO at the 84th meeting as working principally in the production of HCFC-22. **The decree by the Ministry of Justice and Human Rights that doubles the compensation for workers that are dismissed without just cause was extended on 10 June 2020 for a further 180 days. On this basis, the severance for the 48 workers would amount to US \$2,017,835.²⁰**

¹⁸ The International Monetary Fund forecasts Argentina's GDP will contract by 5.7 per cent in 2020, <https://www.imf.org/~media/Files/Publications/WEO/2020/April/English/StatsAppendixA.ashx?la=en>

¹⁹ UNEP/OzL.Pro/ExCom/80/56

²⁰ **Based on the most recent exchange rate at the time of finalization of the present document of 70.15 ARS per US dollar, effective 26 June 2020.**

Funding return associated with verification of HCFC-22 production

27. At its 84th meeting, the Executive Committee approved the second tranche of stage II of the HPMP for Argentina (decision 84/64). Stage II included US \$8,333/yr for annual monitoring of HCFC-22 production and stockpiles, and in situ verification by experts (for a total of US \$50,000). Should the Executive Committee choose Option 1, the Executive Committee may wish to consider requesting UNIDO to return to the 86th meeting US \$16,667, plus agency support costs of US \$1,167, associated with the production monitoring for 2021 and 2022.

Option 2: Restarting the incinerator and continue production of HCFC-22

28. The incremental capital costs for refurbishing the incinerator amounts to US \$1,168,801 (i.e., those proposed by the Secretariat at the 83rd meeting). However, the level of IOCs had been adjusted as follows:

- (a) A production of 1,540 mt/yr (i.e., average 2017-2019 production) of HCFC-22 between 2020 and 2024, and 1,300 mt/yr between 2025 and 2029;
- (b) A discount rate of 38.1 per cent; and
- (c) Destruction of HFC-23 would start on 1 January 2021 (i.e., assuming refurbishment of the incinerator would take six months).

29. The NPV for restarting the incinerator and continue producing HCFC-22 varies between US \$1,207,771 (one year IOC) and US \$1,306,104 (nine years IOC) as shown in Table 1.

Table 1. NPV (US \$) of Option 2 as a function of the number of years for which IOCs are provided

Years	1	2	3	4	5	6	7	8	9
NPV	1,207,771	1,235,989	1,258,027	1,273,984	1,285,048	1,293,060	1,298,862	1,303,063	1,306,104

30. If the 2019 production of 1,606 mt/yr, rather than the average 2017-2019 production, is used for 2021-2024, the NPV would range between US \$1,208,257 (one year IOC) and US \$1,307,382 (nine years IOC).

31. The Secretariat notes that the operation of the incinerator would only commence on 1 January 2021 given the time needed to refurbish it, resulting in increased emissions for four months of HFC-23 by-product (i.e., 16.64 mt of HFC-23, or 246,208 mt-CO₂eq) relative to Option 1.

32. At the 84th meeting, UNIDO had noted that the option to refurbish the incinerator included replacing the exotic metal burner for one of smaller size in order to allow a lower mass-rate of HFC-23 to be incinerated at a higher efficiency, and at lower design capacity, than the original burner, allowing the incinerator to be operated continuously when the HCFC-22 production line was in operation. If the incinerator was not operated continuously, FIASA would need to temporarily store the HFC-23 in its cryogenic tank, triggering a requirement for the enterprise to register as a hazardous waste generator and hazardous waste treatment facility, which the Government could not compel it to do. However, the Secretariat noted that FIASA was operating under the same regulatory requirements when the enterprise was generating credits under the Clean Development Mechanism; during that period, FIASA stored HFC-23 by-product in its cryogenic storage tank and operated the incinerator in campaigns. Moreover, operating the incinerator in campaigns decreases the labour and other fixed costs. Therefore, the Secretariat did not recommend the reduction in capacity of the burner but to instead replace it with one of the same capacity as in the original design.

Project management unit (PMU) for Option 1 or Option 2

33. The Government of Argentina requested funding for a PMU, at 8 per cent of the total funding of the project in the case of Option 2 (i.e., continued operation of FIASA), or 6.2 per cent in the case of closure of the production plant. In its assessment of refurbishment of the incinerator, the Secretariat included costs related to Government monitoring; in line with past practice, the Secretariat's assessment did not include a PMU for the closure option.

Views expressed by the Government of Argentina

34. Regarding closure of FIASA, the Government of Argentina, through UNIDO, noted the following:

- (a) Given the 2019 economic crisis, FIASA was not able to reach the production target of between 2,000 and 2,600 mt in 2019 as originally forecasted; however, sales of HCFC-22 increased by 14 per cent relative to 2018, and the price of HCFC-22 was well-forecasted under UNIDO's model. Therefore, the Government could accept as the basis for determining compensation the average 2017-2019 sales between 2020 and 2024, and 1,300 mt/yr between 2025 and 2029;
- (b) The financial model developed by UNIDO at the 83rd meeting was based on the best data available at that time, the methodology was consistent with past practice under the Fund; and funding from the Multilateral Fund is provided in US dollars. Accordingly, the financial model should be based on a single currency (US dollars) and not a mix of currencies. **A loan in local currency taken in 2019 at an exchange rate of 40 ARS per US dollar and with an interest rate of 70 per cent, would result in an effective US dollar interest rate of 4.6 per cent after taking into account an exchange rate of 65 ARS per US dollar on the loan and the interest, which is lower than the 7.5 per cent interest rate used in UNIDO's model.** While it was not possible at this time for UNIDO to develop a new financial model, it was of utmost importance to consider the enterprise's capacity to sustain the product price in US dollars. FIASA's HCFC-22 price increased by 7 per cent in US dollars between 2019 and 2020, demonstrating that the enterprise is able to increase the price in both local currency and US dollars, which it is able to do as it operates in a duopoly. Moreover, the local costs of production, which are in ARS, decrease when assessed in US dollars;
- (c) FIASA's role in the duopoly has been strengthened given the reduction of the import quota given the 2020 control target. This impact will be even higher in 2025, when the import quota will be further reduced;
- (d) The Government strongly disagreed with the discount rate used by the Secretariat to calculate the NPV of compensation. Despite the low interest rates prevailing in Argentina for US dollar-based loans between 1.9 per cent (90 days) and 2.9 per cent (one year), UNIDO used a much higher (10 per cent) discount rate;
- (e) In view of the difficult economic situation and the high interest rates prevalent in the country, owners are opting to repair rather than replace their appliances. Thus, HCFC-22 based appliances continue to be used even though their leakage rate increases with their age; therefore, current HCFC-22 demand is unlikely to fall;
- (f) It would be more accurate to describe FIASA's 2019 price of HCFC-22 as approximately a factor of three higher than the international price of an Asian supplier for bulk product supplied to large consumers on a high-volume market. FIASA supplies small quantities in cylinders to local retailers or consumers. These are two different products with different

prices; and

- (g) It is common practice in Argentina for a decree to initially enter into force for 180 days, and to be renewed for several years every 180 days. The decree currently in force that doubles compensation was reinforced after the declaration of emergency for the COVID-19 pandemic, and at this time any lay-offs must be agreed with the Ministry of Labor.

35. Regarding refurbishment of the incinerator, the Government of Argentina noted that replacement of the exotic metal burner was unavoidable since it is not operational. The original equipment manufacturer suggested to replace the burner with one more suitable for the current reduced rate of HFC-23 by-product generation. The Government therefore considered the replacement of the burner eligible. **In addition, the Government did not agree with the discount rate suggested by the Secretariat. Accordingly, operating costs could be paid on an annual basis based on the HFC-23 by-product generated and associated control costs, thereby avoiding the need for an upfront payment and the application of disputed discount rates.**

36. The Government also provided audited statements reflecting FIASA's profit in 2017 and 2018, which was between US \$1.9 million and US \$2.4 million. The Secretariat notes that those statements encompass all of FIASA's operations and do not specify the profits, if any, derived from HCFC-22 production.

37. The Government considers that FIASA continues to be financially viable, otherwise, it would no longer be able to receive loans from a bank. Accordingly, the Government was not in agreement with the lost profit calculations by the Secretariat.

38. **Based on the above, and with the aim to reach Kigali's spirit,** the Government of Argentina **believes any discussion on closure should be at** a minimum of US \$6 million (including severance for workers and compensation for lost profits). If an agreement on the closure of FIASA cannot be reached, FIASA would continue production of HCFC-22 and start destruction of HFC-23 by-product as soon as the funding is agreed and the required refurbishment of the equipment is completed.

Conclusion

39. Since the 83rd meeting, Argentina suffered a severe economic crisis that, in the Secretariat's assessment, has resulted in FIASA being no longer financially viable. This does not mean the enterprise would immediately close its HCFC-22 production. It has been able to continue producing HCFC-22 by increasing its price, which it can do because it operates in what is effectively a duopoly, with importers almost fully utilizing their import quotas and FIASA satisfying the remaining market demand. In an open market, an increase in the price of a commodity would lead to decreased demand, with that decrease depending on the elasticity of demand. In a duopoly, such elasticity of demand is limited. However, while the HCFC-22 market may effectively be a duopoly in Argentina, the refrigerant market is not: as the price of HCFC-22 increases, other refrigerants are likely to substitute the HCFC-22 demand. It is likely that FIASA could continue to produce HCFC-22 by increasing its price for some indeterminate time, with a cycle of increasing prices of HCFC-22 leading to further decreases in demand and production leading to further increasing prices of HCFC-22. The devaluation of the ARS will further contribute to this cycle as consumers purchase HCFC-22 from FIASA in local currency.

40. Since the 80th meeting, when the Government of Argentina provided preliminary data to close its HCFC-22 production swing plant,²¹ the Government has requested assistance from the Multilateral Fund to address its emissions of HFC-23 by-product. At its 82nd meeting, the Executive Committee considered information on *inter alia* options and all costs and savings related to the control of HFC-23 by-product

²¹ UNEP/OzL.Pro/ExCom/80/56

emissions in Argentina,²² and at the 83rd and 84th meetings proposals from the Government to address those emissions.²³ The Secretariat notes that approval of a project for Argentina at the present meeting would enable the control of HFC-23 by-product emissions as soon as possible and therefore help maximize the climate benefits of the Kigali Amendment.

41. At its 16th meeting, the Executive Committee decided that ODS consumption should be calculated on the basis of either the year, or an average of the three years, immediately preceding project preparation. This approach ensured that if Article 5 countries faced an anomalous situation in the year preceding project preparation, a more representative basis (i.e., the average of the three years) could be considered. While **the independent consultant's and the Secretariat's** assessment is that FIASA would no longer be financially viable under the 2019 economics of production, the Secretariat considers the 2019 economic crisis in Argentina to be anomalous. Article 5 countries should request assistance from the Multilateral Fund when they need assistance to comply with their obligations under the Protocol and independently of whether conditions in the country at that time may affect the level of compensation. In its wisdom, the Executive Committee decided at its 16th meeting to provide Article 5 countries with flexibility to address anomalous years. The Executive Committee may wish to consider applying a similar flexibility for FIASA.

42. **The Secretariat estimated the cost of closure to be US \$2,017,835 given that the decree that doubles the compensation for workers that are dismissed without just cause was extended for 180 days on 10 June 2020, and based on the economics of production in 2019 (i.e., lost profits would be zero). An alternate scenario based on a more favourable economic situation in Argentina than the one that prevailed in 2019, and assuming that FIASA's sales of HCFC-22 would not decrease as indicated in the independent technical audit, would result in a total level of funding of US \$4,676,055.** The level of funding for the continued production of HCFC-22 and destruction of HFC-23, varied between US \$1,207,771 and US \$1,307,382, depending on the number of years for which funding support is provided and whether the average 2017-2019 production or the 2019 production is used to determine IOCs.

43. Notwithstanding constructive discussions with UNIDO, agreement on the costs of the project could not be reached. In order to facilitate the Executive Committee consideration of the project, the Secretariat has included in the present document a recommendation, noting that the project's final costs will depend on the Executive Committee's deliberations.

44. As there were no agreed costs, the Secretariat could submit a draft Agreement between the Government of Argentina and the Executive Committee to the 86th meeting reflecting any guidance provided at the 85th meeting. That draft Agreement would specify the funding levels, targets and obligations, and *inter alia* address the following:

- (a) In the case of continued operation of the HCFC-22 production line and refurbishment of the incinerator:
 - (i) The submission of annual progress reports on the status of the project, including the level of disbursement, the quantity of HCFC-22 produced, and the quantity of HFC-23 by-product generated, destroyed, sold, stored and emitted, together with an annual independent verification report documenting the Government of Argentina's compliance, through the completion of the project; and
 - (ii) The level of penalty that would be applied to emissions of HFC-23 by-product that were determined not to have been destroyed to the extent practicable;

²² UNEP/OzL.Pro/ExCom/82/69

²³ UNEP/OzL.Pro/ExCom/83/44 and UNEP/OzL.Pro/ExCom/84/71

- (b) In the case of closure of the HCFC-22 production line:
 - (i) The submission of annual progress reports until completion of the project, on the status of the project, including the level of disbursement, and the submission of an independent verification report, in line with the guidelines and procedures approved by the Executive Committee, including evidence of the dismantling of key equipment; and
 - (ii) The level of penalty that would be applied to HFC-23 by-product that was determined to have continued to be emitted after a date specified by the Committee;
- (c) The level of agency support costs, and the role of the agency in the project; and
- (d) That UNIDO would submit the project completion report six months after the date of completion of the project, to be agreed at the 85th meeting, and that any remaining balances after the completion of the project would be returned to the Multilateral Fund within 12 months of the project completion.

Recommendation

45. The Executive Committee may wish to:

- (a) Note the key aspects related to HFC-23 by-product control technologies: Argentina (decision 84/90) contained in document UNEP/OzL.Pro/ExCom/85/64;
- (b) Approve, in principle, US \$[XXX], plus agency support costs of US \$ [XXX] for UNIDO, to enable the Government of Argentina to comply with the HFC-23 by-product emission control obligations under the Kigali Amendment to the Montreal Protocol, on the understanding that:
 - (i) *[In the case of closure:* The Government of Argentina would ensure that by [date] the production of HCFC-22 and generation of HFC-23 by-product in Argentina was zero;

OR

In the case of continued operation: The Government of Argentina would ensure that by [date], emissions of HFC-23 by-product from HCFC-22 production in Argentina were destroyed in compliance with the Montreal Protocol;]
 - (ii) The project would be completed by [date];
- (c) *[In the case of closure:* Request UNIDO to return to the 86th meeting US \$16,667, plus agency support costs of US \$1,167, associated with the production monitoring for 2021 and 2022;]
- (d) Note that the funding approved in principle specified in sub-paragraph (b) above is the total funding that would be available to Argentina from the Multilateral Fund for the control of HFC-23 by-product emissions; [and]
- (e) Request the Secretariat, in cooperation with UNIDO, to prepare a draft Agreement between the Government of Argentina and the Executive Committee for the control of HFC-23 by-product emissions for consideration at the 86th meeting, in light of the guidance

provided by the Executive Committee at the present meeting [; and]

- (f) [Approve the first tranche of the HFC-23 by-product control emissions for Argentina, and the corresponding 2020-2021 implementation plan, at the amount of US \$[XXX], plus agency support costs of US \$[XXX] for UNIDO.]

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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eighty-fourth Meeting
Montreal, 16–20 December 2019

**KEY ASPECTS RELATED TO HFC-23 BY-PRODUCT CONTROL TECHNOLOGIES:
ARGENTINA (DECISION 83/66)****Background**

1. At its 83rd meeting, the Executive Committee considered project proposal options to control and phase out HFC-23 emissions at Frio Industrias Argentinas (FIASA), at a total cost between US \$10,867,000 and US \$59,667,000, plus agency support costs,¹ as originally submitted in line with decision 82/85(e).
2. During the discussions, Executive Committee members expressed general agreement that the detailed evaluation of the project was of significant value for the assessment of similar future projects and contributed to the discussion on the policy issues identified in the second part of the project document.
3. Issues identified for further discussion² included the influence of Government policies and regulations on the availability of cost-effective options and the impact of the history of the swing plant, including the Clean Development Mechanism (CDM) project to control HFC-23 by-product emission implemented at the facility during 2007–2013. Questions were also raised regarding: the estimation of the market price of HCFC-22 and the cost of the raw materials; the methods used to estimate the remaining life of the facility and the date by which it would no longer be financially viable; and determination of the eligible incremental operating costs of the project.
4. Further to additional clarifications by the Secretariat, the Executive Committee agreed to establish a contact group to consider the project proposal options to control HFC-23 by-product emissions in Argentina and related policy issues identified by the Secretariat, and the request for project preparation for the control of HFC-23 by-product emissions in the HCFC production sector in Mexico submitted as part of the work programme of UNIDO for 2019, under agenda item 9(c)(iii).

¹ UNEP/OzL.Pro/ExCom/83/44.

² Paragraphs 260-263 of UNEP/OzL.Pro/ExCom/83/48.

5. Subsequently, the convener of the contact group reported that the group had reached agreement on approving the project preparation request for Mexico, but had been unable to conclude its deliberations on the proposal to control HFC-23 by-product in Argentina. Accordingly, the Committee decided to defer to the 84th meeting further consideration of the project proposal to control HFC-23 by-product emissions in Argentina (decision 83/66(b)).

Resubmission of the project proposal to the 84th meeting

6. In line with decision 83/66(b), on behalf of the Government of Argentina, UNIDO has re-submitted the project proposal to control and phase out HFC-23 emissions at FIASA.³ In reviewing the resubmitted project proposal, the Secretariat noted that the three options for addressing emissions of HCF-23 by-product, namely closure of the HCFC-22 production at FIASA (Option 1), restarting the incinerator at FIASA (Option 2), and off-site destruction of HFC-23 by-product (Option 3), are identical to those reflected in the project document submitted to the 83rd meeting. Therefore, the Secretariat has appended that project document to the present document.

7. Together with the project proposal, UNIDO submitted the following information that the Executive Committee may wish to consider:

- (a) Between 1 January 2019 and 30 June 2019, the HCFC-22 production at FIASA was 610 metric tonnes (mt), which is 4 per cent higher than the 2018 level of production during that same period. Sales of HCFC-22 for that same period showed a higher increase (11 per cent) given higher demand and the availability of stocks;
- (b) The Government of Argentina reiterated its request for funding for a project management unit (PMU), at 6.2 per cent of the total funding of the project in the case of closure of the production plant, or 8 per cent in the case of continued operation of FIASA;⁴
- (c) UNIDO reiterated its request for 7.0 per cent agency support costs, irrespective of the option selected.

Update on the status of ratification of the Kigali Amendment

8. The Executive Committee may wish to note that the Government of Argentina ratified the Kigali Amendment on 22 November 2019.

Update on the financial viability of FIASA

9. Subsequent to the 83rd meeting, the Argentina peso lost approximately half of its value against the U.S. dollar relative to the average 2018 exchange rate; and, as of September 2019, the inflation rate in Argentina was 54 per cent. Given this situation, during the project review process, the Secretariat discussed the financial viability of FIASA in light of the devaluation of the national currency.

10. Notwithstanding the low level of production relative to the enterprise's capacity, both the technical audit undertaken by the independent expert at the 83rd meeting and the assessment undertaken by UNIDO concluded that FIASA was profitable given the conditions in Argentina prevailing at the time the proposal had been submitted.

³ As per the letter of 23 September 2019 from the Ministry of Foreign Affairs and Worship of Argentina to UNIDO.

⁴ While funding for a PMU was not requested in the proposal options submitted to the 83rd meeting, a request for such funding was raised during the review of the project, as reflected in paragraphs 66 and 67 of document UNEP/OzL.Pro/ExCom/83/44.

11. FIASA's production of HCFC-22 is dependent on imports of chloroform and anhydrous hydrogen fluoride (AHF). As such, its profitability is directly related to the price at which it can purchase those chemicals from the international market. Based on the lost profits calculated by UNIDO for 2018, and the assessment undertaken by the independent technical expert, FIASA would no longer be profitable if the price of chloroform and AHF were adjusted to reflect the current exchange rate, and all other variables were kept constant. The Secretariat also requested the independent consultant that had undertaken a technical audit of FIASA to determine the costs of closure for the 83rd meeting to provide an assessment of the impact of Argentina's changing economic conditions on HCFC-22 production costs at FIASA. As that assessment may contain information considered confidential, Executive Committee members wishing to review the assessment may request it from the Secretariat on the understanding that the information and data contained therein is only for the evaluation of the project and not to be disclosed to a third party.

12. In addressing this issue, UNIDO considered that FIASA remains financially viable given the current economic situation in Argentina in light of the following:

- (a) While the value of Argentina peso decreased, the inflation rate increased. The currency devaluation has a similar impact on importers, but FIASA's fixed costs have been reduced in U.S. dollars, which should help FIASA compete in export markets due to lower production costs; and
- (b) The financial viability of FIASA also depends on HCFC-22 demand. Demand in 2018 dropped substantially due to the devaluation of the currency, with enterprises and consumers deciding to delay servicing, and there was no purchase power to replace old HCFC-22 equipment with new appliances. As the economy recovers, it is expected that service demand will significantly increase.

Concerns raised in relation to the document submitted to the 83rd meeting

13. In resubmitting the project proposal to the 84th meeting, UNIDO included the following concerns in relation to the document submitted to the 83rd meeting. For ease of reference, Secretariat's clarifications on the concerns are also presented:

- (a) *'(...) production has been declining, dropping from 1,823 mt in 2017 to 1,192 mt in 2018, and it is expected to continue for the next five years.'*⁵

UNIDO indicated that it was not clear how the projected decline in HCFC-22 production for the next five years in the technical audit was made. The decline in production in 2018 was directly related with the contraction of the economy of Argentina, which resulted from the interest rate policy implemented to moderate the impact of the exchange rate. The Industrial Production Index for machinery increased between January and July 2019, and that increase is reflected in the increased sales of HCFC-22 by FIASA through June of 2019. UNIDO also highlighted that the import-production quota system in place in Argentina should be taken into account when estimating the profitability of the enterprise.

The Secretariat notes that regarding the projected decline in HCFC-22 production, the independent consultant assumed that HCFC-22 production at FIASA would increase in 2019 by approximately 25 per cent (to approximately 1,486 mt), in line with a market recovery, and then slowly continue to decline in line with historic trends, until production was no longer economically viable in 2023. At the 83rd meeting, the independent consultant

⁵ Related to paragraph 40 of UNEP/OzL.Pro/ExCom/83/44.

also presented an alternative scenario⁶ in which there was no market recovery and production in 2019 remained constant; under that scenario, production would no longer be economically viable in 2022. In 2018, consumption of HCFCs in Argentina fell by 26 per cent; the reduction in production at FIASA accounted for 98 per cent of that decline.⁷ Future declines in consumption are likely to continue to be disproportionately borne by FIASA.

- (b) *“Demand for HCFC-22 in Argentina continues to decline given the continued implementation of the stage II of the HCFC phase-out management plan (HPMP), as well as the conversion of the country’s air-conditioning manufacturing sector to R-410A;”⁸*

In 2018, consumption of HCFCs in Argentina fell by 26 per cent from 2017 consumption. The reduction in production at FIASA accounted for 98 per cent of that drop;”⁹

UNIDO indicated that the conversion of the air-conditioning manufacturing sector to R-410A took place in 2014 and, therefore, the decline in consumption in 2018 was not a consequence of that conversion.

The Secretariat notes, however, that the conversion of the air-conditioning manufacturing sector to R-410A that took place in 2014 will contribute to the decline in servicing demand for HCFC-22.

- (c) *“Based on the annual quantities of HFC-23 by-product generated and the capacity of the incinerator (613 mt/yr), the incinerator would need to be operated 31 days per year. Accordingly, the total incinerator fixed costs (i.e., operating labor, nitrogen, maintenance, and overhead) are estimated at two months of the annual costs proposed by UNIDO;”¹⁰*

UNIDO indicated that the option to refurbish the incinerator included replacing the exotic metal burner for one of smaller size in order to allow a lower mass-rate of HFC-23 to be incinerated at a higher efficiency, and at lower design capacity, than the original burner. Accordingly, incinerator staff would be necessary to operate the incinerator until 2030.

The Secretariat notes that while the exotic metal burner of the incinerator could be replaced with one of smaller size that would allow the HFC-23 to be incinerated at a higher efficiency, such improved efficiency was not taken into account when assessing the operating costs of the incinerator. While minor savings in operating costs may be possible with a more efficient burner, through reduced consumption of natural gas, it would be more cost-effective to replace the burner with one comparable to its original size and to operate the incinerator for a limited number of days.

⁶ Slide 7 of <http://multilateralfund.org/83session/Document%20Library3/1/Presentation%20of%20the%20audit%20report%20by%20Wakim%20Consulting.pdf>

⁷ Paragraph 43(g) of UNEP/OzL.Pro/ExCom/83/44.

⁸ UNEP/OzL.Pro/ExCom/61/28 and decision 61/34.

⁹ Related to paragraphs 43(f) and (g) of UNEP/OzL.Pro/ExCom/83/44.

¹⁰ Related to paragraph 51(c) of UNEP/OzL.Pro/ExCom/83/44.

Submission of the second tranche of the stage II of the HPMP to the 84th meeting

14. The Executive Committee will consider the request for the second tranche of stage II of the HPMP for Argentina under agenda item 9(f).¹¹ Should the Executive Committee decide on the option of closure of FIASA, the Executive Committee may wish to note that the balances of funds already approved to monitor the production at FIASA under stage II of the HPMP would be returned to the Fund under that agenda item, and the Agreement for the HPMP would be amended to remove the funds approved in principle at the time of closure for the monitoring of production of HCFC-22 at FIASA.

¹¹ UNEP/OzL.Pro/ExCom/84/39.

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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eighty-third Meeting
Montreal, 27– 31 May 2019

**KEY ASPECTS RELATED TO HFC-23 BY-PRODUCT CONTROL TECHNOLOGIES
(DECISION 82/85)**Background

1. At its 79th meeting, the Executive Committee *inter alia* considered 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 to submit preliminary data to the 80th meeting (decision 79/47(c) and (d)). At the 80th meeting, the Committee considered document UNEP/OzL.Pro/ExCom/80/56, containing preliminary information submitted by the Government of Argentina in line with decision 79/47(d).
2. At its 81st meeting, the Executive Committee requested the Secretariat to contract an independent consultant to prepare a report for the 82nd meeting, providing information:
 - (a) On options and all costs and savings related to the control of HFC-23 by-product emissions in Argentina, based on the quantities of HCFC-22 and HFC-23 produced at the plant and information included in relevant past reports to the Executive Committee, including the option of shipping HFC-23 for off-site destruction;
 - (b) On estimates of fugitive emissions and options for monitoring, leak detection and control of HFC-23 by-product at the plant; and
 - (c) On the costs, technical feasibility, and logistical, legal and transaction issues associated with shipping HFC-23 for off-site destruction by means of a technology such as the fluor process described in document UNEP/OzL.Pro/ExCom/81/54.
3. The Executive Committee further requested the Government of Argentina to provide, on a voluntary basis, relevant information for the report referred to above (decision 81/68).
4. At its 82nd meeting, the Executive Committee *inter alia* decided:

- (c) To approve US \$75,000 for UNIDO to enable the agency to submit, at the 83rd meeting, a project proposal options that would enable the Government of Argentina to comply with the HFC-23 by-product control obligations under the Kigali Amendment, taking into account the information contained in document UNEP/OzL.Pro/ExCom/82/69, including data regarding costs and benefits and covering technical feasibility, economic viability and logistical, legal, and transactional issues in relation to the following:
 - (i) Restarting the onsite incinerator at the HCFC-22 production swing plant FIASA, on the basis of three independent estimates of the costs of so doing, including the costs of incinerator operation, hazardous waste compliance, and cost of monitoring and verifying the destruction of the HFC-23 by-product;
 - (ii) Compensation for closure of the HCFC-22 swing plant FIASA by 1 January 2020 or upon ratification of the Kigali Amendment by the Government of Argentina, whichever was to come first;
 - (iii) Destroying HFC-23 by-product through irreversible transformation and other new conversion technologies and storage options for HFC-23 management;
 - (iv) Shipping HFC-23 for offsite destruction by means of a technology approved by the meeting of the Parties;
- (d) To consider each of the project proposal options, including the data provided as per sub-paragraph above, and to discuss the criteria for funding the activities related to the compliance obligations of Article 5 parties;
- (e) To request the Secretariat to contract an independent consultant to undertake a technical audit of FIASA to determine the costs of closure;
- (f) To approve US \$50,000 to enable the Secretariat to carry out the technical audit referred to in sub-paragraph (e) above; and
- (g) To consider applying the procedures set out in the present decision, and the criteria for funding the activities related to the compliance obligations of Article 5 parties, when agreed, with respect to HFC-23 controls in the other Article 5 parties (decision 82/85).

5. In line with decision 82/85, on behalf of the Government of Argentina, UNIDO has submitted project proposal options to control and phase out of HFC-23 emissions at Frio Industrias Argentinas (FIASA), at a total cost between US \$10,867,000, plus agency support costs of US \$760,690, and US \$59,667,000, plus agency support costs of US \$4,176,690, as originally submitted.¹

Scope of the document

6. The present document consists of the following two parts:

Part I: Project proposal for Argentina. It presents a description of the project proposal submitted by the Government, a summary of the independent technical audit² carried out by a consultant, and the Secretariat's comments.

¹ As per the letter of 21 March 2019 from the Ministry of Foreign Affairs and Worship of Argentina to UNIDO.

² For the selection of the consultant, the Secretariat advertised the vacancy on its website, the United Nations (UN) careers website, and the websites of the Society of Women Engineers and the American Association of Cost Engineers.

As both the proposal by UNIDO and the technical audit by the consultant contain information considered confidential, the present document summarizes both submissions, and presents the Secretariat's comments. Executive Committee members wishing to review the submissions may request them from the Secretariat on the understanding that the information and data contained therein is only for the evaluation of the project and not to be disclosed to a third party.

Part II: Policy issues related to control of HFC-23 by-product emissions. Identifies policy issues for which the Secretariat is seeking the Executive Committee guidance with respect to HFC-23 by-product emission controls in the Article 5 parties in line with decision 82/85(d) and (g), and presents a recommendation.

PART I. PROJECT PROPOSAL FOR ARGENTINA

Project description

7. The project proposal submitted by UNIDO presents options that would enable the Government of Argentina to comply with the HFC-23 by-product control obligations under the Kigali Amendment.

Report on HCFC consumption

8. The Government of Argentina reported a 2018 consumption of 198.42 ODP tonnes of HCFCs (i.e., 50 per cent below the baseline), and a production of HCFC-22 of 65.57 ODP tonnes (i.e., 71 per cent below the baseline and 35 per cent below the 2017 level). The 2014-2018 HCFC consumption and production is shown in Table 1.

Table 1. HCFC consumption and production in Argentina in ODP tonnes (2014-2018 Article 7 data)

HCFC	2014	2015	2016	2017	2018*	Baseline
HCFC-22	159.73	167.38	127.89	135.52	109.36	267.3
HCFC-123	1.56	2.23	2.22	3.25	0.87	1.5
HCFC-124	0.63	0.85	0.46	0.17	0.00	1.0
HCFC-141b	104.69	107.66	91.25	105.41	83.90	113.4
HCFC-142b	9.48	17.31	7.23	3.94	4.28	17.5
Total consumption	276.09	295.42	229.05	248.29	198.42	400.7
Total HCFC-22 production	125.73	134.53	95.84	100.27	65.57	224.54

*Country programme data submitted on 1 April 2019.

9. At the 79th meeting, the Secretariat reported that the low levels of HCFC consumption in recent years have been largely due to a slow-down of the economy, as well as exchange-rate control measures that have prevented some importers from fulfilling their entire quota. These circumstances, which are not related to the need for HCFC in the local market, were expected to revert to their previous status in the near future, with a potential increase in the consumption of HCFCs.³ Since then, Argentina has suffered an economic crisis, resulting in a devaluation of the Argentina Peso by approximately 60 per cent relative to other currencies (e.g., Chinese Yuan, American dollar, Euro).

Applicants were reviewed by a panel comprising three Secretariat staff, and the contract for the selected applicant was issued in February 2019.

³ UNEP/OzL.Pro/ExCom/79/27

Status of the ODS production sector

10. FIASA was established in 1986 and produced CFC-11 and CFC-12 until 2007, when its swing plant was converted to producing HCFC-22.⁴ Since then, it has been the sole HCFC producer in Argentina and produces HCFC-22 solely for domestic ODS use.

11. FIASA implemented a Clean Development Mechanism (CDM) project to control HFC-23 by-product emissions from 15 October 2007 to 14 October 2013. On 15 October 2007 FIASA commissioned a new thermal oxidation incineration system purchased from SGL Carbon Group of Meitingen, Germany. FIASA also installed a 40 metric tonnes (mt) cryogenic tank to store HFC-23 and to improve the control of the HFC-23 feed to the incinerator. In October 2013, after the termination of the CDM project, the incinerator was shut down and has remained idle since then; the pipe for the HFC-23 stream (consisting of about 93 per cent of HFC-23 and the balance mainly of HCFC-22) was severed; and the HFC-23 stream was and continues to be vented to the atmosphere.

12. Aside from installing the incinerator and replacing a distillation tower, all other infrastructure and major capital equipment at FIASA remain unchanged since then; the 33-year old reactors are still in use.

Project proposal options

13. UNIDO submitted the following three options for addressing emissions of HCF-23 by-product:⁵

Option 1: Closure of the HCFC-22 production at FIASA

Option 2: Restarting the incinerator at FIASA

Option 3: Off-site destruction of HFC-23 by-product

14. For each option, several scenarios were presented based on technical feasibility (availability of proven technology), regulatory framework (national and international regulations concerning production, treatment, handling, storage, transportation and transboundary movement of HFC-23), and timeliness (whether the option could be implemented by 1 January 2020), as outlined below.

15. UNIDO also provided a legal assessment of the proposed control options (the full assessment is available upon request by members of the Executive Committee).

16. No proposals were submitted for destroying HFC-23 by-product through irreversible transformation and other new conversion technologies, and storage options for HFC-23 management, as requested in decision 82/85(c)(iii), given the lack of data on such options. However, the proposal included a discussion of possible conversion of the line to produce HFC-32.⁶ This option was not further elaborated as currently there is no market for HFC-32 in Argentina, such a conversion may not be sustainable in the long-term, sufficient information on the process and production technology was not available, and the possible investment costs required for such a conversion. In addition, the submission discussed the possible uses of HFC-23 as a feedstock and for controlled uses; the former are of limited commercial and technical

⁴ The Executive Committee approved US \$10,600,000 for the phase-out and closure of the entire CFC production capacity in Argentina.

⁵ For the purpose of the present document, the options have been presented in this order to facilitate the review of the options, as relevant information in one option is used in other options.

⁶ As explained in UNEP/OzL.Pro/ExCom/83/11/Add.1, production of HFC-32 uses anhydrous hydrogen fluoride (AHF) and dichloromethane (i.e., methylene chloride) as raw materials, while production of HCFC-22 uses AHF and trichloromethane (i.e., chloroform).

maturity, and the latter was not considered viable given the investments needed to process the HFC-23 stream to meet the quality requirements for such controlled uses.

Legal assessment of control options

17. National law N° 24.051 regulates generation, handling, transport, treatment and final disposal of hazardous waste. In particular, Article 2 of the Law defines hazardous waste, and Articles 14 and 33 define a hazardous waste generator and hazardous waste treatment facilities.⁷ In the province of San Luis, where FIASA is located, Decree N° 2092 regulates the application of the National law N° 24.051; Annex V of Decree No. 2092 regulates the limits for gaseous emissions, but it does not include limits for the releases of HFC-23. For this reason, before the implementation of the incineration system, the HFC-23 emissions produced as a result of the production of HCFC-22 was not controlled. Therefore, HFC-23 emissions produced since FIASA put the incinerator on hold, were not controlled either.

18. All of the country's hazardous waste laws and regulations would apply to the generation, treatment, storage, transportation, and transboundary movement of HFC-23 by-product for destruction. The responsibility for any damages caused by the HFC-23 until its proven elimination lies with the generator. Even if the waste was handed over for transportation, storage, treatment or destruction to another entity, the generator of waste remains jointly liable for any damages, even if it was caused by another enterprise.

19. Argentina does not regulate gaseous emissions such as HFC-23 under its hazardous waste legislation. However, when a gaseous hazardous waste is captured in a container, the substance is classified as hazardous waste. Thus, any option that includes the placing of HFC-23 by-product in any tank (i.e., a cryogenic tank for storage, or an isotank to transport HFC-23 for off-site destruction), would require FIASA to register as a generator of hazardous waste. Operation of the on-site incinerator would further require FIASA to register as a hazardous waste treatment facility. Transportation of hazardous waste also requires a license. As yet, no license has been issued by the federal or by the provincial authorities to any entity to transport HFC-23 or used hazardous waste containers in the country.

20. UNIDO highlighted that registering as hazardous waste generator and treatment facility is a complex procedure whose duration is uncertain, and no authority can oblige an entity to undertake such registration. Moreover, the following challenges were identified:

- (a) FIASA would need to register as a hazardous waste generator;
- (b) For Option 2, FIASA would also need to register as a hazardous waste treatment facility;
- (c) For Option 3, FIASA would also need to register as a transporter of hazardous waste, or find an enterprise that is registered, and register as an exporter of hazardous waste. In addition, FIASA would need to apply for permits to transport hazardous waste in both the San Luis and the Buenos Aires provinces; and
- (d) For Option 3, as Argentina is a signatory of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention), and the Government of Argentina considers that HFC-23 for destruction would fall within category y45 of Annex I of the Convention and, therefore, would be a hazardous waste, permission would have to be received from the country where HFC-23 would be destroyed and any transit countries through which the waste would be shipped.

⁷ A hazardous waste is every waste that can cause damage, directly or indirectly, to living beings or pollute the soil, water, atmosphere or environment in general. The provisions also apply to those hazardous residues that may constitute inputs for other industrial processes. A generator is every natural or legal person that, as a result of their actions or any process, operation or activity, produce waste qualified as hazardous in the terms of Article 2 of the law.

Option 1: Closure of the HCFC-22 production at FIASA

21. Compensation would be provided to FIASA for the closure of the production facility by 1 January 2020 or upon ratification of the Kigali Amendment by the Government of Argentina, whichever comes first.

22. In order to forecast future sales and production from 2020 through 2029, UNIDO developed the four scenarios shown in Table 2 based on different levels of HCFC-22 production between 2020 and 2030 and different levels of the price of HCFC-22 during that period.

Table 2. Scenarios to forecast HCFC-22 production and sales over the 2020-2030 period

Scenario	HCFC-22 sales volume	HCFC-22 sales prices*
A Option 1	2,600 mt from 2020 to 2024 1,300 mt from 2025 to 2029	US \$3/kg above 2018 price for 2020; annual increase of US \$1/yr thereafter
B Option 1	2,000 mt from 2020 to 2024 1,300 mt from 2025 to 2029	US \$3/kg above 2018 price for 2020; annual increase of US \$1/yr thereafter
C Option 1	2,000 mt from 2020 to 2024 1,300 mt from 2025 to 2029	US \$2/kg above 2018 price for the entire period
D Option 1	2,000 mt from 2020 to 2024 1,300 mt from 2025 to 2029	US \$0.50/kg above 2018 price for 2020; annual increase of US \$0.50/yr thereafter

* The market price of HCFC-22 charged by FIASA in 2018 is confidential.

23. Variable costs for HCFC-22 production were determined based on the 2014-2018 average price (US \$/mt) and consumption factor of raw materials⁸ (mt/mt of HCFC-22 produced), and those normalized variable costs were then projected by the quantity of HCFC-22 produced. Production of HCFC-22 results in the generation of hydrogen chloride (HCl) and sulphuric acid, which FIASA sells; revenue from those sales, and the cost of packaging (i.e., cylinders/isotanks), were based on 2014-2018 average revenues and costs.

24. Fixed costs (e.g., labour; electricity, gas and water, maintenance, and plant overhead) were based on the 2014-2018 average cost paid by FIASA during those years.

25. The net profit per year was determined based on the above assumptions, after taking into account the applicable tax rate, and the sales volume and HCFC-22 price assumed under each scenario. The net present value (NPV) of each scenario shown in Table 3 was determined using a 10 per cent discount rate, a typical cost of capital in developing countries, and taking into account the severance for staff of US \$1,189,000.

Table 3. NPV of lost profits over the 2020-2030 period

Scenario Option 1	NPV (US \$)
A Option 1	59,667,000
B Option 1	46,299,000
C Option 1	16,780,000
D Option 1	18,086,000

⁸ Anhydrous hydrogen fluoride, chloroform, sodium carbonate, sodium sulphite, antimony chloride, sulphuric acid and chlorine

Option 2: Restarting the incinerator at FIASA

26. For the preparation of the project proposal, UNIDO hired SGL Carbon, the manufacturer of the incinerator, to provide an estimate of the cost to refurbish the incinerator before restarting it for on-site destruction of HFC-23.

27. Based on a site visit, SGL Carbon assessed that more than 80 per cent of the incinerator's components would need to be replaced, including the final vent gas scrubber; the exotic metal burner; HF acid recycle and liquid recycle pumps; valves and fittings; field instrumentation, ignition and control panel; repair and revamp material for piping; and spare parts for 10 years of operation. Also included are an optional polytetrafluoroethylene (PTFE)-final vent gas scrubber, new zeolite for the pressure-swing absorption (PSA) oxygen generator, estimated additional construction costs based on safety and structural materials, and installation and commissioning; delivery to Buenos Aires and port clearance and transport to FIASA; and contingencies.

28. UNIDO also included annual independent verifications (US \$20,000/yr) and severance for the four operators of the incinerator in 2030.⁹ The total estimated cost for restarting the HFC-23 incinerator at FIASA is shown in Table 4.

Table 4. Estimate for restarting the HFC-23 incinerator at FIASA

Description	Cost (US \$)
Capital cost	
SGL incinerator refurbishment	916,959
Final vent gas scrubber addition	18,810
Delivery to Buenos Aires port and to FIASA	30,000
SGL installation/commissioning supervision	75,240
FIASA construction	102,600
Contingency (10%)	114,361
Zeolite for oxygen generator (1,800 kg at US\$31/kg)	55,800
Building to house cryogenic tank*	100,000
Total capital cost	1,413,770
Other costs	
Severance for incinerator staff	210,000
Monitoring and verification	200,000
Total other costs	410,000
Total costs	1,823,770

* The cost is provided by UNIDO as a non-binding estimate taking into consideration the scope of work

29. Incremental operating costs (IOCs) were calculated based on the following assumptions:

- (a) HCFC-22 production would be 2,000 mt/yr for the period 2020-2024,¹⁰ and 1,300 mt/yr¹¹ for the period 2025-2029, after which production would cease;
- (b) Annual quantities of HFC-23 by-product were based on the historic by-product generation rate of 3.24 per cent;

⁹ In accordance with Argentina's laws and regulations, workers who are laid off are provided compensation according to the number of years the employee has worked for the enterprise.

¹⁰ The 2014-2018 average HCFC-22 production was 1,898 mt/yr.

¹¹ Under the Montreal Protocol, Argentina's 2025 production target is 1,327 mt/yr.

- (c) Nitrogen costs were based on an annual contract amount; other raw material costs (e.g., natural gas, de-ionized and potable water, electricity, and oxygen) were estimated based on average consumption factors from 2008-2012, when the incinerator was in operation under the CDM project, and the 2018 price for each raw material;
- (d) Revenue from the sale of dilute (50 per cent) HF (HF50)¹² collected by FIASA was estimated based on the 2008-2012 average amount of HF50 generated per mt of HFC-23 incinerated and an estimated 2019 sales price of US \$30/mt;
- (e) Annual maintenance and overhead cost were assumed at 5 and 0.4 per cent, respectively, of the incinerator cost (approximately US \$3 million); and
- (f) Labour costs were based on annual salary of four operators to run the incinerator.

30. Noting that SGL Carbon estimated that the incinerator might be commissioned by 1 June 2020, and that sufficient time would be required for FIASA to register as a hazardous waste generator and treatment facility, the following three scenarios under Option 2 were proposed:

Table 5. Scenarios for the refurbishment of the incinerator at FIASA

Scenario	Description	Advantage	Disadvantage
A Option 2	FIASA stores the HFC-23 by-product on-site in its cryogenic tank as of 1 January 2020 and starts incineration in June 2020	No modification of the HCFC-22 operations are needed	The need of FIASA to register as a hazardous waste generator and treatment facility
B Option 2	FIASA produces an additional 1,000 mt of HCFC-22 in 2019, stops production until the incinerator is recommissioned in June 2020. Additional costs (US \$650,000) for storage of HCFC-22 on-site; labour, cost of capital in 2019, and loss of HCl sales in 2020	Additional six months to register as hazardous waste generator and treatment facility	Additional costs, the possible need for additional production quota; additional emissions of HFC-23 in 2019
C Option 2	FIASA stops production of HCFC-22 as of 1 January 2020, and is compensated for lost profit (US \$2,698,000) associated with 1,000 mt of HCFC-22 and loss of HCl sales (US \$266,000) until the incinerator is recommissioned in June 2020 and FIASA resumes production	Additional six months to register as hazardous waste generator and treatment facility	Additional costs

¹² Each molecule of HFC-23 that is incinerated generates three molecules of HF (UNEP/OzL.Pro/ExCom/79/48).

31. On that basis, the costs to refurbish and operate the incinerator are summarized in Table 6:

Table 6. Cost of the three scenarios to refurbish and operate the incinerator

Description	Costs (US \$)		
	Scenario A Option 2	Scenario B Option 2	Scenario C Option 2
Incinerator refurbishment (Table 4)	1,824,000	1,824,000	1,824,000
HCFC-22 storage tank rental (50 isotanks)	-	225,000	-
Working capital increase	-	99,000	-
Cost of additional labour	-	60,000	-
Loss of HCl sales	-	266,000	260,000
Compensation 1,000 mt of HCFC-22 sales	-	-	2,698,000
Incremental operating costs	1,929,000	1,904,000	1,904,000
Total	3,753,000	4,378,000	6,686,000

32. UNIDO considered that the total cost to restart the incinerator should also include the lost profits from the production reduction required under the Montreal Protocol for 2025-2029. Those lost profits are estimated based on the methodology used, the four scenarios for closure of the production facility (Option 1 described above), and a 10 per cent discount rate to determine the NPV of those lost profits from the 2025-2029 production reduction. The lost profits requested as part of the funding for the three scenarios in Option 2 are shown in Table 7.

Table 7. Total cost to refurbish and operate the incinerator, including lost profits (US \$)

Description	Scenarios for closure (Table 2)			
	A Option 1	B Option 1	C Option 1	D Option 1
Scenario A Option 2				
Incineration costs	3,753,000	3,753,000	3,753,000	3,753,000
NPV loss profit (2025-2029)	29,073,000	15,655,000	7,115,000	9,262,000
Total	32,826,000	19,408,000	10,868,000	13,015,000
Cost-effectiveness*	61.40	36.30	20.33	24.35
Scenario B Option 2				
Costs incinerator (one off)	4,378,000	4,378,000	4,378,000	4,378,000
NPV loss profit (2025-2029)	29,073,000	15,655,000	7,115,000	9,262,000
Total	33,451,000	20,033,000	11,493,000	13,640,000
Cost-effectiveness*	62.57	37.47	21.50	25.51
Scenario C Option 2				
Costs incinerator (one off)	6,686,000	6,686,000	6,686,000	6,686,000
NPV loss profit (2025-2029)	29,073,000	15,655,000	7,115,000	9,262,000
Total	35,759,000	22,341,000	13,801,000	15,948,000
Cost-effectiveness*	66.90	41.80	25.83	29.84

* US \$/kg HFC-23 destroyed

Option 3: Off-site destruction of HCFC-23 by-product

33. For the off-site destruction option, UNIDO considered potential destruction facilities in Argentina. It was noted that the enterprise “Cementos Avellaneda,”¹³ located close to FIASA, has a cement kiln, which is not included in the destruction technologies for HFC-23 approved by the Parties to the Montreal Protocol.

34. As no other approved destruction facilities were found in Argentina (e.g., rotary kiln), the project proposed to export the HFC-23 by-product for destruction at a rotary kiln in Europe. Off-site destruction would require the purchase of two 9 mt-capacity isotanks (US 250,000-US \$300,000/tank) (as no enterprise

¹³ This option has been discussed in document UNEP/OzL.Pro/ExCom/82/69.

was found willing to lease the isotanks); and a compressor (US \$20,000) to transfer the HFC-23 from the cryogenic storage tank into the isotanks.

35. UNIDO received two quotes for the destruction of HFC-23 from registered rotary kiln destruction facilities in Europe; the lowest was from a facility in Denmark with a price of destruction of €4.90/kg (US \$5.59/kg). The roundtrip transportation cost was estimated at US \$17,000/tank. As used hazardous waste tanks are prohibited from import under Argentinian law, a new isotank would need to be purchased for each shipment, resulting in a total cost of US \$17.4 million.

36. For reference, UNIDO presented the costs of off-site destruction if it were feasible to return the used isotank to Argentina on the following basis: two isotanks (US \$600,000); compressor (US \$20,000); production of HCFC-22 and generation of HFC-23 by-product as under Option 2,¹⁴ resulting in 30 shipments of the two isotank carriers (US \$135,000) and incineration at the facility in Denmark (US \$100,620); permits for environmental compliance (US \$3,000/yr); and monitoring and verification (US \$8,400/yr), resulting in a total cost of US \$4,770,000 (US \$8.92/kg of HFC-23 destroyed). In presenting this option, UNIDO emphasized that the import of used isotanks was not permitted into the country; that the purchase of new isotanks for each shipment would add US \$17.4 million to the total cost; and, therefore, suggested not to further consider this option.

Technical audit

37. In order to estimate the costs of closure, the independent consultant used the same methodology as used in previous technical audits for the CFC and HCFC production sector, which starts from gathering plant data for the following cost elements: representative production capacity; estimated capital investment; feedstock costs; energy/utility costs; by-product credits; operating costs; maintenance labour and materials costs; and plant indirect and overhead costs. The contribution of each element per mt of HCFC-22 produced is used to determine the marginal profit margin, after taking into account capacity utilization, and the applicable tax rate. The independent consultant then considered macroeconomic indicators and the estimated remaining useful plant life to determine the lost profits.

38. A discount rate is required to determine the NPV of the lost profits. In most cases, the bank benchmark interest rate is a reasonable surrogate for a discount rate. However, the 2016-2018 benchmark interest rate in Argentina varied between 19.9 to 35.5 per cent, with an average of 26.2 per cent. Such a discount rate might be high given that it would be used for plant closure, and therefore the independent consultant considered a weighted average cost of capital (WACC) approach to be more fair, resulting in a discount rate of 17.7 per cent.

39. To determine compensation for closure, the independent consultant used the standard methodology that had been used in other countries: compensation is based on compensation to workers, in accordance with the laws and regulations applicable in the country in question, and the NPV of future lost profits based on the average production cost margin for the three years preceding the project and the predicted future production.

Findings

40. FIASA's HCFC-22 plant is old, fully depreciated, and has low production capacity by international standards. Its 2016-2018 average cost of production (i.e., cost for FIASA to produce 1 kg of HCFC-22) was almost double the price at which HCFC-22 is available internationally; production has been declining, dropping from 1,823 mt in 2017 to 1,192 mt in 2018, and it is expected to continue for the next five years. The plant remains profitable mainly because it operates in an insulated market, allowing the facility to

¹⁴ HCFC-22 production of 2,000 mt/yr for 2020-2024 and 1,300 mt/yr for 2025-2029, with a by-product generation rate of 3.24 per cent.

command a price approximately 2.8 times international prices. The price FIASA has been able to command in Argentina has fallen slightly since 2016. Assuming the price at which FIASA is able to sell HCFC-22 does not fall further from the 2018 price, the remaining useful life of the plant could be about four years; and less than that if domestic prices drop further.

41. In accordance with Argentina's laws and regulations, workers who are laid off are provided compensation according to the number of years the employee has worked for the enterprise. Based on the years of service of the employees at FIASA and their salaries, and assuming the HCFC-22 production line were to close on 1 January 2020, the compensation to workers would be US \$1,189,083.

42. The NPV present value of FIASA's 2020-2023 after income tax lost profits is US \$3,867,270. The total compensation for closure would therefore be US \$5,056,353.

Secretariat's comments

Option 1: Closure of HCFC-22 production at FIASA

43. The Secretariat noted the following:

- (a) Since 2013, FIASA has always utilized less than 50 per cent of its production capacity; in 2018, it used less than 24 per cent of its capacity;
- (b) Since 2013, FIASA has always used less than 67 per cent of its production quota; in 2018, it used approximately 32 per cent of its quota;
- (c) In 2014, FIASA's HCFC-22 production line operated on 283 days of the year; in 2018, it operated on 150 days of the year. Fixed costs, such as labour, are essentially independent of the number of days of operation and the extent of capacity utilization. For reference, HCFC-22 lines in other Article 5 countries may operate on more than 340 days of the year and at 100 per cent or even higher than the line's capacity;
- (d) FIASA's marginal cost of production will continue to increase with decreasing production as fixed costs will remain constant;
- (e) FIASA's HCFC-22 price is above the international market price. It is almost triple the import price in Brazil and, as noted by the independent consultant, 2.8 times the price at U.S. ports of entry;
- (f) Demand for HCFC-22 in Argentina continues to decline given the continued implementation of the stage II of the HCFC phase-out management plan (HPMP), as well as the conversion of the country's air-conditioning manufacturing sector to R-410A;¹⁵
- (g) In 2018, consumption of HCFCs in Argentina fell by 26 per cent from 2017 consumption. The reduction in production at FIASA accounted for 98 per cent of that drop; and
- (h) Based on the international market price of HCFC-22 and the marginal cost of production calculated both by UNIDO and the independent technical consultant, at current production levels, FIASA would generate more profit by importing HCFC-22 than producing it. However, according to the Government, an enterprise could not exchange production for import quotas and, therefore, this option is not available to FIASA.

¹⁵ UNEP/OzL.Pro/ExCom/61/28 and decision 61/34.

44. In line with the assessment provided by the independent technical audit, the Secretariat considered that production at FIASA would cease by 1 January 2024. Rather than use the 2016-2018 average benchmark interest rate (i.e., 26.2 per cent), as in other production sector closure projects, the Secretariat considered it more fair to use the WACC discount rate (i.e., 17.7 per cent) suggested by the independent consultant in determining the NPV of the control options. Accordingly, the Secretariat proposed to use the cost of closure as determined by the independent consultant (i.e., US \$5,056,353). The Government of Argentina did not agree with the assessment that FIASA would close by 2024, nor did it agree with the use of a discount rate of 17.7 per cent and the proposed level of compensation. As further explained in the section on policy issues related to control of HFC-23 by-product emissions, the Secretariat considers that guidance from the Executive Committee will be needed to determine the eligible incremental costs of the project.

Option 2: Restarting the incinerator

45. During the period FIASA was generating credits under the CDM project,¹⁶ FIASA used the cryogenic tank both as a buffer for the smooth operation of its incinerator, and as storage when the incinerator was not operating. UNIDO clarified that FIASA registered as a hazardous waste generator and treatment facility in 2004; however, it would have to re-register if it re-starts the incinerator. Given the previously successful registration of the enterprise, the Secretariat did not further consider Scenarios B and C of Option 2.

46. Regarding the need to construct a containment building for the cryogenic tank, estimated at US \$100,000, which was not required when FIASA was generating CERs under the CDM project, UNIDO clarified that since the Decree N°. 2092 was established in 2006, after FIASA's registration as a hazardous waste generator and treatment facility in 2004, the facility to contain the tank was requested. However, the Secretariat notes that FIASA only generated CERs after Decree N°. 2092 was established. Moreover, annual registration fees must be provided by registered hazardous waste generators and treatment facilities; it is unclear if FIASA did so after its registration in 2004.

47. The Secretariat noted with appreciation the options presented by UNIDO, and the multiple scenarios considered under each option. However, some elements requested by the Executive Committee were not included. In particular, three independent estimates of the costs of restarting the onsite incinerator were requested (decision 82/85(c)(i)). UNIDO identified two other enterprises currently providing HFC-23 incinerator technology; however, FIASA's incinerator uses proprietary technology and equipment, and the other enterprises would not be able to provide the necessary technological and operational safety guarantee for refurbishment of the incinerator. Quotes from those enterprises would therefore amount to a bid for an entirely new incinerator, which would be costlier than the refurbishment option.

48. The Secretariat considers that UNIDO undertook best efforts to secure additional independent estimates; that the estimate provided is well-documented and robust; and the concern expressed on the need for a technological and operational safety guarantee. Recalling that at the 82nd meeting¹⁷ FIASA and the independent consultant had estimated the costs to refurbish the incinerator at US \$897,840, the Secretariat considered the following minor costs adjustments to the proposal:

- (a) Some equipment included in the refurbishment quote (i.e., HF acid recycle pump, liquid recycle pump, manual valves and fittings, and the piping repair and revamp materials) may be purchased locally at a lower cost. In addition, spare parts for only four years would be

¹⁶ The total certified emission reduction credits (CERs) generated by FIASA under the CDM was 7,306,549 mt-CO₂eq. At US \$5/mt-CO₂, this represents a revenue of approximately US \$36.5 million.

¹⁷ UNEP/OzL.Pro/ExCom/82/69

needed rather than 10 years. Accordingly, the Secretariat estimated the cost at 95 per cent of that submitted (i.e., US \$871,111);

- (b) Installation, commissioning and start-up includes two weeks for an on-site SGL supervisor fitter and supervisor engineer. Given the substantial difference between the daily labor rate proposed and that permitted under United Nations rules (approximately a factor of three higher) and that business class travel was included, those costs were adjusted by 14 per cent;
- (c) The zeolite for the PSA oxygen generator can be purchased or the oxygen gas can be purchased, but purchasing both is not necessary. As the Secretariat included the cost of oxygen gas in its calculation of IOCs, the 1.8 mt of zeolite is not incremental;
- (d) The optional (PTFE-lined) final vent gas scrubber is not incremental as the refurbishment quote already includes a (rubber-lined) final vent gas scrubber;
- (e) Reduced additional FIASA construction costs and cost for the construction of an enclosure for the cryogenic tank to US \$51,300 and US \$50,000, respectively; and
- (f) One-time registration as a hazardous waste generator and treatment facility, based on the costs for such registration indicated in the legal assessment (US \$235).

49. The revised incremental costs for refurbishing the incinerator are presented in Table 8.

Table 8. Incremental capital costs for the refurbishment of the incinerator

Description	Proposal (US \$)	Secretariat (US \$)
Capital cost		
SGL incinerator refurbishment	916,959	871,111
Final vent gas scrubber addition	18,810	0
Delivery to Buenos Aires port and to FIASA	30,000	30,000
SGL installation/commissioning supervision	75,240	64,467
FIASA construction	102,600	51,300
Contingency (10%)	114,361	101,688
Zeolite for oxygen generator)	55,800	0
Building to house cryogenic tank	100,000	50,000
Total capital cost	1,413,770	1,168,566
Other costs		
Severance for incinerator staff	210,000	0
Monitoring and verification	200,000	0
Registration as hazardous waste generator and operator		235
Total other costs	410,000	235
Total costs	1,823,770	1,168,801

50. The Secretariat noted that every year for which data is available (i.e., 2008-2013), revenue from the sale of HF50 is higher than the cost of natural gas, electricity, water and oxygen purchased to operate the incinerator. However, FIASA submitted documentation showing a reduction by a factor of almost 20 in the 2019 price of HF50. While it is possible that the price of HF50 will recover in the coming years, thereby again resulting in savings, the determination of incremental costs is based on the most recent data rather than on forecast prices. The Executive Committee may wish to note that in other Article 5 countries, the costs to operate an incinerator may be substantially reduced by the sale of HF.

51. The Secretariat based its assessment of the IOCs on the following:

- (a) UNIDO based its IOCs on an annual production of 2,000 mt of HCFC-22 for 2020-2024.

Noting the consumption and production trends in Argentina (as shown in Table 1), the production forecast of 2,000 mt is very high. In line with the decision in paragraph 32(b) of document UNEP/OzL.Pro/ExCom/16/20, the Secretariat considers the average of the three years immediately preceding project preparation (1,586 mt/yr) to be an appropriate basis for the level of production for 2020-2023. Production is considered to cease on 1 January 2024, in line with the results of the technical audit;

- (b) Consistent with UNIDO's proposal, a by-product generation rate of 3.24 per cent, which results in an annual HFC-23 by-product generation of 51.4 mt/yr;
- (c) Based on the annual quantities of HFC-23 by-product generated and the capacity of the incinerator (613 mt/yr), the incinerator would need to be operated 31 days per year. Accordingly, the total incinerator fixed costs (i.e., operating labor, nitrogen, maintenance, and overhead) are estimated at two months of the annual costs proposed by UNIDO;
- (d) Costs of raw materials and utilities were calculated as follows: for natural gas, electricity and HF50, normalized consumption based on the values included in the audited reports submitted under the CDM project,¹⁸ and the 2018 price of raw materials as submitted by UNIDO; normalized consumption and 2018 price for water and oxygen as submitted by UNIDO;
- (e) Costs related to the Government's monitoring of HFC-23 destruction at US \$4,167/yr¹⁹ for 2020 through 2022, at which point the stage II of the HPMP will be completed, and at US \$10,000 for 2023; and
- (f) Annual registration fees as a hazardous waste generator and treatment facility, as described in the legal assessment (US \$3,960/yr).

52. The revised IOCs are presented in Table 9.

Table 9. Costs to operate the refurbished incinerator (US \$)

Description	2020	2021	2022	2023
Variable costs*	66,840	66,840	66,840	66,840
Government monitoring	4,167	4,167	4,167	10,000
Annual registration fees	3,960	3,960	3,960	3,960
IOCs	74,967	74,967	74,967	80,800

* Variable costs include the costs of natural gas, water, electricity, oxygen gas, labor, nitrogen, maintenance, plant overhead, and revenue from the sale of 50 per cent HF.

53. UNIDO included the lost profits associated with the 2025 and 2030 control measures in its assessment of the costs to refurbish the incinerator. The Secretariat did not include those costs, nor did it do so for the option of off-site destruction (described below), as those lost profits are currently not eligible at HCFC-22 production swing plants.

54. Executive Committee members have expressed varying views on the duration for which funding to operate an HFC-23 incinerator should be provided. As explained in Part II of the present document on policy issues related to control of HFC-23 by-product emissions, the Executive Committee may wish to provide guidance on this matter. For reference, four years of IOCs would be US \$1,474,501, with annual funding tranches as specified in Table 10

¹⁸ See UNEP/OzL.Pro/ExCom/79/48

¹⁹ Paragraph 28 of document UNEP/OzL.Pro/ExCom/82/69

Table 10. Funding to refurbish and operate the incinerator assuming IOCs are provided for four years

Year	2019	2020	2021	2022	2023	Total
Funding (US \$)	1,168,801	74,967	74,967	74,967	80,800	1,474,501

55. Executive Committee members have expressed an openness to providing flexibility to Argentina should the country decide to choose closure as a means of complying with the HFC-23 by-product obligations under the Kigali Amendment, on the understanding that the funding level would be determined based on the most cost-effective approach. Accordingly, as an alternative to a multi-year agreement with multiple tranches, a single funding tranche (i.e., the equivalent of a lump-sum payment) could be considered, on the understanding that the HCFC-22 production line at FIASA would stop production by 1 January 2020 and would be dismantled, that key equipment would be destroyed, and that this would be documented in line with the guidelines for verification of ODS production. Such a lump-sum would be based on the NPV of the tranches above, depending on the number of years to be included, as determined by the Executive Committee, as shown in Table 11.

Table 11. “Lump-sum payment” to refurbish and operate the incinerator as a function of the number of years of IOCs are provided

Number of years of IOC	NPV (US \$)
1	1,222,907
2	1,268,872
3	1,307,921
4	1,343,677

56. UNIDO included an annual cost of US \$20,000 for independent verifications as part of the project costs in its proposal. However, the Secretariat considers that, in line with the current practice in the production sector, those costs should be considered as part of the agency support costs.

57. Notwithstanding constructive discussions with UNIDO, which resulted in a narrowing of the difference between several of the proposed costs, an agreement on the total cost for the option to refurbish and operate the incinerator was not reached. As further explained in the section below on policy issues related to control of HFC-23 by-product emissions, the Secretariat considers that guidance from the Executive Committee will be needed to determine the eligible incremental costs of the option of restarting the incinerator.

Option 3: Off-site destruction

58. Off-site destruction is not a practicable alternative unless the used isotank can be reimported into the country. UNIDO clarified that the quality of a hazardous waste container that would prevent its reimportation into the country was not whether it was used, but whether it contained even traces of HFC-23. The Secretariat discussed with UNIDO whether a certificate issued by the destruction facility in Denmark, or an independent entity, would allow the reimportation of the used isotank. In addition to, or in lieu of, and noting that Decree No. 2092 provides for the Authority to “establish the obligations of each of the mentioned categories, *with the possibility to modify the general character of the amount of obligations to fulfil when it is technically reasonable and will take into account the situation of greater environmental risk for the classification*” (emphasis added), the Secretariat inquired if the Government of Argentina could grant an exemption to permit the reimportation of the isotank into Argentina, noting that such an exemption could provide an environmental benefit that would outweigh the risks associated with trace quantities of HFC-23 entering the country.

59. Regarding the former, UNIDO indicated that the customs authority would have the prerogative to test whether the isotank had traces of HFC-23, irrespective of a certificate, which would introduce substantial risks in the capability of the Government to ensure it can comply with its obligations under the Montreal Protocol; and that the destruction facility would be able to flush the isotank but not issue a

certificate. At the time of finalization of the present document, it was unclear whether an independent entity could provide such a certificate and, if so, at what cost.

60. Regarding the latter, UNIDO clarified that the flexibility provided is understood to require greater not lesser control, and that the objective of the law is relevant. In particular, the flexibility afforded under the Decree could not be used for an objective that is not the management of hazardous waste. Climate change is not covered by the scope of the legislation.

61. The Secretariat sought clarification as to why the quoted costs of incineration (US \$5.59/kg) were higher than the US \$2.45/kg at rotary kilns in Europe previously reported by UNIDO.²⁰ UNIDO highlighted that some countries in Europe (e.g., Poland) no longer allow the import of hazardous waste for destruction; and that hazardous waste destruction facilities in Europe appear to be running at close to full capacity, and it was therefore not easy to find a facility willing to provide a bid for the destruction of HFC-23 from Argentina.

62. As the Executive Committee requested a proposal for off-site destruction, the Secretariat undertook an assessment of the costs of that option, noting the following:

- (a) The viability of off-site destruction is dependent on the used isotank being permitted to re-enter the country;
- (b) It is unclear whether an independent entity could issue a certificate to demonstrate that no HFC-23 was detected as remaining in the tank; the costs of such a certificate are at present unknown and would be additional to the preliminary costs calculated by the Secretariat below;
- (c) Even with such a certificate, there is a risk the isotank could be held up at customs upon re-entry into Argentina, as customs would have the prerogative to undertake its own assessment that the isotank did not contain even traces of HFC-23; and
- (d) As a Party to the Basel Convention, Argentina would have to receive permission from Denmark and any transit countries through which the HFC-23 waste is shipped (i.e., the countries of intermediate ports, if any, before the waste was delivered to Denmark).²¹

63. Accordingly, the Secretariat calculated the cost of off-site destruction based on the costs submitted by UNIDO, except to adjust the cost of the isotanks (US \$460,000, based on the quote from the independent consultant at the 82nd meeting,²² rather than US \$600,000), and based on the same level of HCFC-22 production and HFC-23 by-product generation as proposed by the Secretariat under the option of restarting the incinerator (i.e., 1,586 mt/yr for 2020-2023, and then closure; 3.24 per cent HFC-23 by-product generation rate), as shown in Table 12.

Table 12. Off-site destruction costs including four-year IOCs (US \$)

Description	2019	2020	2021	2022	2023
Incineration		283,682	283,682	283,682	283,682
Shipping		102,000	102,000	102,000	102,000
Legal and inspection costs for permits		3,000	3,000	3,000	3,000
Monitoring		8,400	8,400	8,400	8,400
Isotanks and compressor	480,000				
Total annual tranche	480,000	397,082	397,082	397,082	397,082

²⁰ UNEP/OzL.Pro/ExCom/82/21.

²¹ UNEP/OzL.Pro/ExCom/82/69

²² UNEP/OzL.Pro/ExCom/82/69

64. Should the Executive Committee wish to consider a lump-sum payment, on the understanding that the HCFC-22 production line at FIASA would stop production by 1 January 2020 and would be dismantled, that key equipment would be destroyed and documented, the NPV of the tranches above, depending on the number of years to be included, are presented in Table 13.

Table 13. “Lump-sum payment” for off-site destruction of HFC-23 as a function of the number of years IOCs are provided

Number of years of IOC	NPV (US \$)
1	817,339
2	1,103,925
3	1,347,392
4	1,554,228

65. The Secretariat considers the following observations relevant:

- (a) The NPV of four years of off-site destruction is higher than the NPV of four years of refurbishing and operating the incinerator;
- (b) Absent an exemption from the Government of Argentina to ensure that the used isotank can be reimported into the country, the option of off-site destruction would introduce substantial, and perhaps unacceptable, risks relative to the option of restarting the incinerator; and
- (c) If the mid-point of the cost of incineration in Europe as reported in document UNEP/OzL.Pro/ExCom/82/21 and that submitted by UNIDO were to be taken, there would be a reduction of 20 per cent of the annual tranches in 2020-2023, and a decrease in the net present value between 8 and 14 per cent, depending on the number of years included.

66. The Government of Argentina noted the proposal to include costs related to Government’s monitoring of HFC-23 destruction and proposed that an unspecified level funding for a project management unit (PMU), which had inadvertently not been included in the original submission, be included. The Government of Argentina further noted that during the CFC production closure project in Argentina, 6.2 per cent was applied for the PMU; that the appropriate percentage to be applied for a PMU could depend on the selected project option (i.e., refurbishment of the incinerator, off-site destruction, or closure), its duration and the level of funding approved; and that this topic should be included during the discussions at the Executive Committee meeting.

67. In its assessment of refurbishment of the incinerator and off-site destruction, the Secretariat included costs related to Government monitoring; in line with past practice, the Secretariat’s assessment did not include a PMU for the closure option. For the case of the HPMP that the Executive Committee approved, the agreed level of compensation did not include funding for a PMU; however, the country was given the flexibility to use a specified level of funding for its PMU.

PART II. POLICY ISSUES RELATED TO CONTROL OF HFC-23 BY-PRODUCT EMISSIONS

68. The Executive Committee decided *inter alia* to consider each of the project proposal options, including the data provided in the proposals submitted by UNIDO in line with decision 82/85(c), and to discuss the criteria for funding the activities related to the compliance obligations of Article 5 parties; and to consider applying the procedures set out in decision 82/85, and the criteria for funding the activities

related to the compliance obligations of Article 5 parties, when agreed, with respect to HFC-23 controls in the other Article 5 parties (decision 82/85(d) and (g)).

69. Accordingly, the Secretariat is raising the following policy issues for which it seeks the Executive Committee's guidance:

Extent to which market demand and profitability of HCFC-22 production should determine expected future production of HCFC-22

70. Consistent with the assessment of the independent consultant, the Secretariat considers that FIASA will shut down production by 1 January 2024 given the trend in the HCFC consumption and production in the country, market demand for HCFC-22 in Argentina, FIASA's price of HCFC-22 versus the price for which HCFC-22 can be imported, FIASA's cost of production relative to its international competitors, and that FIASA's cost of production will increase as production continues to decrease to the point where it will no longer be profitable. The Government of Argentina has a different assessment: it instead considers that, relative to 2018, production of HCFC-22 at FIASA will increase by at least 69 per cent in 2020, that such production can be maintained until 2024, and then continue at 10 per cent above the 2018 production levels between 2025 and 2029.

71. FIASA is profitable because it can charge a price that is at least double the international market price. A similar situation may apply to HCFC-22 production lines in other Article 5 countries.

72. The Executive Committee may wish to provide guidance to the Secretariat on:

- (a) The extent to which market demand and profitability of HCFC-22 production determine expected future production of HCFC-22; and
- (b) The extent to which the profitability of an HCFC-22 production line should depend on the local versus international market price.

Basis for HCFC-22 production to be used in determining IOCs

73. Given the financial crisis in Argentina in 2018, the Secretariat proposed using the average of the three years immediately preceding project preparation, in line with the decision in paragraph 32(b) of document UNEP/OzL.Pro/ExCom/16/20. UNIDO pointed out that this decision is applicable to ODS consumption and, therefore, should not be applied in the case of FIASA.

74. The Executive Committee may wish to provide guidance on whether the decision in paragraph 32(b) of document UNEP/OzL.Pro/ExCom/16/20 should be used as a basis for the HCFC-22 production to be used in determining IOCs, or whether to use another method.

Duration for which funding support for HFC-23 by-product emission controls is provided

75. Executive Committee members have expressed different views on the duration for which IOCs should be provided. Some Executive Committee members have suggested that IOCs should be provided as long as the destruction of HFC-23 is taking place; others have suggested a more limited duration.

76. Some Executive Committee members have suggested that IOCs are intended to incentivize early action, and the need for such an incentive may change as the cost of adopting control measures becomes the regular cost of business. Other Executive Committee members have suggested that the costs of destruction should not be considered as IOCs but recurring costs. In contrast to IOCs, which are expected to decrease as the cost of the alternative to be phased in goes down and the cost of the controlled substance that is phased out goes up, many of those recurring costs are not expected to change with time and, therefore,

funding should continue to be provided for them. As recurring costs are a new concept, the Executive Committee may wish to consider whether it wishes to develop guidelines for their application to HFC-23 by-product control projects.

77. The Executive Committee may wish to provide guidance to the Secretariat on the duration IOCs and/or recurring costs are provided for HFC-23 by-product control projects.

Level of agency support costs

78. In line with decision 67/15, projects with a project costs above US \$250,000 would receive an agency fee of 7 per cent, and for projects in the production sector, the agency fee would be no greater than 6.5 per cent, to be determined on a case-by-case basis. It is not clear whether HFC-23 by-product control projects would be considered projects in the production sector (i.e., up to 6.5 per cent support costs, to be determined on a case-by-case basis) or investment projects (i.e., 7 per cent support costs).

79. The Secretariat considers that in those HFC-23 by-product control projects where there would be continued production of HCFC-22, and hence continued generation of HFC-23 by-product that must be controlled, continued agency support of the project would be expected. Moreover, costs of independent verification would be included in the agency support costs. Accordingly, in such cases, it would be appropriate to consider an HFC-23 by-product control project as an investment project eligible for 7 per cent support costs.

80. In contrast, in projects where closure of the HCFC-22 production facility is the modality used to comply with HFC-23 by-product control obligations, the agency support costs for the production sector would be applicable. UNIDO emphasized that it was not selective in accepting projects and seeks to treat countries equally, irrespective of the level of consumption/production in the country and the project value; that UNIDO undertakes a number of projects in low-volume-consuming countries, where support costs do not fully cover UNIDO's costs; and that UNIDO considers that its portfolio is more relevant in determining the support costs, rather than on a project-by-project basis. Moreover, UNIDO emphasized that projects in the production sector always took into consideration lost profits and, in such cases, it was understandable that a lower support cost was applied. For production swing plants where it is not yet clear whether lost profits will be eligible, UNIDO considers that 7 per cent may be appropriate.

81. The Executive Committee may wish to consider providing guidance on the appropriate level of agency support costs for HFC-23 by-product control projects in Article 5 countries, including whether the costs of independent verification should be included in such costs or in the project costs, and whether the agency support costs should differ between (on- or off-site) destruction of HFC-23 by-product and closure of HCFC-22 production facilities.

RECOMMENDATION

82. The Executive Committee may wish to:

- (a) Note the key aspects related to HFC-23 by-product control technologies (decision 82/85) contained in document UNEP/OzL.Pro/ExCom/83/44;
- (b) Consider any technical and financial assistance it wishes to provide to the Government of Argentina to allow for compliance with the HFC-23 by-product control obligations of the Kigali Amendment of the Montreal Protocol, and in light of the information contained in document UNEP/OzL.Pro/ExCom/83/44; and
- (c) Consider whether it wishes to provide policy guidance on the following issues related to HFC-23 by-product control projects:

- (i) Extent to which market demand and profitability of HCFC-22 production should determine expected future production of HCFC-22;
 - (ii) Basis for HCFC-22 production to be used in determining incremental operating costs;
 - (iii) Duration for which funding support to control HFC-23 by-product emissions is provided; and
 - (iv) The appropriate level of agency support costs.
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