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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-sixth Meeting
Montreal, 26–30 May 2025
Item 9(d) of the provisional agenda¹

PROJECT PROPOSAL: INDONESIA

This document consists of the comments and recommendation of the Secretariat on the following project proposal:

Phase-down

- | | | | |
|---|--|------------|-----------------------------|
| • | Kigali HFC implementation plan (stage I,
first tranche) | World Bank | Individual
consideration |
|---|--|------------|-----------------------------|

¹ UNEP/OzL.Pro/ExCom/96/1

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Indonesia

PROJECT TITLE	AGENCY
Kigali HFC implementation plan (stage I)	World Bank (lead)

LATEST ARTICLE 7 DATA (Annex F)	Year: 2023	3,502.63 mt	1,535,575 CO ₂ -eq tonnes
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SECTORAL HFC CONSUMPTION DATA (CO ₂ -eq tonnes) AND ACTIVITIES									
	Aero sol	Foam	Fire- fighting	Air-conditioning and refrigeration				Solvent	Other
				Manufacturing			Servicing		
				Refrigeration	AC	Other			
Latest CP report (2024)*			120,460	2,149,866	1,757,137	855,473	8,727,916	594,881	59,518
KIP stage I activities as agreed (Y/N)	N	N	N	Y	Y	N	Y	N	N

* CP data reflects total imports, without subtracting exports of 1,356,616 CO₂-eq tonnes

AVERAGE 2020–2022 HFC CONSUMPTION IN SERVICING*	5,375.78 mt	8,648,957 CO ₂ -eq tonnes
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* Based on the data collected during KIP preparation, which is different from that submitted under the country programme reports

BASELINE CONSUMPTION DATA (CO ₂ -eq tonnes)	2020	2021	2022	Average 2020-2022
HFC annual consumption	11,107,955	9,707,351	30,402,883	17,072,729
HCFC baseline (65%)				6,297,991
HFC baseline				23,370,721

HFC CONSUMPTION ELIGIBLE FOR FUNDING	
Starting point for sustained aggregate reductions	TBD
Previously approved HFC phase-down investment projects	No
Aggregate reductions from previously approved projects (CO ₂ -eq tonnes)	n/a

PROJECT DATA AS AGREED		2025*	2026-2027	2028	2029	2030	2031	2032	Total
Consumption (CO ₂ -eq tonnes)	Montreal Protocol limits	23,370,721			21,033,649			21,033,649	n/a
	Maximum allowable	23,370,721			19,865,113			18,696,577	n/a
	Reduction from baseline (%)	0			15			20	n/a
Amounts recommended in principle (US \$)	World Bank	Project costs	3,170,609	0	2,818,319	0	1,056,870	0	7,045,798
		Support costs	221,943	0	197,282	0	73,981	0	493,206
		Total project costs	3,170,609	0	2,818,319	0	1,056,870	0	7,045,798
		Total support costs	221,943	0	197,282	0	73,981	0	493,206
		Total funds	3,392,552	0	3,015,601	0	1,130,851	0	7,539,004

* Recommended for approval at the present meeting

Reduction from remaining consumption eligible for funding in stage I	7,275,282* CO ₂ -eq tonnes
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* Includes up to 4,811,218 CO₂-eq tonnes associated with stockpiling in the baseline years

Secretariat's recommendation:	Individual consideration
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PROJECT DESCRIPTION

1. The present document contains the following sections:
 - I. Summary of the proposal as submitted
 - II. Background: Status of implementation of the HCFC phase-out management plan and previous HFC-related activities
 - III. HFC consumption overview: HFC consumption levels, trends, and consumption by sector
 - IV. Stage I of the Kigali HFC implementation plan, as submitted: Regulatory framework, phase-down strategy, total stage cost, and implementation plan for the first tranche
 - V. Secretariat's comments, including the agreed cost of activities
 - VI. Recommendation

I. Summary of the proposal as submitted

2. On behalf of the Government of Indonesia, World Bank as the designated implementing agency has submitted a request for stage I of the Kigali HFC implementation plan (KIP), in the amount of US \$ 8,352,642, plus agency support costs of US \$584,685, as originally submitted.²

3. The implementation of stage I of the KIP will assist the Government of Indonesia in meeting the target of 10 per cent reduction from its HFC baseline consumption by 1 January 2029.

4. The first tranche of stage I of the KIP being requested at this meeting amounts to US \$4,567,579, plus agency support costs of US \$319,731 for World Bank, as originally submitted, for the period of June 2025 to December 2027.

II. Background

Status of implementation of the HCFC phase-out management plan

5. Table 1 presents information on the HCFC phase-out management plan (HPMP) in Indonesia as of March 2025.

Table 1. HPMP implementation status for Indonesia

	Stage I	Stage II	Stage III
Meetings when HPMP was approved/updated	64 th (approved) 71 st , 76 th (updated)	76 th	92 nd
Reduction from baseline	20% by 2018	55% by 2023	100% by 2030
Total project cost (US \$)	12,692,684	8,302,163	14,925,847
Date of completion	1 June 2020	31 December 2025	31 December 2031

Status of implementation of previous HFC-related activities

6. Table 2 presents an overview of activities implemented in Indonesia in the context of the Kigali Amendment that have been funded by the Multilateral Fund.

Table 2. Previously approved HFC-related activities in Indonesia

Approval meeting	Project title	Implementing agency	Cost (US \$)	Date of completion
81 st	Enabling activities for HFC phase-down	World Bank	250,000	June 2021

² As per the letter of 3 February 2025 from the Ministry of the Environment of Indonesia to World Bank.

III. HFC consumption overview

HFC consumption levels

7. Indonesia imports and exports HFCs for use in multiple manufacturing and servicing subsectors. The most consumed substances in terms of CO₂-equivalent (CO₂-eq) tonnes in 2024 were HFC-134a (36 per cent of total HFC consumption), R-410A (22 per cent), HFC-32 (19 per cent), R-404A (18 per cent), R-407C (5 per cent), and other HFCs (1 per cent). Table 3 presents the country's HFC consumption as reported to the Ozone Secretariat under Article 7 of the Montreal Protocol and the country's HFC baseline.

Table 3. HFC consumption (2020–2024 Article 7 data) and baseline in Indonesia

HFC	GWP	2020	2021	2022	2023	2024*
Metric tonnes (mt)						
HFC-23	14,800	0.06	0.86	37.90	7.93	-37.15
HFC-32	675	1,084.91	1,555.49	1,950.81	1,448.78	3,545.40
HFC-134a	1,430	2,970.32	2,903.41	6,784.68	2,197.06	3,228.45
HFC-152a	124	14.97	14.40	20.95	-0.03	14.26
HFC-227ea	3,220	8.54	5.29	20.81	33.85	37.41
HFC-236fa	9,810	1.54	16.00	4.27	6.62	0
HFC-245fa	1,030	517.83	200.36	993.81	399.15	114.12
R-404A	3,921.60	553.46	298.81	2,566.46	-1,159.65	592.50
R-407C	1,773.85	269.63	190.13	477.15	248.39	343.11
R-410A	2,087.50	1,118.32	1,016.34	2,303.06	229.57	1,368.08
R-417A	2,346	19.25	32.93	7.76	11.02	91.22
R-507A	3,985	73.87	57.17	455.38	78.58	27.9
Others**		73.05	57.35	55.7	1.36	38.2
Total (mt)		6,705.75	6,348.54	15,678.74	3,502.63	9,363.50
CO₂-eq tonnes						
HFC-23	14,800	888	12,728	560,920	117,364	-549,820
HFC-32	675	732,314	1,049,956	1,316,797	977,927	2,393,145
HFC-134a	1,430	4,247,558	4,151,876	9,702,092	3,141,796	4,616,684
HFC-152a	124	1,856	1,786	2,598	-4	1,768
HFC-227ea	3,220	27,499	17,034	67,008	108,997	120,460
HFC-236fa	9,810	15,107	156,960	41,889	64,942	0
HFC-245fa	1,030	533,365	206,371	1,023,624	411,125	117,544
R-404A	3,921.60	2,170,449	1,171,813	10,064,630	-4,547,683	2,323,548
R-407C	1,773.85	478,283	337,262	846,393	440,607	608,626
R-410A	2,088	2,334,493	2,121,610	4,807,638	479,227	2,855,867
R-417A	2,346	45,161	77,254	18,205	25,853	214,002
R-507A	3,985	294,372	227,822	1,814,689	313,141	111,182
Others**		226,610	174,880	136,400	2,284	95,628
Total (CO₂-eq tonnes)		11,107,955	9,707,351	30,402,883	1,535,575	12,908,634
HFC baseline calculation (CO₂-eq tonnes)						
HFC average consumption in 2020–2022					17,072,729	
HCFC baseline (65%)					6,297,991	
HFC baseline					23,370,721	

* Country programme data

** HFC-125, HFC-143a, R-407F, R-422A, R-438A, R-448A, R-449A, R-449C, R-452A, R-454B, R-508A, R-508B and R-513A

Country programme implementation report

8. The sectoral HFC consumption data provided by the Government of Indonesia in its country programme (CP) implementation report for 2023 is not consistent with the data reported under Article 7 of the Montreal Protocol. This issue is further discussed in paragraphs 57 to 59 below.

HFC consumption trends

9. HFC consumption in Indonesia between 2016 to 2021 was relatively stable, ranging from approximately 5,000 to 7,000 mt; however, over the past three years, consumption fluctuated considerably, notably reflected in an unusually high and then low consumption in 2022 and 2023, respectively, attributed to a rebound from depressed economic activity due to the COVID-19 pandemic, stockpiling, and re-exportation of certain refrigerants with high global-warming potential (GWP) in 2023 and 2024, as further discussed in paragraphs 55 and 56 below.

HFC consumption by sector

10. In 2023, the highest HFC consumption was noted in the servicing sector (76.4 per cent of total HFC consumption in the country in mt and 76.0 per cent in CO₂-equivalent (CO₂-eq) tonnes), followed by the manufacturing of mobile air-conditioning (MAC) (8.6 per cent in mt and 7.9 per cent in CO₂-eq tonnes), commercial and residential air-conditioning (AC) (5.2 per cent in mt and 4.3 per cent in CO₂-eq tonnes), domestic refrigeration (4.0 per cent in mt and 3.6 per cent in CO₂-eq tonnes), commercial refrigeration (2.8 per cent in mt and 5.7 per cent in CO₂-eq tonnes), organic Rankine cycle (ORC) (1.3 per cent in mt and 0.9 per cent in CO₂-eq tonnes), foam (0.8 per cent in mt and 0.5 per cent in CO₂-eq tonnes), solvents (0.6 per cent in mt and 0.3 per cent in CO₂-eq tonnes), and firefighting (0.3 per cent in mt and 0.8 per cent in CO₂-eq tonnes), as shown in table 4. Detailed tables with HFC consumption per substance and sector based on submitted data are provided in annex III to the present document.

Table 4. Estimated sectoral distribution of HFC consumption in Indonesia (2023)

Sector	Consumption				Most consumed HFCs
	mt	Share (%)	CO ₂ -eq tonnes	Share (%)	
Manufacturing					
AC	465.56	5.2	609,628	4.3	R-410A, HFC-32, HFC-134a, R-407C, R-404A, R-417A
Commercial refrigeration	250.32	2.8	809,167	5.7	R-404A, HFC-134a, HFC-23
MAC	778.00	8.6	1,116,481	7.9	HFC-134a, R-407C
Domestic refrigeration	357.81	4.0	511,668	3.6	HFC-134a
Foam	71.50	0.8	73,645	0.5	HFC-245fa
Firefighting	27.59	0.3	108,939	0.8	HFC-227ea, HFC-236fa
Solvent	56.06	0.6	35,941	0.3	HFC-245fa, HFC-152a, HFC-227ea
ORC	117.40	1.3	120,922	0.9	HFC-245fa
Subtotal manufacturing	2,124.24	23.6	3,386,391	24.0	
Servicing	6,884.71	76.4	10,748,962	76.0	HFC-134a, HFC-32, R-410A, R-404A, R-407C, R-507A and others
Total	9,008.95	100	14,135,353	100	

Manufacturing sectors

Residential air-conditioning manufacturing

11. Indonesia's AC market is the largest in Southeast Asia and it has been expanding since 2012, with 3.5 million AC units sold in 2023. The growing demand for air conditioners is met by imports and domestic manufacturing by both local and international enterprises. Major global brands are often supported by local manufacturing facilities to meet demand and reduce supply chain costs, as is encouraged by the Government's policy on local content requirements. The subsector has been shifting from R-410A to HFC-32, though larger split systems still rely on R-410A. Local manufacturing output estimates for 2023 vary substantially, ranging from 300,000 to 1.2 million units.

Chiller and commercial air-conditioning manufacturing

12. This subsector includes commercial AC installations, such as large multi-split units with variant refrigerant flow (VRF), packaged AC units, and air- and water-cooled chillers. HFC-134a is the preferred refrigerant in large centrifugal chillers and screw chillers, while R-410A is mainly used in VRF systems and small- to medium-capacity chillers using scroll compressors. Small volumes of HFC blends such as R-407C and R-507A are also used in chillers.

Mobile air-conditioning manufacturing

13. Indonesia's automotive industry is the second largest in Southeast Asia, with a manufacturing output of 1.18 million passenger cars recorded in 2023, predominantly destined for the domestic market, and over 18 million registered passenger cars in use. Japanese-owned brands account for most manufacturing, with one multinational corporation claiming over half of the market share. Most vehicles fall into the car, sport utility or multipurpose vehicle categories, with relatively small refrigerant charges, and are commonly assembled by domestic enterprises, either through joint ventures or contracts. All motor vehicles manufactured, imported, and sold in the country are fitted with air conditioners, charged almost exclusively with HFC-134a, with only one local assembler importing small volumes of HFO-1234yf to service new cars imported from Europe. Indonesia's car manufacturers' association estimates that the development of new car models using alternative MAC systems would require about 10 years.

14. Indonesia also manufactures rail passenger cars. One known manufacturer uses R-407C to charge roof-mounted AC units; the manufacturing output forecast for the period 2023–2025 is 1,100 units.

Domestic refrigeration manufacturing

15. The domestic refrigeration subsector accounts for most manufacturing activity in the country's refrigeration industry, with both HFC-134a and R-600a used as shown in table 5 below. There are eight manufacturers of domestic refrigerators in Indonesia, including five with Indonesian and Article 5 ownership and three multinational enterprises with local partnerships. Equipment manufactured includes domestic refrigerators, chest freezers, showcases, and water dispensers, with most refrigerators and freezers manufactured for the domestic market having a capacity under 200 litres and charged with HFC-134a, and larger (280-600 litre capacity), mostly imported, units predominantly based on R-600a. The average annual manufacturing in the 2019–2023 period amounted to 4.9 million units, destined for both domestic and foreign markets.

16. The entire subsector, including enterprises that make small commercial refrigeration units in addition to household refrigerators, is to be converted under stage I of the KIP, with the goal of eliminating 301.29 mt, or 430,844 CO₂-eq tonnes, of HFCs.

Table 5. Manufacturing of domestic refrigerators in Indonesia by refrigerant (units)

Refrigerant	2019	2020	2021	2022	2023
HFC-134a	4,109,730	3,910,521	3,827,277	3,764,796	3,473,167
R-600a	786,550	877,633	1,103,065	1,233,488	1,074,876
Total	4,896,280	4,788,154	4,930,342	4,998,284	4,548,043

Commercial and industrial refrigeration manufacturing

17. Over 1.4 million units of stand-alone commercial refrigeration equipment are imported annually by 180 enterprises for applications such as showcases, ice cream machines, ice cube makers, display cabinets, bottle coolers, ice cream boxes, chest freezers, upright freezers, undercounter freezers, upright chillers, beer coolers, blood bank refrigerators, pharmaceutical refrigerators, biomedical freezers, and ultralow temperature (ULT) freezers, with capacity ranging from 250 to 1,500 litres. Some equipment is

also locally manufactured, assembled, installed and charged. The main refrigerants used in this subsector are HFC-134a, R-290, R-404A, R-407C, R-410A, R-507A, R-600a, and R-717. A small number of cascade systems are charged with R-404A and R-290.

18. There are over 30 manufacturers and suppliers of commercial refrigeration equipment in the country, installing and assembling large commercial and industrial refrigeration systems at supermarkets, food-processing plants, cold-storage and pharmaceutical facilities. Many manufacture both refrigeration systems and foam for stand-alone equipment or polyurethane (PU) foam sandwich panels for cold rooms and logistic facilities, and some only engage in the manufacturing and/or installation and assembly of refrigeration systems. There are about 70 enterprises with large cold-storage facilities, including processing plants for seafood, meat, chicken, and dairy products, horticulture facilities and rental cold logistics.

Transport refrigeration manufacturing

19. In 2023, 2,245 refrigerated trucks were produced in Indonesia. The assembling enterprises commonly build sandwich-panel boxes for refrigeration units, primarily charged with HFC-134a and R-404A, and install them on commercially available truck cab chassis. Enterprises using refrigerated trucks to import, export, or distribute goods either operate their own fleets or rely on the services of logistic enterprise fleets with over 1,000 refrigerated trucks.

Foam manufacturing

20. There are an estimated 80 enterprises engaged in the manufacturing of PU foam in Indonesia. Most of them have previously converted from CFCs and HCFCs to cyclopentane, HFO or water-based formulations with assistance from the Multilateral Fund. Some foam enterprises are using HFC-245fa in foam production, with consumption gradually increasing over the past few years.

Solvent manufacturing

21. The use of HFCs as solvents is mainly in the manufacturing of semiconductors and other electronics, including plasma etching, chamber cleaning and heat transfer. While Indonesia aspires to establish the manufacturing of semiconductors in the coming years, HFCs are being monitored in import applications for this use. HFC-152a is used in glassmaking; and consumption of small amounts of HFC-227ea and HFC-245fa has also been recorded in the sector.

Aerosol manufacturing

22. Indonesia's aerosol industry has fully converted to R-600a with support from the Multilateral Fund. No manufacturers of metered-dosed inhalers were identified, and it is believed that HFC-based inhalers are imported rather than manufactured locally.

Firefighting

23. HFC-227ea is used as a fire-suppression agent for total flooding systems, and small volumes of HFC-236fa are imported for use as a cleaning agent in portable fire extinguishers. HFC-23, HFC-125, HFC-227ea and blends are used in the fixed installed fire-extinguishing systems.

Organic Rankine cycle

24. The ORC units use HFC-245fa as a working fluid because it has a low boiling point. The Rankine cycle helps to recover additional energy from waste heat in Indonesia's 16 geothermal power plants, ranging in capacity from 2.5 MW to 377 MW. In addition, the ORC is used by some large chemical manufacturers in the production of organic chemicals.

Refrigeration and air-conditioning servicing sector

25. There are approximately 75,000 technicians, 80 per cent of whom are self-taught, and estimated thousands of informal workshops consuming HFCs in Indonesia to service all sorts of appliances, with about 10,000 of them specializing in AC. The 380 formally registered AC workshops, owned either by equipment manufacturers or by suppliers, offer after-sales services across the country.

26. Technicians can acquire formal technical education by attending vocational high schools and public or private training centres and become certified through assessment centres. By the end of the HPMP, over 9,000 technicians will have become certified, including over 5,000 that have already completed their certification. Toolkits have been provided to 151 service shops and technicians, and five reclamation centres were established. Stage III of the HPMP is expected to certify 3,500 technicians (with additional 3,500 under government's own resources), establish an additional nine reclamation centres, procure training and certification equipment for 15 vocational training centers, procure maintenance and recovery equipment for 200 service shops, and procure 1,000 sets of basic servicing tools for newly certified technicians.

27. The Work Competency Certification for RAC technicians establishes mandatory certification and conditions for employing technicians in businesses with RAC facilities, classifying technicians into five categories. Currently, the competency-based certification system is operational for levels one ("assistant technician"), two ("maintenance technician"), and three ("residential AC and domestic refrigeration technician"),³ and mandatory for levels two and three. The certification is not yet operational for levels four ("commercial refrigeration technician") and five ("central AC and chiller senior technician"). No competency standard has been established yet for MAC technicians.

28. The residential AC sector has nearly completely moved to HFC-32 due to market dynamics. With the majority of HFC consumption in Indonesia associated with servicing, enhancing HFC management through limiting the GWP of refrigerants used in this sector to less than 700 will be prioritized under stage I.

Mobile air-conditioning servicing

29. Indonesia's MAC servicing sector comprises both formal and informal workshops. There are over 18 million registered passenger vehicles, over 6 million trucks, and over 250,000 buses in Indonesia. The number of MAC technicians in the country is estimated to be over 10,000. About 110 authorized servicing centres are associated with compressor manufacturers. The workshops associated with automobile manufacturers and importers do not service MAC in general but rather outsource it to authorized MAC servicing centres. Car owners tend to choose the authorized MAC servicing centres while under warranty, but most owners of out-of-warranty cars turn to the multi-brand workshop segment.

30. The main HFC used in the sector is HFC-134a, charged back into AC systems whenever components are being replaced or repaired. Almost all MAC systems in Indonesia are HFC-134a-based, except for some imported European car models which use HFO-1234yf, commercially available in the country as a replacement for HFC-134a in light-duty vehicles. Blends such as R-444A, R-456A, R-480A and R-513A are being investigated for light-duty servicing. For electric vehicles, lower-GWP HFC and HFO refrigerant blends and secondary loop R-290 are being investigated. Daikin has introduced R-474A as a more efficient alternative to HFO-1234yf in electric vehicles.

³ Level three technicians require in-depth knowledge and skills for the installation, maintenance, and troubleshooting of residential RAC equipment, including brazing, flaring, and refrigerant recovery, while level two technicians undertake simple maintenance activities not requiring a complete shutdown or interventions on the refrigerant circuit, such as change of spare parts or consumables (i.e., filters) and cleaning or sanitizing both indoor and outdoor units.

31. The only refrigerant currently in use for train transportation AC systems in Indonesia is R-407C. Potential alternatives for railway cars and buses include HFC and HFO blends such as R-513A, R-454A and R-454C, while R-458A is being investigated as a replacement for HCFC-22 in buses.

Local installation and assembly subsector

32. Over 30 enterprises are estimated to be engaged in the installation and assembly of large commercial and industrial refrigeration systems at supermarkets, food processing and pharmaceutical plants and cold storage facilities.

IV. Stage I of the Kigali HFC implementation plan as submitted

Institutional, policy and regulatory framework

33. The Directorate General of Climate Change Control, operating under the Ministry of the Environment (Kementerian Lingkungan Hidup or KLH), hosts the national ozone unit (NOU), which is responsible for the implementation of Montreal Protocol-related measures and programmes. The NOU coordinates inter alia with the Ministries of Trade (on import and export policies, regulations, and permits), Industry (import permits and quota), and Finance (taxes, duties, import quota and permits), as well as with the local governments in the implementation of phase-out and control measures for ozone-depleting substances (ODSs).

34. Indonesia's commitment to HFC phase-down is outlined in the National Medium-Term Development Plan (RPJMN) 2020–2024, which targets a 29 per cent reduction in greenhouse gas (GHG) emissions by 2030. The upcoming RPJMN 2025–2029 focuses on green and circular economy and emphasizes climate change mitigation. Presidential Regulation 98/2021 establishes the framework for GHG emission reductions, requiring sector-level mitigation plans from line ministries.

35. Indonesia has a comprehensive policy and regulatory framework for ODS control. The ODS licensing system was established in 1998, revised in 2006 to include HCFCs, and further amended in 2012. Regulations specific to HCFCs include bans on the use of HCFC-22 and HCFC-141b in the RAC manufacturing and assembly sectors and on the import of HCFC-22-based RAC equipment, with or without refrigerant charge (2014). No regulations have yet been developed specifically for HFCs.

36. Since 2023, HFCs have been considered restricted goods and allowed to enter Indonesia only through selected ports. Currently, there are around 130 registered importers, exporters and distributors of HFCs in the country, either for further distribution or for their own manufacturing processes. The KLH provides technical recommendations for issuing one-year import permits for HFCs and goods containing refrigeration systems and monitors the volume of substances imported by registered importers and stockpiled. HFC import quota for individual enterprises are established in consultation with relevant ministries and agencies.

37. The country has established standards regarding technician training and certification, the use of fire extinguishers, the safe handling of toxic and flammable refrigerants, and energy efficiency and conservation, including the establishment of minimum energy performance standards and suitable labelling for domestic refrigerators and room air conditioners. On the provincial level, the Jakarta government has been applying a “Green Buildings” regulation since 2022, which obliges the owners of buildings with high energy consumption to put in place energy conservation programmes and regular energy audits, to apply recommendations of such audits, and to report annually on the results.

Phase-down strategy for stage I of the Kigali HFC implementation plan*Overarching strategy*

38. In implementing its KIP, Indonesia will balance actions required for meeting the Kigali Amendment obligations with promoting and sustaining economic growth and development of national industries. Stage I will restrict market availability of residential and light commercial AC systems to those based on refrigerants with GWP lower than 700; ban the import and use of HFC-134a in domestic refrigeration manufacturing; and ban the manufacture and import of HFC-based stand-alone commercial refrigeration equipment. Conversions in the manufacturing sector include the conversion of the domestic refrigeration manufacturing sector and a project to phase down HFC use in train MAC. Industry will be provided with sufficient time to convert, based on sector characteristics and market trends, and subsequent technology conversions will be avoided as much as possible. Early retirement of existing equipment will be minimized by providing a sufficient consumption tail in servicing sectors, and emissions from the biggest HFC polluters will be managed through quota.

Proposed reductions

39. Stage I of the KIP targets a 10 per cent reduction from the average HFC consumption in the baseline years by 2029, i.e., a reduction of 2,337,072 CO₂-eq tonnes from the 23,370,721 CO₂-eq tonnes baseline. Table 6 presents the estimated consumption in a business-as-usual (BAU) scenario in the absence of a KIP, the Montreal Protocol limits, the estimated consumption levels under the stage I of the KIP, which take into account stockpiling that may have taken place in 2022, and the proposed HFC consumption targets under stage I of the KIP for Indonesia. The models used to develop the BAU scenario and stage I consumption are further discussed in paragraphs 61 to 64 below.

Table 6. HFC consumption forecast under the unconstrained scenario, Montreal Protocol limits, and proposed HFC reductions under stage I (CO₂-eq tonnes), as submitted

	2024*	2025	2026	2027	2028	2029
HFC consumption forecast at an average annual growth rate of 8.6 % (BAU)	14,930,000	16,570,000	17,850,000	19,350,000	20,860,000	22,560,000
Montreal Protocol HFC consumption limits	23,370,721	23,370,721	23,370,721	23,370,721	23,370,721	21,033,649
HFC consumption estimated under the KIP	20,860,000	20,860,000	19,350,000	17,850,000	16,570,000	15,890,000
HFC consumption targets proposed under the KIP	23,370,721	23,370,721	23,370,721	23,370,721	23,370,721	21,033,649
Proposed reductions from the HFC consumption baseline (%)	0	0	0	0	0	10

* CP data for 2024 was not available at the time of submission of the project and, therefore, this consumption was forecast.

Proposed activities

40. Stage I includes investment projects, comprising a reduction of 312.29 mt of HFCs, in the domestic refrigeration manufacturing sector and a subproject to phase down the consumption of R-407C by a train AC manufacturer, and non-investment projects in the servicing sector, comprising a reduction of 987.08 mt of HFCs, including regulatory and capacity-building projects, communications and outreach, and policy and technical assistance, as originally submitted.

Domestic refrigeration manufacturing sector

41. There are eight manufacturers of domestic refrigerators in Indonesia (i.e., Fujisei Plastik Seitek (Fujisei), Haier Electrical Appliances Indonesia (Haier), Hartono Istana Teknologi (Polytron), LG Electronics Indonesia (LG), Maspion Elektronik (Maspion), Panasonic Manufacturing Indonesia (Panasonic), Sanken Argadwija (Sanken), and Sharp Electronics Indonesia (Sharp)). Four of these enterprises are multinational: Haier, LG, Panasonic and Sharp. Haier is a 100 per cent Article 5-owned enterprise and has one line capable of manufacturing both HFC-134a- and R-600a-based refrigerators; funding is requested to enable the conversion of the enterprise's HFC-134a consumption. LG already manufactures R-600a-based domestic refrigerators and, in line with decision 23/15, is not eligible for funding and will therefore convert its (small) remaining consumption with its own resources. Panasonic is 40 per cent locally owned but has already converted its domestic refrigeration manufacturing to R-600a except for a small domestic refrigeration manufacturing line that was established in July 2024, after the cut-off date for eligible capacity and, therefore, will convert to R-600a with its own resources. Sharp is 7.6 per cent locally owned and has two lines manufacturing HFC-134a-based domestic refrigerators and upright freezers; funding is requested to convert the enterprise in line with its eligible Article 5 ownership.

42. Accordingly, funding is requested to convert Fujisei, Haier, Maspion, Polytron, Sanken and Sharp from HFC-134a to R-600a, resulting in the phase-out of 267.41 mt of HFC-134a. An additional 33.84 mt of HFC-134a would be phased out without assistance from the Multilateral Fund. Fujisei, Maspion and Sharp exclusively manufacture with HFC-134a, while Haier, Polytron and Sanken already have R-600a-based manufacturing capacity; the funding requested took into account inter alia the existing baseline equipment. In addition, the following enterprise-specific considerations were taken into account, resulting in incremental capital costs (ICCs) for the six enterprises of US \$2,750,553, detailed in table 7 below:

- (a) Ultrasonic welding machines (US \$20,000/unit) were requested based on the number of manufacturing lines, except for Polytron and Sharp that requested Lokring kits and accessories. The ultrasonic welding machine or Lokring would be used to seal the filling tube after R-600a was charged into the unit; that sealing is currently done via brazing;
- (b) Upgrades to the test chamber at Polytron and Sharp were requested. Polytron, which already manufactures R-600a-based domestic refrigerators, has nine test chambers, of which only one can be used for R-600a-based domestic refrigerators. To enable the conversion of the enterprise, it is necessary to have five test chambers capable of testing R-600a models; the enterprise would co-finance three of those test chambers, while funding was requested for two test chambers. Sharp, which does not manufacture with R-600a, would need to upgrade its test chamber for use with R-600a-based refrigerators; and
- (c) 2023 consumption was used except for Haier, Sanken and Sharp, where the average 2021 to 2023 consumption was used due to fluctuations in consumption during those years.

43. Incremental operating costs (IOCs) were requested based on the difference in the price of HFC-134a (US \$5.31/kg) and R-600a (US \$7.19/kg), and a 50 per cent reduction in refrigerant charge; and based on the difference in the price of an HFC-134a-based and a R-600a-based compressor, which varies by enterprise. In addition, for Polytron and Sharp, the additional cost of Lokring nut (US \$0.13/unit) versus brazing (US \$0.025/unit) was considered, resulting in IOCs of US \$3,041,949 for the six enterprises. Based on co-financing of US \$3,565,134 provided by the enterprises, the total funding requested is US \$2,227,270, as shown in table 7.

Table 7. Requested funding (US \$) and consumption (mt) for the domestic refrigeration manufacturing sector, as submitted

Particulars*	Fujisei	Haier**	Maspion	Polytron**	Sanken**	Sharp ⁺
Units manufactured (number)	91,921	225,768	57,663	1,608,873	134,943	1,509,387
HFC-134a (mt)	10.09	***35.81	4.68	91.74	***8.58	***116.51
Refrigerant storage and transfer	30,000	30,000	30,000	5,000	30,000	171,420
Assembly line modifications	106,200	5,000	165,000	45,000	120,000	503,558
Ultrasonic welding machine	40,000	0	60,000	0	40,000	0
Lokring machine and accessories	0	0	0	17,000	0	247,260
Safety systems	56,000	0	84,000	28,000	56,000	109,296
Product redesign, prototype, tests and trials	30,000	10,500	21,000	37,500	22,500	7,600
Test chamber upgrades	0	0	0	250,000	0	35,000
Energy and safety certification	8,000	2,800	5,600	10,000	6,000	31,020
Safety training for workers	5,000	5,000	5,000	5,000	5,000	5,000
Installation and delivery	5,000	5,000	5,000	5,000	5,000	5,000
Plant safety audit and permit	2,000	2,000	2,000	2,000	2,000	2,000
Subtotal	282,200	60,300	377,600	404,500	286,500	1,117,154
Contingency	22,720	3,500	33,400	34,500	24,100	106,079
ICCs	304,920	63,800	411,000	439,000	310,600	1,223,233
IOCs (US \$/kg)	7.81	9.98	16.29	12.54	16.06	10.65
IOCs	78,837	357,277	76,259	1,150,441	137,776	1,241,359
Total incremental costs	383,757	421,077	487,259	1,589,441	448,376	2,464,592
Co-financing	200,523	0	402,198	327,099	292,563	2,342,751
Funding requested	183,234	421,077	85,061	1,262,342	155,813	121,841
CE (US \$/kg)	18.16	11.70	18.18	13.76	18.16	1.05

* US \$ unless otherwise specified

** Enterprise already has R-600a manufacturing capacity

*** Average consumption in 2021–2023

⁺ Enterprise with 7.6 per cent Article 5 ownership

44. In addition to the eight manufacturers noted above, one enterprise (Denpoo Mandiri) assembles cold-water dispensers based on imports of semi-complete knock-down kits that are pre-charged with HFC-134a. The enterprise assembles and tests the assembled units at its factory in Indonesia and in case of any leaks, the refrigerant is topped up using simple tools (manifold gauge). That consumption is addressed under the servicing sector.

Train mobile air-conditioning systems investment subproject

45. The only manufacturer of AC units for rail passenger cars in Indonesia is INKA Multi Solusi (IMS), a subsidiary of Industri Kereta Api (INKA), national rail locomotive and rolling stock manufacturer for the Indonesian Railway Company. Currently, all railcars made by this manufacturer are equipped with roof-mounted AC units charged with R-407C. Since 2014, IMS has manufactured over 2,000 such units, consuming 49.22 mt of R-407C between 2019 and 2023.

46. Between 2029 and 2034, Indonesia plans to tighten R-407C supply for use in rail and transport MAC and to stop the installation of new passenger car air conditioners based on R-407C by 1 January 2035, based on the satisfactory evaluation of the performance and reliability of new AC systems under real train operation conditions. A ban on the manufacturing of transport and rail MAC based on refrigerants with GWP higher than 150 is planned to be introduced by 2035. Although relatively low-impact, this application presents an opportunity for the Government to proactively address HFC phase-down with an investment subproject launched at a state-owned enterprise. The use of a lower-GWP refrigerant in train MAC systems will require design changes to ensure safety, as well as optimization of compressor size and performance suitable for the local climate, noting that in the future, aging trains will require replacement of their AC systems, and the lack of suitable refrigerant for servicing could jeopardize public safety.

47. Stage I of the KIP will support the subproject at IMS to eliminate 11 mt or 19,512 CO₂-eq tonnes of R-407C by introducing low-GWP refrigerant technology in the manufacturing of train MAC systems, which will later facilitate complete phase-out of R-407C in the MAC sector in Indonesia, planned for 2035-2039. The project will assist IMS in researching and developing new MAC models based on R-454C (GWP of 145), and in manufacturing 10 units for prototyping and real-world testing. Since R-454C is classified as a mildly flammable refrigerant, the enterprise will need suitable charging equipment, safety testing, and certification for passenger car installations. In cooperation with train operators, the manufacturer will maintain and monitor the operation of those AC units for one year to evaluate their performance and reliability. If the safety and performance requirements are met, the enterprise plans to develop further technical specifications for new MAC systems for passenger railroad cars based on R-454C. The research and development results can be shared with countries in the region for wider climate impact.

48. The ICC breakdown for the subproject is presented in table 8. Funding requested from the Multilateral Fund amounts to US \$330,000. The project's cost-effectiveness (CE) is calculated at US \$27.27/kg, or US \$15.38/CO₂-eq tonne.

Table 8. Cost breakdown of the subproject at the train MAC manufacturer IMS

Particulars	Unit cost (US \$)	Qty.	Total cost (US \$)
Investment component for IMS			
A2L refrigerant charging machine	10,000	1	10,000
Safety system at charging area	20,000	1	20,000
Research and development, prototyping, bench tests and validation	60,000	1	60,000
Safety testing and certification	10,000	1	10,000
Manufacturing of 10 AC units for real train operation conditions	18,000	10	180,000
Performance monitoring of 10 installed MAC units over one year	20,000	1	20,000
Subtotal			300,000
Contingency		10%	30,000
Total			330,000

Servicing sector

49. Activities in the servicing sector proposed for implementation by World Bank under stage I and in the first tranche, as well as their cost breakdown, are presented in table 9.

Table 9. Servicing sector activities and their costs in stage I and the first tranche of the KIP for Indonesia as submitted by World Bank

Stage I KIP Activity	Cost (US \$)	
	Stage I	First tranche
1. Strengthening capacity in MAC servicing		
Development and issuance of a national standard for competency-based MAC technician training, assessment and certification, and of the related training and assessment modules (US \$60,000); and review and update of the existing occupational standards and curricula to include good practices, leak reduction and handling new refrigerants (US \$15,000)	75,000	75,000
Organization of 5 training workshops for trainers on the new competency-based certification scheme for MAC technicians (US \$25,000); and 84 three-day theoretical and practical workshops to train, assess and certify 1,680 MAC technicians in the installation, repair, maintenance and handling of equipment charged with controlled substances and HFO-1234yf, including the costs of training material and trainers' travel costs (US \$672,000)	697,000	25,000
Launch of the new MAC training programme and procurement and delivery of 112 training equipment packages at 14 training centres (US \$1,120,000); and provision of 30 training packages to 30 servicing centres (US \$300,000)	1,420,000	1,120,000
Provision of MAC servicing tool kits, including gauges and leak detectors, to the	840,000	0

Stage I KIP Activity	Cost (US \$)	
	Stage I	First tranche
1,680 technicians certified in training workshops		
Subtotal 1	3,032,000	1,220,000
2. Strengthening capacity in commercial and domestic refrigeration servicing		
Development of standardized training modules and material for the servicing of domestic and commercial refrigeration equipment, including the safe handling of refrigerants and equipment during maintenance and repair, avoiding leaks, and refrigerant recovery and recycling (US \$60,000); an additional training module on inverter compressor technology and repair of electronic components of energy-efficient refrigeration equipment (US \$35,200); and integration of good servicing practices into existing occupational standards and curricula (US \$15,000)	110,200	75,000
Procurement and delivery of 45 sets of refrigeration training equipment ⁴ to 9 selected vocational and private training centres (US \$256,500) and 32 electronic repair tool kits to 4 training centres (US \$19,200)	275,700	205,200
Organization of 3 training workshops for trainers (US \$15,000) and 45 workshops to train, assess and certify 900 technicians in good servicing practices, the safe handling of refrigerants, and diagnosing/repairing/replacing electronics of inverter technologies, including training material (US \$360,000); and procurement and delivery of selected servicing tools (microns, manifold gauges or anemometers) to participating technicians (US \$324,000)	699,000	0
Pilot training programme to offer combined training and certification on good servicing practices (3 days) and electronic component repairs (0.5 day) for 300 technicians at 4 training centres and procurement and delivery of electronic toolkits for inverter checks and digital clamp multimeters to participating technicians (US \$148,500)	148,500	0
Subtotal 2	1,233,400	280,200
3. Assistance to a local domestic refrigeration assembler (Denpo Mandiri)		
Procurement and delivery to the beneficiary of a set of tools for HFC-134a recovery and recharge ⁵ during assembly and aftersales servicing of imported pre-charged water coolers, until the ban on HFC-134a imports is imposed (US \$7,043); and related safety training (US \$3,000)	10,043	0
Subtotal 3	10,043	0
Total	4,275,443	1,500,200

Technical assistance

50. Activities for technical assistance proposed for implementation by World Bank under stage I and in the first tranche, as well as their cost breakdown, are presented in table 10.

Table 10. Technical assistance activities planned in stage I of the KIP

Component / Activity	Cost (US \$)	
	Stage I	1 st tranche
1. Policy impact assessment		
Policy impact assessments (at least 2) for: domestic refrigeration, stand-alone commercial refrigeration, HFC-125 used as cleaning agent in new fire-protection systems, and/or avoidance of the use and import of HFCs with GWP above 700 for residential AC units	100,000	0

⁴ Including inter alia leak detectors, HC refrigerant identifiers, recovery machines and cylinders, scales, vacuum pumps, brazing kits, ohmmeters and anemometers

⁵ Including electronic scales, vacuum pump, manifold gauge, HC leak detector, 220-240V/50-60Hz recovery machine, recovery cylinder, a Vulkan Lokring manual assembly tool, and ventilation

Component / Activity	Cost (US \$)	
	Stage I	1 st tranche
2. Studies and guidelines		
Feasibility study on green public procurement of lower-GWP appliances and equipment to enhance the efforts to slow down the increasing stock of public-owned property dependent on HFCs, including household refrigerators used in schools, hospitals, and other public buildings	50,000	0
Study for raising awareness on the safe and effective adoption of low-GWP MAC in rail and public transportation, including the cost-and-benefit and safety aspects, inter alia related to compressor size and placement	75,000	75,000
Impact assessment of HFCs used in the seafood/fish cold chain and study on alternatives and development pathways, supporting the Ministry of Maritime Affairs and Fisheries in the considered significant expansion of the cold chain and use of high-GWP HFCs in the sector as per future economic planning; HFC alternatives for different parts of the fish cold chain for the short, medium and long term; and analysis of costs and climate impact and benefits	185,000	185,000
Subsequent to the above impact assessment and study and drawing on the existing international guidelines, development of guidelines for the end users of state-owned agriculture and fisheries cold chain	95,000	0
Country-wide study on the alternatives to HFC-245fa consumed in the ORC by the energy sector and chemical industry	85,000	0
3. Consultations and training on HFC management and alternatives		
Consultations and training for priority stakeholders to be held in 2028, including: awareness-raising activities with consumer groups to promote safe, low-GWP and energy-efficient refrigeration; dedicated consultations and meetings on alternatives for ULT refrigeration; training workshop with fire-protection authorities/industry on low-GWP alternatives; a series of workshops for commercial refrigeration contractors and end users on the implications of HFC phase-down during stage I and beginning of stage II; and expert support to sectors where HFC bans are proposed in stage I in the form of workshops or on-site visits	100,000	50,000
Annual meetings on HFO-1234yf developments for the MAC sector	15,000	9,000
Study tour to non-Article 5 countries for officials from the Directorate General of Rail Transportation on the rail AC sector	50,000	50,000
Workshops held in 2028 for stakeholders from the RAC and cold-chain industry and associations, including commercial refrigeration sector contractors and end users, to assess market trends and discuss the availability and commercial viability of alternatives to R-404A	3,500	0
Total	758,500	369,000

Total cost of stage I of the Kigali HFC implementation plan

51. The budget for stage I has been proposed at US \$8,380,364, as summarized in table 11.

Table 11. Requested funding for activities to be implemented in stage I of the KIP for Indonesia (US \$) and reductions to be achieved, as submitted

Component / Activity	Funding	Phase-down	
		mt	CO ₂ -eq tonnes
1. Activities in the manufacturing sector			
1.1. Domestic refrigeration: Conversions from the use of HFC-134a to R-600a at 6 manufacturers	2,229,368	301.29	430,840

Component / Activity	Funding	Phase-down	
		mt	CO ₂ -eq tonnes
1.2. Transport AC: Support for a railway AC manufacturer in developing, producing and testing 10 prototype train AC units based on R-454C	330,000	11.00	19,512
Subtotal for activities in the manufacturing sector	2,557,270	312.29	450,356
2. Activities in the servicing sector			
2.1. Capacity strengthening in the MAC servicing sector	3,032,000	594.49	840,608
2.2. Capacity strengthening in commercial and domestic refrigeration servicing	1,233,400	241.89	342,038
2.3. Assistance to a local domestic refrigeration assembler (Denpoo Mandiri)	10,043	1.97	2,784
Subtotal for activities in the servicing sector	4,275,443	838.35	1,185,430
3. Technical assistance			
3.1. Execution of at least 2 impact assessment studies on the planned bans on HFC use/imports for the manufacturing sector (by January 2029)	100,000	19.61	29,80
3.2. Development of HFC-related studies (4) and guidelines (1) for different sectors	490,000	96.08	146,053
3.3. Consultations, study tours, and training workshops on HFC management and alternatives in the MAC, transport AC and commercial refrigeration sectors	168,500	33.04	50,224
Subtotal for technical assistance	758,500	148.73	226,084
PMU activities, i.e., staff and consultants (US \$440,000), operational costs including travel (US \$125,851), monitoring and reporting (US \$150,000), and public awareness outreach (US \$46,000)	761,851	n/a	n/a
Total for stage I of the KIP	8,352,642	1,299.37	1,861,870

Additional policy measures

52. The total reductions in consumption to be achieved through the activities for which funding from the Multilateral Fund was requested is 1,861,870 CO₂-eq tonnes. In order to achieve the additional reductions required to meet the 10 per cent reduction target, the Government will implement the following regulatory and policy measures by 1 January 2029 without additional funding from the Multilateral Fund:

- (a) Ban the import and manufacturing of HFC-based domestic refrigerators;
- (b) Ban the import and manufacturing of HFC-based standalone commercial refrigeration equipment based;
- (c) Ban the import, manufacture and installation of HFC-125-based fire suppression equipment;
- (d) Limit the import and manufacturing of residential and light commercial AC to equipment based on refrigerants with GWP lower than 700; and
- (e) Limit the manufacturing and installation of ULT freezers based on HFC-23 to the average consumption for such manufacturing in 2020–2022, and limit ULT freezers beyond that quantity to those based on refrigerants with GWP of 1,400 or less.

53. Based on the regulatory and policy measures listed above, and the consumption to manufacture such equipment shown in table 12, the country would achieve additional reductions of

475,201 CO₂-eq tonnes without additional assistance from the Multilateral Fund. The average consumption in the manufacturing of ULT freezers would be limited to 12.30 mt of HFC-23 by 1 January 2029.

Table 12. Manufacturing consumption of HFC-23 for ULT freezers, HFC-134a and R-404A for stand-alone commercial refrigeration, and R-410A for residential AC equipment (mt)

Substance	2020	2021	2022	2023	2024
HFC-23	0.0	0.0	36.90	7.41	0.0
HFC-134a	84.8	78.5	83.1	101.6	77.9
R-404A	96.4	55.0	104.3	131.6	114.8
R-410A	23.41	7.79	2.66	3.48	*

* Not available at the time of finalization of the present document

Implementation plan for the first tranche

54. The first funding tranche of stage I of the KIP, submitted in the total amount of US \$4,567,579, will be implemented between June 2025 and December 2027. Detailed information on the activities to be implemented, including adjustments and level of funds as agreed, are presented in paragraphs 88 and 89 and in table 17 below.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

V. Comments

HFC consumption

HFC consumption fluctuations during baseline years

55. The World Bank noted fluctuations in consumption in the 2020 to 2023 period. The 12.6 per cent reduction in consumption between 2020 and 2021 was likely due to the COVID-19 pandemic. The substantial increase in 2022 consumption both in metric tonnes (by more than double) and CO₂-eq tonnes (more than triple) was followed by historically low consumption in 2023. In analyzing this trend, the World Bank considered that economic recovery after COVID-19 and the associated global supply chain issues, while contributing factors, do not appear to be the primary reason for the large increase in consumption in 2022. The World Bank undertook a detailed review of the 2022-2023 import and export data and found uncharacteristically large imports in 2022 of five high-GWP HFCs (almost nine times more R-404A, eight times more R-507A, five times more HFC-245fa, and more than double HFC-134a and R-410A than imported in 2021) and concluded that this appears to be stockpiling as considerable amounts of those gases were exported in 2023. The World Bank concluded that the 2022 and 2023 consumption for those five substances are anomalies and, therefore, the models used by the World Bank to forecast consumption under the BAU scenario and under stage I excluded the 2022 anomalous consumption and were instead based upon on estimated demand.

56. In particular, the World Bank used the estimated 2019 consumption⁶ and 2020–2021 reported data to which it applied growth rates based on the overall sector or application-level, which were provided by industry, and at the HFC-level in that sector. A linear regression was applied from 2022 through 2045 at a sector level, and the analysis also reflected the Government's policy of promoting local manufacturing of cooling equipment, which affected the growth in HFC-32 consumption.

⁶ Included in the submission and estimated at 12,412,389 CO₂-eq tonnes but not reported under Article 7 or in the country's CP data report.

Differences between country programme report and survey data

57. The Secretariat sought to better understand the country's consumption and the models developed by the World Bank to forecast future consumption. Regarding the former, the Secretariat noted that the use of HFCs reported by the country in its 2020 to 2023 CP data reports was inconsistent with the use reported in the submission.⁷ In particular, for all years, the total use in the CP reports is equal to the imports without deducting exports. In addition, HFC use in the 2022 CP data report does not take into account stockpiling, resulting in reported sectoral use that is considerably higher than the market use, while the use reported in the 2023 CP data report does not take into account considerable exports and quantities of HFCs drawn from the 2022 stockpile. A comparison of data sources is shown in table 13.

Table 13. Comparison of sectoral use (mt) in CP data reports and in the KIP submission, and exports

Sectoral use	2020	2021	2022	2023	2024
KIP survey	6,689.35	6,319.94	8,220.14	9,008.95	
CP data	6,706.72	6,357.95	15,682.04	6,255.43	9,663.91
Exports (mt)	0.96	9.41	3.30	2,752.80	300.41
Exports (CO ₂ -eq tonnes)	1,022	17,456	3,399	8,227,306	1,356,616

*Total use by sector does not include exports

58. Finally, the following inconsistencies between the project submission and CP data reports were noted:

- (a) The CP data reports did not reflect the use of HFC-245fa in PU foam manufacturing;
- (b) The relative use of HFCs for RAC manufacturing and servicing in the CP data reports (approximately 50/50) is inconsistent with that provided in the submission (where manufacturing accounts for approximately one quarter and servicing approximately three quarters of HFC use in the RAC sector). In line with the World Bank's observation that the data included in the submission was more accurate, given that it was based on the data survey and subsequent analysis undertaken during the KIP preparation, the Secretariat used the data provided in the submission when reporting the average mt and CO₂-eq tonnes of HFCs used in the servicing sector in the baseline years, which is used when determining the deductions from the remaining consumption eligible for funding in the servicing sector, as shown in table 15 below;
- (c) HFC-23 use was reported exclusively for servicing in the CP data reports, while the submission indicated use in manufacturing in 2022 and 2023 (see also paragraph 60 below); and
- (d) The use of HFC-236fa in firefighting reported in the KIP proposal differs from that reported under the country's CP data reporting.

59. At the 95th meeting, the Executive Committee drew the attention of the agencies to decisions 34/18 and 41/16, in which the issue of data inconsistencies had been addressed and which requested the bilateral and implementing agencies to ensure the consistency of the Article 7 data, CP data and project phase-out data in all project proposals before their submission to the Secretariat.⁸ Accordingly, the Secretariat requested the World Bank to assist the country so that it could correct its 2020–2023 CP data reports. The Secretariat will provide an update on this matter during the 96th meeting.

⁷ The Secretariat also noted that not all the exports reported by the country were reported as imports in the country to which the HFCs were exported.

⁸ Paragraph 144 of UNEP/OzL.Pro/ExCom/95/94

The 2024 country programme data report

60. The 2024 CP data report became available on 1 May 2025, by the time of finalization of the present document. The Secretariat noted that the reported 2024 consumption of 12,908,634 CO₂-eq tonnes is below the HFC consumption estimated for the same year in the World Bank's BAU forecast scenario (14,930,000 CO₂-eq tonnes in table 6 above). The CP report includes exports of the five HFCs identified by the World Bank as having uncharacteristically large imports in 2022, and explained in the 2024 CP data report as most likely sourced from previous year stock, as well as exports of 37.32 mt of HFC-23, with no use in manufacturing, which would require further clarification.⁹ The Secretariat sought to better understand the incidence of this additional information in the BAU forecast provided, the understanding of the country's actual market needs in 2020–2022, the estimation of the level of stockpiling in 2022, and whether there was manufacturing of ULT freezers with HFC-23 in those years. At the time of finalization of the present document, the Secretariat was discussing the matter with the World Bank and will provide an update during the 96th meeting.

Overarching strategy*Reduction targets*

61. The Secretariat noted that the country, with the assistance of the World Bank, had taken into consideration the anomalous consumption in 2022 and 2023 and developed a BAU scenario that, based on the survey, more closely matches actual market demand in the country. Under this BAU scenario, HFC consumption was expected to reach 16.57, 17.85, and 19.35 million CO₂-eq tonnes in 2025, 2026 and 2027, respectively. Those levels of consumption are expected in the absence of interventions, while under stage I of the KIP, funding was being requested for activities that will help the country reduce consumption. Accordingly, the Secretariat asked whether the Government would consider targets for 2025–2028 that were below the HFC baseline, noting that the BAU model suggested such intermediate targets were feasible. To ensure the same approach among countries, the Secretariat considered scenarios where importers had not stockpiled HFCs during the baseline years, which resulted in a possible lower final target of approximately 16.3 million CO₂-eq tonnes. Noting the uncertainties inter alia in the evolution of low-GWP technologies in the RAC sector, the uptake of such technologies in the country, and other factors that could affect the country's future consumption, the Secretariat suggested that, based on the country's national circumstances, a final target for Indonesia could be approximately 18.6 million CO₂-eq tonnes, which is between the originally proposed target for 2029 (21,033,649 CO₂-eq tonnes) and that indicated above (16.3 million CO₂-eq tonnes).

62. Subsequent to a discussion, the World Bank proposed maintaining the 2025–2028 targets at the HFC baseline, a reduction target of 15 per cent of baseline in 2029 and a 20 per cent of baseline in 2032. Noting that the 2025 to 2028 targets were above those under the BAU scenario proposed by the World Bank but also recognizing that the discretion to set targets that are achievable and still meaningful based on national circumstances rested on the Government, the Secretariat asked whether it would be appropriate to consider alternate targets, for example a 15 per cent reduction from baseline between 2025 and 2031, and 20 per cent reduction in 2032; or based on the 2025 quota and the BAU scenario for the years 2025–2028, a 15 per cent reduction in 2029, and linear reductions to 20 per cent below the country's baseline by 2032.

63. The World Bank maintained the existing targets and highlighted that the BAU scenario was carefully crafted to consider growth by sector and by HFC in that particular sector, as well as new manufacturing installations (including with at least one that started manufacturing in 2025) stemming from the Government's industrial policy to promote domestic manufacturing. Any earlier interventions than

⁹ In 2022, HFC-23 imports increased from 0.86 to 37.90 mt, out of which 36.90 mt were attributed to manufacture ULT freezers (table 12), followed by imports of 7.93 mt in 2023 out of which 7.41 mt were attributed to such manufacturing. With the export of 37.32 mt in 2024 the amount of HFC-23 needed for local manufacturing becomes unclear.

those proposed coming into force in 2029 would be risky for the Government given market trends, policy and a number of unknowns in many sectors given that this is the first stage of HFC phase-down. The World Bank further emphasized that there are many uncertainties on the consumption due to COVID-19 pandemic, stockpiling, and the Government's national policies and development plan to promote economic growth and local industries. While the World Bank had made best efforts to project BAU, many external factors could impact the consumption and hence the Government could only accept advanced reduction targets for 2029 and 2032 while maintaining 2025–2028 targets at the baseline level.

64. In addition, the World Bank explained that the revised reduction target of 15 per cent in 2029 already exceeded the target in the approved 2025–2029 RPJMN. In particular, the ODS phase-out and HFC phase-down are supporting the second national priority specified in that plan to achieve the cumulative GHG emission reduction target under the green economy transformation indicator and HFC phase-down target is committed to RPJMN as part of the workplan to be carried out by the Ministry of Environment, which is planned to be included in annexes to the RPJMN. Finally, the World Bank emphasized the complexities and time required in setting up targets in the country's national plan, which depended on extensive consultations between Government agencies and relevant stakeholders that were based on data analysis and modeling several scenarios. Any large changes in the targets would require a repeat of this entire consultative process. The Executive Committee may wish to consider the targets in light of the information provided.

Deductions from remaining consumption eligible for funding associated with HFCs stockpiled in the baseline years

65. The Secretariat considered that HFCs that were stockpiled in the baseline years should not be included in the country's HFC consumption eligible for funding. In order to estimate the quantity of HFCs that were stockpiled in the baseline years, the Secretariat asked for the models developed by the World Bank for the BAU and stage I consumption scenarios. In absence of those, the Secretariat considered three approaches to estimate actual market needs: based on the aggregated use reported in the KIP across all sectors, which results in a contribution to the HFC baseline from stockpiled HFCs of 5,602,730 CO₂-eq tonnes; a linear model based on reported 2020, or the average of 2020–2021 consumption, and the World Bank's BAU scenario growth rate, which results in an estimated contribution to the HFC baseline from stockpiled HFCs between five and six million CO₂-eq tonnes; and a model that only considered consumption in 2022 and 2023, which assumed that half of the total 2022–2023 consumption was used in 2022 and the other half in 2023, resulting in an estimated contribution to the HFC baseline from stockpiled HFCs of 4,811,218 CO₂-eq tonnes. The Secretariat noted that the former two approaches might result in an overestimate of the quantity of stockpiled HFCs as they may not have fully taken into account possible COVID-19 recovery and therefore proposed to use the latter methodology, which was agreed.

66. In addition, the Secretariat noted that the methodology for determining the starting point had not yet been agreed by the Executive Committee and the need for the country to retain sufficient remaining consumption eligible for funding for future KIP stages. It was therefore agreed that if the Executive Committee established the starting point at a different level than the HFC baseline, the additional deduction due to stockpiling would need to be adjusted on the understanding that it should not be larger than 4,811,218 CO₂-eq tonnes.

67. The country submitted its 2024 CP data report subsequent to the finalization of discussions between the Secretariat and the World Bank on the level of stockpiles of HFCs in 2022 noted above. In 2024, the country reported exporting 1,356,616 CO₂-eq tonnes of HFCs.

Institutional, policy and regulatory framework

HFC licensing and quota system

68. In line with decision 87/50(g), World Bank has confirmed that Indonesia has an established and enforceable system of licensing and quotas for monitoring HFC imports/exports in place.

69. Quotas are issued in CO₂-eq tonnes. In determining the national quota, the Government sets aside 20 per cent of the maximum allowable consumption as a buffer to anticipate new importers or manufacturers, and unexpected imports. The licensing and quota system entered into force on 10 March 2024; imports that took place between 1 January and 10 March 2024 fell within that buffer.

70. The Secretariat noted that given the country's unusual consumption in 2022, and dramatic reduction in consumption in 2023, including due to exports that took place that year, allocating quotas on the basis of sales that took place that year might more realistically reflect HFC demand than based on imports. The World Bank explained that quotas allocated in 2024 were based on imports in the baseline years; prior year import; sales in the year of import; manufacturing plan, if relevant; and the total amount of HFC imported between 1 January 2024 and 10 March 2024. The 2024 quota was 13,800,185 CO₂-eq tonnes, and quotas for 2025 have been set at 18,539,125 CO₂-eq tonnes.

Technical and cost-related issues

Domestic refrigeration manufacturing sector

71. The funding requested by the World Bank for the domestic refrigeration manufacturing sector was not consistent with the cost guidelines agreed by the Executive Committee for stage I of KIPs in decision 95/86, as the requested IOCs were above the agreed IOC threshold for the sector and the CE of conversions for several enterprises were above the agreed CE threshold because the World Bank considered them to be small or medium-sized enterprises (SMEs). While the Executive Committee did not provide a definition of SMEs for domestic refrigeration, the Secretariat nonetheless assessed whether, on an exceptional basis, it could consider enterprises included in the project with consumption under 15 mt to be SMEs. As none of the enterprises met the conditions specified in decision 95/86(c)(ii), the Secretariat was unable to consider the enterprises to be SMEs. However, the Secretariat noted that the stage I of the KIP included all the remaining enterprises in the domestic refrigeration manufacturing subsector, for which a CE threshold had been established by the Executive Committee; and understood that Indonesia would submit no further requests for funding from the Multilateral Fund to convert any enterprises in the subsector, and, therefore, proposed that the project be considered as an umbrella project, in line with decision 19/32. The World Bank confirmed the Secretariat's understanding and agreed to consider the project as an umbrella project.

72. Regarding the proposed IOCs, the Secretariat noted that the lower price of R-600a (US \$2.90/kg) relative to that of HFC-134a (US \$5.07/kg) reported by the country, and the reduction in refrigerant charge when converting from HFC-134a to R-600a, would result in savings. In addition, information from industry experts indicates that global manufacturing of R-600a-based compressors for domestic refrigerators exceeds that of HFC-134a-based compressors and the price of such compressors are generally lower, though there may be variations in the relative price of the two compressor types based on the local supply chain and other factors. Regarding the proposal to use Lokring caps for Polytron and Sharp, the two largest manufacturers in the project, which would result in a substantial increase in IOCs for the project, the Secretariat noted that Lokring technology was used by enterprises that manufacture on the order of tens of pieces of equipment per day. Instead, the Secretariat recommended providing the enterprises with ultrasonic

welding machines, used by other enterprises in the project. Further to a discussion, the IOCs for the domestic refrigeration manufacturing sector were agreed at zero.

73. While no IOCs would be provided to the enterprises under the project, the Secretariat noted with appreciation that the country had submitted a request for funding to prepare a project to improve the energy efficiency of the equipment manufactured by the enterprises under decision 94/60 to the 96th meeting.¹⁰ The approval of such a project would allow additional funding to be provided to the enterprises to improve the energy efficiency of the equipment they manufacture.

74. Following detailed discussions with the World Bank, the following adjustments were made to the costs of converting the six enterprises:

- (a) In line with decision in paragraph 32(b) of document UNEP/OzL.Pro/ExCom/16/20, the 2024 consumption was used to determine agreed eligible incremental costs;
- (b) Lokring machines and accessories were replaced with ultrasonic welding machines;
- (c) Adjustments were made based on whether the baseline charging machine and leak detectors were capable of charging and detecting R-600a, and if baseline equipment was established after the cut-off date for eligible capacity;
- (d) Adjustments to safety training at enterprises already manufacturing with R-600a, and for Haier a reduction in the costs related to refrigerant storage and transfer, assembly line modifications, and the costs for installation and delivery given the limited equipment procured; and
- (e) Adjustment to the cost of activities and equipment at Sharp in line with those of the other five enterprises.

75. Based on the adjustments agreed above, and consistent with decisions 19/32(a)¹¹ and 95/86, the total agreed cost to convert the six enterprises is US \$1,139,809 to phase out 266.83 mt of HFC-134a, as shown in table 14 below. The World Bank confirmed that LG, Panasonic, and the six enterprises funded under the project are the only enterprises manufacturing HFC-134a-based domestic refrigerators in the country, and that LG and Panasonic had no consumption of HFC-134a in 2024. Accordingly, the total phase-out from the conversion of the manufacturing sector is 266.83 mt.

Table 14. Agreed funding (US \$) and 2024 consumption (mt) for the domestic refrigeration manufacturing sector

Particulars*	Fujisei	Haier**	Maspion	Polytron**	Sanken**	Sharp***
HFC-134a (mt)	12.20	15.60	5.18	87.42	7.95	138.48
Refrigerant storage and transfer	30,000	26,500	30,000	5,000	30,000	38,000
Assembly line modification	90,000	2,500	15,000	45,000	90,000	144,000
Ultrasonic welding machine	40,000	0	40,000	20,000	40,000	40,000
Safety systems	56,000	0	84,000	28,000	56,000	40,000
Product redesign, prototype, tests and trials	30,000	10,500	21,000	37,500	22,500	7,600
Test chamber upgrades	0	0	0	250,000	0	35,000
Energy and safety certification	8,000	2,800	5,600	10,000	6,000	31,000
Safety training for workers	5,000	1,000	5,000	1,000	5,000	5,000
Installation and delivery	5,000	2,500	5,000	5,000	5,000	5,000
Plant safety audit and permit	2,000	2,000	2,000	2,000	2,000	2,000

¹⁰ UNEP/OzL.Pro/ExCom/96/23

¹¹ For an umbrella project, the CE of an individual enterprise can be up to 100 per cent above the established threshold, in line with decision 19/32(a).

Particulars*	Fujisei	Haier**	Maspion	Polytron**	Sanken**	Sharp***
Subtotal	266,000	47,800	207,600	403,500	256,500	347,600
Contingency	21,100	2,400	16,400	9,300	21,100	25,700
ICCs	287,100	50,200	224,000	412,800	277,600	373,300
Agreed eligible costs	287,100	50,200	142,554	412,800	218,784	28,371
CE (US \$/kg)	23.53	3.22	27.52	4.72	27.52	0.20

* US \$ unless otherwise specified

** Enterprise already has R-600a manufacturing capacity

*** Enterprise with 7.6 per cent Article 5 ownership

Train mobile air-conditioning systems investment subproject

76. Noting that the subproject was virtually identical to that proposed for Viet Nam at the 93rd meeting,¹² the Secretariat sought to understand why the reductions in consumptions to be achieved from the present project were slightly smaller, and the costs slightly higher, than those in Viet Nam. In addition, the Secretariat noted that in Viet Nam, the Government had committed to implement a ban on the manufacturing and import of MAC systems using R-407C by 1 January 2029 and inquired whether the Government of Indonesia could similarly ban such manufacturing and imports.

77. The World Bank clarified that the cost of the subproject in Indonesia was higher than that in Viet Nam due to additional safety measures for the charging area, additional safety testing and certification, and additional AC models (one and two refrigeration circuits) to be redesigned and tested. The Government of Indonesia did not consider implementing a ban by the completion of the stage I of the KIP because there were other, unidentified enterprises manufacturing train MAC systems in the country; the consumption at those enterprises was not known. The phase-out of R-407C for Indonesia was estimated based on the projected manufacturing by the enterprise in 2035.

78. The Secretariat recalled that in line with decision 95/86(a) funding for MAC projects was to be considered on a case-by-case basis. On that basis, it was agreed that the enterprise would co-finance the contingencies, resulting in agreed costs of US \$300,000 for the project, on the understanding that the enterprise would not be eligible for the ICCs for a future project to phase down HFC consumption in MAC, but it would be eligible for IOCs should such a project be submitted in a future stage. In addition, the World Bank confirmed that in the unlikely event that IMS and/or train operators (e.g., KAI) determined that the R-454C-based MAC could not satisfy performance specifications, including related to energy efficiency, the Government committed to exploring other low-GWP alternatives; to submitting an annual report on progress in identifying a suitable alternative; and that the World Bank would submit a request to the Executive Committee for a change of technology once a suitable technology was found for the consideration of the Committee.

Servicing and technical assistance

79. In the servicing sector, procurement and training prices per unit were adjusted downward to align with costs approved in other KIPs (e.g. Malaysia and Viet Nam) and the quantity of trainings, certification, and procurement of equipment for technicians participating in trainings were increased to enable the training and certification of 1,260 RAC technicians and the training of 2,100 MAC technicians.

80. The Secretariat noted with appreciation the technical assistance activity related to the fisheries sector. Indonesia is the world's second largest producer of seafood and the sector employs 7 million Indonesians, contributed US \$26.9 billion to Indonesia's economy in 2018 and US \$6.24 billion to its exports in 2022. However, it is estimated that between 20 and 40 per cent of total fishery production is lost each year due to poor handling and inadequate cold chains. The proposed activity is expected to contribute to a better understanding of the sector's needs and contribute to not only reduced demand for high-GWP

¹² UNEP/OzL.Pro/ExCom/93/93

HFCs, but also the development of sustainable cold chains and reduced food waste. Similarly, the Secretariat noted the utility of the study for alternatives to HFC-245fa in the ORC since not much is known about this use, and the information could benefit other countries with geothermal power plants.

81. Based on the cost of activities in the servicing sector, agreed at US \$5,033,143, reductions from the remaining HFC consumption eligible for funding in the servicing sector amount to 1,587,784 CO₂-eq tonnes, as summarized in table 15.¹³

Table 15. Agreed costs and reductions from HFC consumption eligible for funding in servicing and for technical assistance

Servicing sector		
Average HFC consumption in the servicing sector in baseline years	mt	5,375.78
	CO ₂ -eq tonnes	8,648,957
Agreed funding for servicing and technical assistance	US \$	5,033,143
Agreed CE threshold	US \$/kg	5.10
Reductions from the remaining HFC consumption in the sector	mt	986.89
	CO ₂ -eq tonnes	1,587,784

Project management unit

82. Funding for the project management unit (PMU) was agreed at US \$572,846 (US \$424,000 for staff and consultants, operational costs including travel (US \$125,851), monitoring and reporting (US \$140,846), and a project launch workshop (US \$8,000)), amounting to 8.85 per cent of the project costs.

Total project cost

83. At the total cost of US \$7,045,798, stage I of the KIP for Indonesia will result in a reduction of 2,464,064 CO₂-eq tonnes from the country's HFC consumption eligible for funding, as summarized in table 16. An additional up to 4,811,218 CO₂-eq tonnes associated with stockpiled HFCs that had been imported in the country during the baseline years for use in years subsequent to the baseline years will also be deducted from the country's remaining HFC consumption eligible for funding.

Table 16. Agreed cost of activities to be implemented during stage I of the KIP in Indonesia

Sector	Phase-down		Agreed funding (US \$)	CE	
	mt	CO ₂ -eq tonnes		US \$/kg	US \$/CO ₂ -eq tonne
Domestic refrigeration manufacturing sector	266.83	381,567	1,139,809	4.27	2.99
Rail MAC subproject	11.00	19,512	300,000	27.27	15.37
Servicing sector	838.17	1,348,503	4,274,643	5.10	3.17
Technical assistance	148.73	239,281	758,500	5.10	3.17
Subtotal	1,264.72	1,988,863	6,472,952	5.12	3.25
PMU	0	0	572,846	n/a	n/a
Additional policy measures ¹⁴	178.63	475,201	0	n/a	n/a
Total	1,443.35	2,464,064	7,045,798	4.48	2.86

84. Stage I of the KIP will be implemented in three tranches. The second and third tranche will be submitted in 2028 and 2030, which will allow the country to submit those tranches to the same meeting as the third and fourth tranche of the stage II of the HPMP, thus minimizing the country's reporting and administrative burden.

¹³ Calculated in line with the methodology presented in annex I of document UNEP/OzL.Pro/ExCom/92/46

¹⁴ Described in paragraph 52 and 53 of the present document.

Implementation plan for the first tranche of the Kigali HFC implementation plan

85. The agreed plan and cost of activities to be implemented by the World Bank during the first tranche is presented in table 17.

Table 17. Activities and their costs under the first tranche of the KIP for Indonesia, as agreed

Activity	Cost (US \$)
1. Activities in the manufacturing sector	
Payments made to 6 manufacturers of domestic refrigeration equipment to fully convert to R-600a and phase out 266.83 mt of HFC-134a	1,139,809
Subtotal 3	1,139,809
2. Activities in the servicing sector	
2.1. Capacity strengthening for MAC servicing	
Development of a national standard for competency-based MAC technician training and related training units	25,000
Review and update of the existing occupational standards and curricula to include good servicing practices	15,000
Organization of 5 training workshops for trainers on the new competency-based certification scheme for MAC technicians	25,000
MAC training equipment: procurement and delivery of 112 training equipment packages to 30 training centres and 105 training packages to 2,100 servicing centres	937,200
2.2. Capacity strengthening for commercial and domestic refrigeration servicing	
Development of standardized training modules for the servicing of domestic and commercial refrigeration equipment, including the safe handling of refrigerants and equipment during maintenance and repair, avoiding leaks, and refrigerant recovery and recycling	60,000
Development of a training module on inverter compressor technology and repair of electronic components of energy-efficient equipment	35,000
Integration of safe servicing practices into existing occupational standards and curricula	15,000
Procurement and delivery of 9 sets of refrigeration training equipment to 5 vocational and private training centres	256,500
Procurement and delivery of 8 electronic repair tool kits to 4 training centres	19,200
Organization of 3 training workshops for trainers	15,000
Subtotal 2	1,377,900
3. Technical assistance	
Impact assessment of HFCs used in the seafood/fish cold chain and study on alternatives and alternative development pathways and development of guidelines for end-users of cold chain equipment	280,000
Study for raising awareness on safe and effective adoption of low GWP-MAC in rail and public transport	75,000
Consultations, study tours, and training workshops on HFC management and alternatives in the MAC, transport AC and commercial refrigeration sectors	22,000
Subtotal 1	377,000
4. Project implementation and monitoring	
PMU activities, including staff and consultants (US \$181,714), operational costs including travel (US \$16,186), monitoring and reporting (US \$45,000), and a project launch workshop (US \$8,000)	250,900
Subtotal 4	250,900
Total for the first tranche	3,170,609

2025–2027 business plan of the Multilateral Fund

86. World Bank is requesting US \$7,045,798, plus agency support costs, for the implementation of stage I of the KIP for Indonesia. The total value of US \$3,392,552, including agency support costs, requested for the period of 2025–2027, is US \$23,937,448, below the amount in the business plan. The substantial difference is attributed to: (i) one agency not participating in the project, (ii) fewer

manufacturing sectors included in stage I than expected, and (iii) the business plan comprising two tranches during 2025–2027, while the second tranche is being proposed in 2028 in the document.

Gender policy implementation

87. In line with decisions 84/92(d), 90/48(c) and 92/40(b), efforts will be undertaken to assure gender mainstreaming within the framework of the KIP. Women represent an important share of the domestic refrigeration manufacturing sector workforce, including factory floor workers (up to 70 per cent). The KIP will seek to increase women's participation in the servicing sector as well. Activities that focus on developing more advanced skills, such as repair of electronics, have the potential to attract more women to training and certification programmes in the servicing sector.

Sustainability of the HFC phase-down and assessment of risks

88. The Government of Indonesia will sustain over time the commitments and activities included in stage I of the KIP through the implementation and strengthening of the licensing and quota system for HFCs; the development of policies by 1 January 2029, namely the bans on the manufacturing and import of HFC-based domestic refrigerators and stand-alone commercial refrigeration equipment; prohibition of the manufacturing and import of residential air conditioners and light commercial AC equipment based on refrigerants with GWP greater than 700; ban on the manufacturing, installation and import of HFC-125-based fire-suppression equipment; and limitations on the manufacturing and import of ULT freezers based on HFC-23 to the average output of such equipment in the 2020 to 2022 period, and to only allow the manufacturing and import of ULT freezers based on refrigerants with GWP of 1,400 or less once that limit has been reached.

89. A potential risk to the sustainability of HFC reductions is that a national quota in CO₂-eq tonnes may not control the growth of specific HFCs. This will be mitigated through the application of the World Bank's HFC phase-down model, which generates a list of reductions needed across HFCs and sectors by the end of a stage to ensure sustainability into the subsequent stage. This is paired with the HFC quota allocation tool to ensure that the Indonesian NOU can execute the proposed reductions through quota issuance each year. By enabling regulators to periodically recalibrate and determine what additional policy or investment interventions are needed to sustainably manage HFCs, the model could counterbalance potential increases in HFC demand driven by policies promoting economic growth and local manufacturing.

Impact on the climate

90. The activities proposed, including policy decisions aiming to restrict residential and light commercial AC systems to refrigerants with a GWP below 700, ban HFC in domestic refrigeration manufacturing, prohibit new manufacturing capacity for stand-alone commercial refrigeration using HFCs, and convert the domestic refrigeration manufacturing sector while phasing down HFC use in rail applications, in addition to strengthening the capacity of the RAC and MAC servicing sectors through training and capacity building, indicate that the implementation of stage I of the KIP will reduce refrigerant emissions into the atmosphere, resulting in climate benefits. A calculation of the impact on the climate of the activities in the KIP indicates that by 2032, Indonesia will have reduced its emissions by approximately 4,674,144 million CO₂-eq tonnes of HFCs, calculated as the difference between the HFC baseline for compliance and the 2032 target, assuming that all consumed HFCs would eventually have been emitted.

Draft Agreement

91. A draft Agreement between the Government of Indonesia and the Executive Committee for stage I of the KIP is contained in annex I to the present document.

Coordination of activities in the servicing sector under HCFC phase-out and HFC phase-down plans

92. Annex II summarizes the simultaneous implementation of activities under the HPMP and the KIP for Indonesia. While both plans include activities in the servicing sector, the KIP includes a substantial component on MAC servicing, while the national refrigerant recovery, recycling and reclaim (RRR) network is covered under the HPMP. In terms of RAC technician training and certification, the KIP builds on the scheme established under the HPMP in a cost-efficient manner, expanding the scope of training to include additional sectors and technologies, repairs of electronic components and energy-efficiency considerations. Stage I of the KIP includes activities in the domestic refrigeration and rail MAC manufacturing sectors, while stage III of the HPMP also deals with the use of controlled substances in firefighting equipment and chillers. Both plans envision the strengthening of the regulatory framework related to Annex C and Annex F substances, respectively, and are managed by the same PMU.

VI. Recommendation

93. The Executive Committee may wish to consider:

- (a) Approving, in principle, stage I of the Kigali HFC implementation plan (KIP) for Indonesia for the period 2025–2032 to reduce HFC consumption by 15 per cent by 2029 and by 20 per cent by 2032 of the country’s baseline, in the amount of US \$7,045,798, plus agency support costs of US \$493,206, for World Bank;
- (b) Noting:
 - (i) That the Government of Indonesia will establish its starting point for sustained aggregate reductions in HFC consumption based on guidance provided by the Executive Committee;
 - (ii) That, once the Executive Committee provides the guidance referred to in subparagraph (b)(i), reductions from the country’s remaining HFC consumption eligible for funding will be determined in line with this guidance;
 - (iii) That the reductions from the country’s remaining HFC consumption eligible for funding, referred to in subparagraph (b)(ii) above, will be deducted from the starting point referred to in subparagraph (b)(i);
 - (iv) That an additional reduction of 4,811,218 CO₂-eq tonnes associated with stockpiled HFCs that had been imported in the country during the baseline years for use in subsequent years will also be deducted from the starting point referred to in subparagraph (b)(i);
- (c) Also noting the strong commitment of the Government of Indonesia to support reductions in HFC consumption in advance of the Montreal Protocol targets;
- (d) Further noting the commitment of the Government of Indonesia, by 1 January 2029:
 - (i) To ban the manufacture and import of HFC-based domestic refrigerators;
 - (ii) To ban the manufacture and import of HFC-based stand-alone commercial refrigeration equipment;
 - (iii) To ban the manufacture, installation and import of HFC-125-based fire-suppression equipment;

- (iv) To prohibit the manufacture and import of residential air conditioners and light commercial air-conditioning equipment based on refrigerants with global-warming potential (GWP) greater than 700;
- (v) To limit the manufacturing and import of ultralow temperature freezers based on HFC-23 to the average manufacturing output of such equipment in the 2020 to 2022 period, if any, and only to allow the manufacturing and import of ultralow temperature freezers based on refrigerants with a GWP of 1,400 or less once that limit has been reached;
- (e) Approving the draft Agreement between the Government of Indonesia and the Executive Committee for the reduction in consumption of HFCs in accordance with stage I of the KIP, contained in annex I to the present document; and
- (f) Approving the first tranche of stage I of the KIP for Indonesia and the corresponding tranche implementation plan, in the amount of US \$3,170,609, plus agency support costs of US \$221,943, for World Bank.

Annex I

DRAFT AGREEMENT BETWEEN THE GOVERNMENT OF INDONESIA AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROFLUOROCARBONS IN ACCORDANCE WITH STAGE I OF THE KIGALI HFC IMPLEMENTATION PLAN (Period: 2025–2032)

Purpose

1. This Agreement represents the understanding of the Government of Indonesia (“the Country”) and the Executive Committee with respect to the reduction of controlled use of Annex F substances set out in Appendix 1-A (“The Substances”) to a sustained level of 18,696,577 CO₂-equivalent (CO₂-eq) tonnes by 1 January 2032 in compliance with the Montreal Protocol schedule and the terms of this Agreement.
2. The Country agrees to meet the annual consumption limits of Annex F substances as set out in row 1.2 of Appendix 2-A (“The Targets, and Funding”) in this Agreement as well as in the Montreal Protocol reduction schedule for Annex F substances mentioned in Appendix 1-A. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of Annex F substances that exceeds the level defined in row 1.2 of Appendix 2-A as the final reduction step under this Agreement for Annex F substances specified in Appendix 1-A, and in respect to any consumption of Annex F substances that exceeds the level[s] defined in row[s] 4.1.3 [and 4.2.3] (remaining consumption eligible for funding).
3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees, in principle, to provide the funding set out in row 3.1 of Appendix 2-A to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A (“Funding Approval Schedule”).
4. The Country agrees to implement this Agreement in accordance with stage I of the Kigali HFC implementation plan (“the Plan”) as approved. In accordance with subparagraph 5(b) of this Agreement, the Country will accept independent verification of the achievement of the annual consumption limits of Annex F substances set out in row 1.2 of Appendix 2-A of this Agreement. The aforementioned verification will be commissioned by the relevant bilateral or implementing agency.

Conditions for funding release

5. The Executive Committee will only provide the Funding, in accordance with the Funding Approval Schedule, when the Country satisfies the following conditions at least 10 weeks in advance of the applicable Executive Committee meeting set out in the Funding Approval Schedule:
 - (a) That the Country has met the Targets set out in row 1.2 of Appendix 2-A for all relevant years. Relevant years are all years since the year in which this Agreement was approved. Years for which there are no due country programme implementation reports at the date of the Executive Committee meeting at which the funding request is being presented are exempted;
 - (b) That the meeting of these Targets has been independently verified for all relevant years, unless the Executive Committee decided that such verification would not be required;
 - (c) That the Country had submitted a Tranche Implementation Report in accordance with Appendix 4-A (“Format of Tranche Implementation Reports and Plans”) covering each

previous calendar year; that it had achieved a significant level of implementation of activities initiated with previously approved tranches; and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent; and

- (d) That the Country has submitted a Tranche Implementation Plan in accordance with Appendix 4-A covering each calendar year until and including the year for which the Funding Approval Schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen.

Monitoring

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A (“Monitoring Institutions and Roles”) will monitor and report on implementation of the activities in the previous Tranche Implementation Plans in accordance with their roles and responsibilities set out in the same appendix.

Flexibility in the reallocation of funds

7. The Executive Committee agrees that the Country may have the flexibility to reallocate part or all approved funds, according to the evolving circumstances, to achieve the smoothest reduction of consumption and phase-down of Annex F substances specified in Appendix 1-A, in accordance with the following considerations:

- (a) Reallocations categorized as major changes must be documented in advance, either in a Tranche Implementation Plan as foreseen in subparagraph 5(d) above, or as a revision to an existing Tranche Implementation Plan to be submitted 10 weeks prior to any meeting of the Executive Committee, for its approval. Major changes would relate to:
 - (i) Issues potentially concerning the rules and policies of the Multilateral Fund;
 - (ii) Changes that would modify any clause of this Agreement;
 - (iii) Changes in the annual levels of funding allocated to the individual bilateral or implementing agencies for the different tranches;
 - (iv) Provision of funding for activities not included in the current endorsed Tranche Implementation Plan, or removal of an activity in the Tranche Implementation Plan, with a cost greater than 30 per cent of the total cost of the last approved tranche;
 - (v) Changes in alternative technologies, on the understanding that any submission for such a request would identify the associated incremental costs, the potential impact on the climate, and any differences in CO₂-eq tonnes to be phased down if applicable, as well as confirm that the Country agrees that potential savings related to the change of technology would accordingly decrease the overall funding level under this Agreement;
- (b) Reallocations not categorized as major changes may be incorporated into the approved Tranche Implementation Plan, under implementation at the time, and reported to the Executive Committee in the subsequent Tranche Implementation Report;
- (c) Any enterprise included in the Plan that would be found to be ineligible under the policies of the Multilateral Fund (i.e., due to foreign ownership or establishment after the applicable

cut-off date) would not receive financial assistance. This information would be reported as part of the Tranche Implementation Plan; and

- (d) Any remaining funds held by the bilateral or implementing agencies or the Country under the Plan will be returned to the Multilateral Fund upon completion of the last tranche foreseen under this Agreement.

8. Specific attention will be paid to the execution of activities in the refrigeration servicing sector included in the Plan, in particular that the Country may use the flexibility available under this Agreement to address specific needs that might arise during project implementation.

Bilateral and implementing agencies

9. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. The World Bank has agreed to be the lead implementing agency (the “Lead IA”) in respect of the Country’s activities under this Agreement. The Country agrees to evaluations, which might be carried out under the monitoring and evaluation work programmes of the Multilateral Fund or under the evaluation programme of the Lead IA taking part in this Agreement.

10. The Lead IA will be responsible for ensuring coordinated planning, implementation and reporting of all activities under this Agreement, including but not limited to the independent verification as per subparagraph 5(b). The role of the Lead IA is contained in Appendix 6-A. The Executive Committee agrees, in principle, to provide the Lead IA with the fees set out in row 2.2 of Appendix 2-A.

Non-compliance with the Targets in the Agreement

11. Should the Country, for any reason, not meet the Targets for the elimination of Annex F substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all its obligations that were due to be met prior to receipt of the next tranche of funding under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amount set out in Appendix 7-A (“Reductions in Funding for Failure to Comply”) in respect of each CO₂-eq kg of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the Country did not comply with this Agreement and take related decisions. Once decisions are taken, the specific case of non-compliance with this Agreement will not be an impediment for the provision of funding for future tranches as per paragraph 5 above.

12. The Funding of this Agreement will not be modified on the basis of any future Executive Committee decisions that may affect the funding of any other consumption sector projects or any other related activities in the Country.

13. The Country will comply with any reasonable request of the Executive Committee and the Lead IA to facilitate implementation of this Agreement. In particular, it will provide the Lead IA with access to the information necessary to verify compliance with this Agreement.

Date of completion

14. The completion of the Plan and the associated Agreement will take place at the end of the year following the last year for which a maximum allowable total consumption level has been specified in Appendix 2-A. Should at that time there still be activities that are outstanding, and which were foreseen in the last Tranche Implementation Plan and its subsequent revisions as per subparagraph 5(d) and

paragraph 7, the completion of the Plan will be delayed until the end of the year following the implementation of the remaining activities. The reporting requirements as per subparagraphs 1(a), 1(b), and 1(d) of Appendix 4-A will continue until the time of the completion of the Plan unless otherwise specified by the Executive Committee.

Validity

15. All conditions set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Montreal Protocol unless otherwise defined herein.

16. This Agreement may be modified or terminated only by mutual written agreement of the Country and the Executive Committee of the Multilateral Fund.

APPENDICES

APPENDIX 1-A: THE SUBSTANCES

Substances	Starting point for aggregate reductions in consumption
To be determined	

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars		2025	2026	2027	2028	2029	2030	2031	2032	Total
1.1	Montreal Protocol reduction schedule of Annex F substances	%	freeze	freeze	freeze	freeze	10	10	10	10	n/a
		CO ₂ -eq tonnes	23,370,721	23,370,721	23,370,721	23,370,721	21,033,649	21,033,649	21,033,649	21,033,649	n/a
1.2	Maximum allowable total consumption of Annex F substances	Reduction in %	0	0	0	0	15	15	15	20	n/a
		CO ₂ -eq tonnes	23,370,721	23,370,721	23,370,721	23,370,721	19,865,113	19,865,113	19,865,113	18,696,577	n/a
2.1	Lead IA (World Bank) agreed funding (US \$)		3,170,609	0	0	2,818,319	0	1,056,870	0	0	7,045,798
2.2	Support costs for Lead IA (US \$)		221,943	0	0	197,282	0	73,981	0	0	493,206
3.1	Total agreed funding (US \$)		3,392,552	0	0	3,015,601	0	1,130,851	0	0	7,539,004
3.2	Total support costs (US \$)		221,943	0	0	197,282	0	73,981	0	0	493,206
3.3	Total agreed costs (US \$)		3,392,552	0	0	3,015,601	0	1,130,851	0	0	7,539,004
4.	To be determined										

APPENDIX 3-A: FUNDING APPROVAL SCHEDULE

1. Funding for the future tranches will be considered for approval at the first meeting of the year specified in Appendix 2-A.

APPENDIX 4-A: FORMAT OF THE TRANCHE IMPLEMENTATION REPORTS AND PLANS

1. The submission of the Tranche Implementation Report and Plans for each tranche request will consist of four parts:

- (a) A narrative report, with data provided by tranche, describing the progress achieved since the previous report, reflecting the situation of the Country in regard to phase-down of Annex F substances, how the different activities contribute to it, and how they relate to each other, including, where applicable, activities related to energy efficiency approved in the context of HFC phase-down pursuant to decision 91/65. The report should include the amount of Annex F substances consumption reduced as a direct result of the implementation of activities, by substance, the alternative technology used and the related phase in of alternatives, to allow the Secretariat to inform the Executive Committee on the resulting change in climate relevant emissions. The report should also include quantitative information on the activities implemented and further highlight the successes, experiences, and challenges related to the different activities included in the Plan, reflecting any changes in the circumstances in the Country, and providing other relevant information. The report should also include information on and justification for any changes vis-à-vis the previously submitted Tranche Implementation Plan(s), such as delays, use of flexibility for the reallocation of funds during implementation of a tranche as provided for in paragraph 7 of this Agreement, or other changes;
- (b) An independent verification report on the Plan's results and the consumption of Annex F substances, as per subparagraph 5(b) of the Agreement. If not decided otherwise by the Executive Committee, such a verification of consumption data must be provided with each tranche request, covering all relevant years for which a verification report has not yet been acknowledged by the Committee, as specified in subparagraph 5(a) of the Agreement;
- (c) A written description of the activities to be undertaken during the period covered by the requested tranche including quantitative information, highlighting implementation milestones, the time of completion and the interdependence of the activities, and taking into account experiences made and progress achieved in the implementation of earlier tranches; the data in the Plan will be provided by calendar year. The description should include a reference to the overall Plan and progress achieved, as well as any possible changes to the overall Plan that are foreseen. The description should also specify and explain in detail such changes to the overall Plan. This description of future activities can be submitted as a part of the same document as the narrative report under subparagraph 1(a) above; and
- (d) An Executive Summary of about five paragraphs, summarizing the information contained in subparagraphs 1(a) to 1(c) above.

APPENDIX 5-A: MONITORING INSTITUTIONS AND ROLES

1. The monitoring process will be managed by the Indonesia Ministry of Environment (Kementerian Lingkungan Hidup – KLH) through the National Ozone Unit (NOU) with the assistance of the Lead IA. The consumption will be monitored and determined based on official import and export data for the

Substances recorded by relevant government departments. The NOU will be responsible for monitoring the sustainability of the consumption reduction targets achieved through and during this Agreement. The NOU shall compile and report the following data and information on an annual basis, on or before the relevant due dates:

- (a) Reports on consumption of the Substances to be submitted to the Ozone Secretariat; and
- (b) Reports on progress in the implementation of the Plan to be submitted to the Multilateral Fund Secretariat.

2. The KLH and the Lead IA will engage an independent and qualified entity to carry out a qualitative and quantitative performance evaluation of the Plan's implementation. The evaluating entity shall have full access to relevant technical and financial information related to implementation of the Plan. The evaluating entity shall prepare and submit to the KLH and the Lead IA, a consolidated draft report at the end of each Tranche Implementation Plan, comprising the findings of the evaluation and recommendations for improvements or adjustments, if any. The draft report shall include the status of the Country's compliance with the provisions of this Agreement. Upon incorporating the comments and explanations as may be applicable, from KLH and the Lead IA, the evaluating entity shall finalize the report and submit to the KLH and Lead IA. The KLH shall endorse the final report, and the Lead IA shall submit the same to the relevant meeting of the Executive Committee along with the Tranche Implementation plan and reports.

APPENDIX 6-A: ROLE OF THE LEAD IMPLEMENTING AGENCY

1. The Lead IA will be responsible for a range of activities, including at least the following:
 - (a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's Plan;
 - (b) Assisting the Country in the preparation of the Tranche Implementation Reports and Plans as per Appendix 4-A;
 - (c) Providing independent verification to the Executive Committee that the Targets have been met and associated tranche activities have been completed as indicated in the Tranche Implementation Plan, consistent with Appendix 4-A;
 - (d) Ensuring that the experiences and progress are reflected in the updates to the overall Plan and in the future Tranche Implementation Plans, consistent with subparagraph 1(c) of Appendix 4-A;
 - (e) Fulfilling the reporting requirements of the Tranche Implementation Reports and Plans and of the overall Plan as specified in Appendix 4-A for submission to the Executive Committee;
 - (f) In the event that the last funding tranche is requested one or more years prior to the last year for which a consumption target had been established, annual Tranche Implementation Reports and, where applicable, verification reports on the current stage of the Plan should be submitted until all activities foreseen had been completed and HFC consumption targets had been met;
 - (g) Ensuring that appropriate independent technical experts carry out the technical reviews;
 - (h) Carrying out the required supervision missions;

- (i) Ensuring the presence of an operating mechanism to allow for an effective and transparent implementation of the Tranche Implementation Plan and accurate data reporting;
- (j) In case of reductions in funding for failure to comply in accordance with paragraph 11 of the Agreement, to determine, in consultation with the Country, the allocation of the reductions to the different budget items and to the funding of the Lead IA;
- (k) Ensuring that disbursements made to the Country are based on the use of the indicators;
- (l) Providing assistance with the policy, management and technical support when required; and
- (m) Timely releasing funds to the Country/participating enterprises for completing the activities related to the project.

2. After consultation with the Country and taking into account any views expressed, the Lead IA will select and mandate an independent entity to carry out the verification of the Plan's results and of the consumption of Annex F substances mentioned in Appendix 1-A, as per subparagraph 5(b) of the Agreement and subparagraph 1(b) of Appendix 4-A.

APPENDIX 7-A: REDUCTIONS IN FUNDING FOR FAILURE TO COMPLY WITH THE TARGETS IN THE AGREEMENT

1. In accordance with paragraph 11 of the Agreement, the amount of funding provided may be reduced by US \$5.72 per CO₂-eq tonne of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the Target specified in row 1.2 of Appendix 2-A has not been met, on the understanding that the maximum funding reduction would not exceed the funding level of the tranche being requested. Additional measures might be considered in cases where non-compliance extends for two consecutive years. Where the country has failed to comply with the Agreement due to illegal trade, the reduction in funding would not be applied if the illegally traded controlled substances are seized and subsequently confiscated, destroyed, exported, or returned to the country of origin.

Annex II

**SIMULTANEOUS IMPLEMENTATION OF THE HCFC PHASE-OUT MANAGEMENT PLAN
AND THE KIGALI HFC IMPLEMENTATION PLAN IN INDONESIA**

Category of activity	HPMP – stage III		KIP – stage I		HPMP+KIP combined cost (US \$)
	Activity	Cost (US \$)	Activity	Cost (US \$)	
Manufacturing					
Domestic refrigeration			Conversions at 6 manufacturers from the use of HFC-134a to R-600a: equipment and installation upgrades, product redesign, prototyping, testing, energy and safety certification, audits, permits and training	1,139,809	1,139,809
Transport AC			Support for a railway AC manufacturer to develop, produce and test 10 prototype R-454C-based train AC units	300,000	300,000
Policy and technical assistance					
Strengthening of the regulatory framework	Development of a compendium of local policies and regulations related to the phase-out of controlled substances as a guide for stakeholders Monitoring the use of HCFC-123 in chillers and firefighting and issuance of bans on its import and use Updating of the national safety standards and competency curriculum	210,000	Execution of 2 impact assessment studies on the planned bans related to HFC use and/or imports for the manufacturing sector by January 2029; development of HFC-related studies and guidelines for different sectors; holding consultations, study tours, and training workshops on HFC management and alternatives in the MAC, transport AC and commercial refrigeration sectors	758,500	968,500
Technical assistance for chillers and the firefighting sector	Mapping of the installed capacity and needs assessment for chiller and firefighting systems Development of SOPs on good servicing practices and leak reduction for chillers, procurement manual and guidelines for replacing chillers based on HCFC-123 Assessment of alternative technologies, supply chains, manufacturers, distributors, and installers of chillers Raising awareness of low-GWP alternatives through stakeholder consultations, dissemination of SOPs and assessment results, including possible establishment of HCFC-123 recycling banks from chillers	298,363			298,363
Strategy development for sensitive sectors	Assessments to develop a strategy for managing servicing tail consumption in the fisheries and agricultural cold chain sectors	190,000			190,000

Category of activity	HPMP – stage III		KIP – stage I		HPMP+KIP combined cost (US \$)
	Activity	Cost (US \$)	Activity	Cost (US \$)	
Building the capacity of customs	Training of 900 customs officers on the import of controlled substances, updates to the customs training module, and development of a risk-profiling manual on the import of controlled substances	300,000			300,000
Servicing					
Strengthening capacity in RAC servicing	Training of 500 trainers Training and certification of 3,500 RAC technicians in good servicing practices, incorporating gender mainstreaming Procurement and distribution of: - Training and certification equipment to 15 vocational training centres - Maintenance and recovery equipment to 200 servicing shops - Basic servicing tool kits to 1,000 newly certified technicians	10,154,272	Development of standardized training modules for servicing domestic and commercial refrigeration equipment Training module on inverter compressor technology and reparation of electronic components of energy-efficient refrigeration equipment Integration of good servicing practices into the existing occupational standards and curricula Delivery of 45 sets of refrigeration training equipment to 9 vocational and private training centres, and 32 electronic repair kits to 4 training centres Three training workshops for trainers, and 45 workshops to train, assess and certify 900 technicians in good servicing practices, the safe handling of refrigerants, and diagnosing, repairing and replacing electronic components in inverter technologies, training material, and delivery of servicing tools to participating technicians Pilot training programme offering certification on good servicing practices and electronic component repairs for 300 technicians at 4 training centres Delivery of electronic tool kits to participating technicians	1,456,400	11,610,672
Strengthening capacity in MAC servicing			Development of a standard for competency-based MAC technician training, assessment and certification, and related training and assessment modules Review and update of occupational standards and curricula to include good practices, leak reduction and handling new refrigerants Five training workshops for trainers on the new competency-based certification scheme for MAC technicians; and 84 workshops to train, assess and certify	2,808,200	2,808,200

Category of activity	HPMP – stage III		KIP – stage I		HPMP+KIP combined cost (US \$)
	Activity	Cost (US \$)	Activity	Cost (US \$)	
			1,680 MAC technicians in the installation, repair, maintenance and handling of equipment charged with controlled substances and HFO-1234yf, including the costs of training material and trainers' travel costs Launch of the new MAC training programme Provision of 112 equipment packages to 14 training centres, 30 training packages to 30 service centres, and MAC servicing tool kits to 1,680 certified technicians		
Pre-charged water coolers			Provision of a tool set for HFC-134a recovery and recharge for an enterprise that imports semi-complete knock-down pre-charged water coolers and after-sales servicing of those coolers; and related safety training	10,043	10,043
Strengthening of the RRR network	Establishment of 9 new reclamation centres, with procurement and delivery of equipment Improvements to infrastructure and access to self-service stations at 14 reclamation centres Development of SOPs on the use of reclamation equipment and facilities Training of 140 trainers in reclamation	1,501,712			1,501,712
Awareness-raising campaigns	Seven awareness campaigns on HCFC bans, phase-out, controlled uses and leakage reduction, and 10 end-user- campaigns on the safety and benefits of alternative technologies Upgrading of the Monti-RAC mobile application platform for use in the certification programme Ten workshops across the country on the use and application of low-GWP technologies	1,004,000			1,004,000
PMU	PMU HPMP	1,267,500	PMU KIP	572,846	1,840,346
TOTAL		14,925,847		7,045,798	21,971,645

Annex III

HFC CONSUMPTION BY SECTOR AND SUBSTANCE IN INDONESIA (2023 COUNTRY PROGRAMME DATA)

Table 1. HFC consumption in Indonesia by sector in mt (2023)

Sector	HFC-23	HFC-32	HFC-134a	HFC-152a	HFC-227ea	HFC-236fa	HFC-245fa	R-404A	R-407C	R-410A	R-417A	R-507A	Other HFCs*	Total	Share of total (%)
Manufacturing															
Domestic refrigeration			357.81											357.81	4.0
Commercial refrigeration	7.41		101.58					141.33						250.32	2.8
Residential AC		207.25								3.48				210.73	2.3
MAC			766.54						11.46					778.00	8.6
Commercial AC		8.12	91.29					2.03	5.52	147.82	0.05			254.83	2.8
PU foam							71.50							71.50	0.8
Firefighting					24.54	3.05								27.59	0.3
Solvent				24.28	0.09		31.69							56.06	0.6
ORC							117.40							117.40	1.3
Subtotal for manufacturing	7.41	215.37	1,317.22	24.28	24.63	3.05	220.59	143.36	16.98	151.30	0.05	0	0	2,124.24	23.6
RAC servicing															
Refrigeration subsectors															
Domestic														585.75	8.5
Industrial and Commercial														653.48	9.5
Transport														113.18	1.6
Air-conditioning subsectors															
Commercial														978.46	14.2
Residential														2,976.49	43.2
Mobile														1,510.09	21.9
Heat pumps														37.90	0.6
ORC														29.35	0.4
Subtotal for servicing	0.52	2,204.46	2,440.34	0	0	0	29.35	495.18	347.76	1,146.46	28.43	154.58	37.63	6,884.71	76.4
Total	7.93	2,419.83	3,757.56	24.28	24.63	3.05	249.94	638.54	364.74	1,297.76	28.48	154.58	37.63	9,008.95	100.0

* Includes HFCs accounting for less than 1 per cent of total consumption in mt, i.e., R-407F (1.36), R-422A (18.89), R-438A (14.73), R-448A (1.31), R-449A (0.12), R-452A (0.25), R-508A (0.01), R-508B (0.04), and R-513A (0.92)

Table 2. HFC consumption in Indonesia by sector in CO₂-eq tonnes (2023)

Sector	HFC-23	HFC-32	HFC-134a	HFC-152a	HFC-227ea	HFC-236fa	HFC-245fa	R-404A	R-407C	R-410A	R-417A	R-507A	Other HFCs*	Total	Share of total (%)
Manufacturing															
Domestic refrigeration			511,668											511,668	3.6
Commercial refrigeration	109,668		145,259					554,240						809,167	5.7
Residential AC		139,894								7,265				147,158	1.0
MAC			1,096,152						20,328					1,116,481	7.9
Commercial AC		5,481	130,545					7,961	9,792	308,574	117			462,470	3.3
PU foam							73,645							73,645	0.5
Firefighting					79,019	29,921								108,939	0.8
Solvent				3,011	290		32,641							35,941	0.3
ORC							120,922							120,922	0.9
Subtotal manufacturing	109,668	145,375	1,883,625	3,011	79,309	29,921	227,208	562,201	30,120	315,839	117	0	0	3,386,391	24.0
Refrigeration and AC servicing															
Subtotal servicing	7,696	1,488,011	3,489,686	0	0	0	30,231	1,941,898	616,874	2,393,235	66,697	616,001	98,633	10,748,962	76.0
Total	117,364	1,633,385	5,373,311	3,011	79,309	29,921	257,438	2,504,098	646,994	2,709,074	66,814	616,001	98,633	14,135,353	100.0

* Includes HFCs accounting for less than 1 per cent of total consumption in CO₂-eq tonnes, i.e., R-407F (2,481), R-422A (59,370), R-438A (33,355), R-448A (1,815), R-449A (168), R-452A (535), R-508A (58), R-508B (272), and R-513A (579)