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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-fourth Meeting
Montreal, 27-31 May 2024
Item 9(d) of the provisional agenda¹

PROJECT PROPOSAL: CHINA

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

Phase-out

- HCFC phase-out management plan: Room air-conditioning manufacturing and heat pump water heaters sector plan (stage II, fourth tranche) UNIDO, Austria and Italy

¹ UNEP/OzL.Pro/ExCom/94/1

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

CHINA

(I) PROJECT TITLE	AGENCY	MEETING APPROVED	CONTROL MEASURE
HCFC phase-out management plan (stage II) room air-conditioning manufacturing and heat pump water heaters	UNIDO (lead), Italy, Austria	77 th	37.6% phase-out by 2020

(II) LATEST ARTICLE 7 DATA (Annex C, Group I)	Year: 2022	10,577.33 (ODP tonnes)
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(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)							Year: 2022		
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22		1,292.50		3,162.50	2,918.58				7,373.58
HCFC-123				10.80	8.23				19.03
HCFC-124					0.48				0.48
HCFC-141b		2,782.54				275.00			3,057.54
HCFC-142b				4.23	57.48	65.00			126.71

(IV) CONSUMPTION DATA (ODP tonnes)			
2009-2010 baseline:	19,269.00	Starting point for sustained aggregate reductions:	18,865.44
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	12,161.02	Remaining:	6,704.42

(V) ENDORSED BUSINESS PLAN		2024	2025	2026	Total
UNIDO	ODS phase-out (ODP tonnes)	257.15	355.81	351.60	612.96
	Funding (US \$)	6,741,000	9,327,302	9,216,975	16,068,302
Austria	ODS phase-out (ODP tonnes)	28.57	0.00	0.00	28.57
	Funding (US \$)	783,667	0	0	783,667
Italy	ODS phase-out (ODP tonnes)	0.00	0.00	0.00	0.00
	Funding (US \$)	0	0	0	0

(VI) PROJECT DATA			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total	
Montreal Protocol consumption limits (ODP tonnes)			17,342.1	17,342.1	17,342.1	17,342.1	12,524.9	12,524.9	12,524.9	12,524.9	12,524.9	6,262.4	6,262.4	n/a	
Maximum allowable consumption (ODP tonnes)			3,697.7	3,697.7	2,876.0	2,876.0	2,259.7	2,259.7	2,259.7	1,614.1	1,614.1	1,232.6	1,232.6	n/a	
Funding agreed in principle (US \$)*	UNIDO	Project costs	14,671,089	16,000,000	0	0	0	4,150,000	0	6,300,000	0	8,717,105	8,613,995	58,452,189	
		Support costs	1,026,976	1,120,000	0	0	0	290,500	0	441,000	0	610,197	602,980	4,091,653	
	Italy	Project costs	891,892	0	0	0	0	0	0	0	0	0	0	0	891,892
		Support costs	108,108	0	0	0	0	0	0	0	0	0	0	0	108,108
	Austria	Project costs	0	0	0	0	0	350,000	0	700,000	0	0	0	0	1,050,000
		Support costs	0	0	0	0	0	41,833	0	83,667	0	0	0	0	125,500
Funds approved by ExCom (US \$)		Project costs	15,562,981		16,000,000			4,500,000						36,062,981	
		Support costs	1,135,084		1,040,000			332,333							2,507,417
Total funds recommended for approval at this meeting (US \$)		Project costs									7,000,000			7,000,000	
		Support costs									524,667				524,667

* Total adjusted value of stage II of the HPMP for the RAC sector plan and the funding level of tranches between 2018 and 2026 were approved at the 86th meeting (decision 86/34).

Secretariat's recommendation:	Individual consideration
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PROJECT DESCRIPTION

1. On behalf of the Government of China, UNIDO as the lead implementing agency has submitted a request for funding for the fourth tranche of stage II of the room air-conditioning (RAC) manufacturing and heat pump water heaters (HPWHs) sector plan (RAC sector plan) of the HCFC phase-out management plan (HPMP) for China, at a total cost of US \$7,524,667, consisting of US \$6,300,000, plus agency support costs of US \$441,000 for UNIDO and US \$700,000, plus agency support costs of US \$83,667 for the Government of Austria.² The submission includes a progress report on the implementation of the third tranche of the RAC sector plan, the tranche implementation plan for 2024 to 2025, and a verification report in line with paragraph 5(c) of the Agreement between the Government of China and the Executive Committee.

Overview of stage II of the RAC sector plan

2. Stage II of the RAC sector plan comprises an investment component to convert at least 12 RAC manufacturing lines, four compressor manufacturing lines, and three HPWH manufacturing lines to R-290, regulatory actions and technical assistance to facilitate the market uptake of R-290 RAC technology, and project management. The conversion of the manufacturing lines will result in the phase out of 237 ODP tonnes of HCFC-22; an additional 2,228 ODP tonnes of HCFC-22 would be phased out by non-assisted enterprises.

Progress report on the implementation of the third tranche of stage II of the RAC sector plan

Legal framework

3. China ratified the Kigali Amendment on 15 September 2021. From 1 November 2021, the country's catalogue of controlled substances was updated to include HFCs, with the requirement of the import and export licensing system applied to all substances included in the catalogue. The regulation on ODS management was revised in March 2023 to include HFCs in the list of controlled substances, as well as requirements for distributors of controlled substances to register with the ODS management system and to report data, for enterprises to properly dispose of controlled substances, and for large producers and consumers of controlled substances to install monitoring equipment.

Enterprise-level activities

4. Five RAC manufacturing and four compressor manufacturing enterprises, shown in table 1, had signed agreements to convert their manufacturing lines from HCFC-22 to R-290 technologies, and are completed or will be completed by May 2024, as described below:

- (a) Two RAC manufacturers (Changhong Zhongshan and Hisense Jiangmen) and two compressor manufacturers (Shanghai Highly and Shenyang Sanyo) have completed their conversions, with all incremental capital costs (ICCs) paid;
- (b) Two RAC manufacturers (TCL Zhongshan and Yangzi Chuzhou) and two compressor manufacturers (GMCC and Xi'an Qing'an) have completed their conversion, with final payment in progress;
- (c) One RAC manufacturer (TCL Wuhan) has had equipment delivered and installed, with the project expected to be completed in May 2024; and

² As per the letter of 4 March 2024 from the Ministry of Ecology and Environment of China to UNIDO.

- (d) Incremental operating costs (IOCs) amounting to US \$13,992,300 were allocated to beneficiary enterprises; no disbursements against those IOCs have yet been made.

Table 1. RAC and compressor manufacturing enterprises for conversion in the first and second tranches

Name	Production (units)	Consumption (mt)	ICC (US \$)	Disbursement (US \$)
RAC enterprises				
Changhong Zhongshan	82,536	83.36	1,352,355	1,352,355
Hisense Jiangmen	143,213	110.19	1,147,920	1,147,920
TCL Wuhan	849,042	829.59	1,352,355	1,217,120
TCL Zhongshan	925,867	875.87	1,352,355	1,217,120
Yangzi Chuzhou	294,454	322.11	1,340,805	1,206,724
Total	2,295,112	2,221.12	6,545,790	6,141,239
Compressor enterprises				
GMCC*	1,384,268	-	861,490*	775,341
Shanghai Highly	891,288	-	924,479	924,479
Shenyang Sanyo**	1,465,635	-	969,136**	969,136
Xi'an Qing'an	1,682,250	-	1,744,895	1,570,406
Total	5,423,441	-	4,500,000	4,239,362

* 40 per cent non-Article 5 ownership, which is reflected in the ICCs.

** 36 per cent non-Article 5 ownership, which is reflected in the ICCs.

5. During the third tranche, three additional RAC enterprises (four lines), shown in table 2, began the process to convert their manufacturing lines to R-290; one enterprise (Guangdong Midea) completed its conversion with 90 per cent of ICCs disbursed, whereas the remaining two signed contracts had equipment delivered and installed, with project completions expected by June 2024.

Table 2. RAC manufacturing enterprises for conversion in the third tranche

Name	Production (units)	Consumption (mt)	ICC (US \$)	Disbursement (US \$)
Guangdong Midea*	106,627	11.18	741,370*	222,411
Wuhu Midea – line 1	951,200	427.36	1,015,576	304,673
Wuhu Midea – line 2	781,983	242.70	1,015,576	304,673
Hefei/Chongqing Haier**	32,792	56.38	1,000,000	900,000
Total	1,872,602	737.62	3,772,522	1,731,757

* 27 per cent non-Article 5 ownership, which is reflected in the ICCs.

** The converted line was relocated to Chongqing Haier.

6. A further three RAC and five HPWH manufacturing lines, with an aggregated consumption of 1,559.18 mt of HCFC-22, were verified as eligible for participation in the project; the conversion of one of the RAC manufacturing lines (AUX³) to R-290 was completed using the enterprise's own funding, and two HPWH manufacturing lines (TCL Intelligent Heating and Ventilation (7.89 mt) and Zhejiang AMA (21.63 mt)) signed agreements and submitted procurement plans. The remaining two RAC and three HPWH manufacturing lines will be included under the fourth tranche.

Sales of R-290 split air-conditioning units

7. As of December 2023, a total of 505,781 R-290 split units and more than 8,500,000 factory-sealed (i.e., dehumidifiers, portable air-conditioning (AC)) R-290 units had been manufactured and installed.⁴ In

³ The line at AUX has a capacity of 1,000,000 units; in 2020, 109.30 mt of HCFC-22 were consumed in the manufacture of 57,767 AC units.

⁴ IOCs will only be provided based on the sale of split R-290 AC units to China and other Article 5 countries. IOCs will not be paid based on sale of factory-sealed units, such as portable AC, window-type AC, and dehumidifiers, which are already established in the marketplace.

line with decision 84/68(d)(ii), UNIDO provided information on the effect of the incremental IOC incentive scheme on the market uptake of R-290 split AC units: all 505,781 R-290 split units were sold locally; 82 per cent of the sales were for inverter units;⁵ and 41 per cent of the sales (including inverter and fixed-speed units) were for the most energy-efficient units, as shown in table 3.

Table 3. Percentage of R-290 RAC split units by energy class sold by August 2021

Split units	Inverter (%)	Fixed-speed (%)
Local sales		
Grade 1 energy efficiency	31	10
Grade 2 energy efficiency	50	8
Grade 3 energy efficiency	0	1
Export to Article 5 and non-Article 5 countries	0	0

Verification of converted manufacturing lines

8. The verification report confirmed that one compressor manufacturer, Shanghai Highly, completed manufacturing line conversions from HCFC-22 technology to R-290 technology, and concluded that the new equipment installations and manufacturing processes met the relevant national product and safety standards, that the new lines were capable of running at the original manufacturing capacity, and that the baseline equipment was destroyed. Funding allocation for the project was found to be transparent, with funds disbursed cost-effectively and in line with the Foreign Environmental Cooperation Centre's (FECO's) allocation guidelines.

Technical assistance activities

9. Five HPWH manufacturing enterprises found to be interested in and eligible for the project participated in a training workshop at FECO covering project management requirements under the HPMP, preparation of project proposals, safety in converting to R-290, the development of R-290-based compressors, and product testing and certification.

10. In June 2023, the Ministry of Ecology and Environment and the Ministry of Industry and Information Technology jointly issued a list of recommended alternative technologies with low global-warming potential (GWP) and zero ODP. The list is intended to provide guidance to and have influence on Government procurement, and comprises 23 alternatives categorized into refrigerants, blowing agents, and solvents. The only alternatives recommended for use in room AC units are R-290, R-600a, R-161 (fluoroethane), and blends of R-290 and R-600a; neither HFC-32 nor R-410A is included in the list of recommended alternatives for room AC units.⁶

11. The domestic appliance safety standards GB4706.32 and IEC 60335-2-40 were revised, and China is in the process of approving and adopting them. A contract was signed for the revision of QB/T4975-2016, Safety technical specification for manufacturing household and similar use room air conditioners using flammable refrigerants, originally published in 2016.

⁵ The sales from one enterprise were mistakenly categorized as fixed-speed units at the 86th meeting. Those sales have since been verified as inverter-based equipment.

⁶ In contrast, HFC-32 is among the recommended alternatives for equipment in industrial and commercial refrigeration and air-conditioning, in line with the agreed technology for that sector.

12. Of thirteen research and development (R&D) projects for the introduction of R-290 technology, with an associated budget of US \$3,488,912,⁷ seven have been completed and the remaining six continue to progress. Disbursements against the signed contracts total US \$2,337,908; the projects are expected to be completed by 2025. A virtual meeting was organized where project teams shared their research progress and findings, with another planned after the completion of the projects to share final reports.

13. The annual international workshop to promote alternative technologies in the RAC sector was held in Ningbo in May 2023, attended by national consultants, local manufacturers, and international organizations. The focus of the workshop was on HFC alternatives due to the upcoming changes to HFC legislation, and contributors to stage I of the HPMP were presented with a note of appreciation.

14. A Southeast Asian and South Asian delegation undertook a study tour to China to learn about China’s experiences with R-290 and to share information from their own countries on applicable regulations, energy efficiency requirements, and the AC market.

15. Two tasks planned under the third tranche, the promotion of R-290 RAC split units through a pilot installation of 10,000 R-290 RAC units in an apartment building⁸ and promotion of the 2017 ecolabel for R-290 RAC units, have not been started, as well as the implementation of the “Clean Cooling Hub” planned in cooperation with the Government of Austria.

Project implementation and monitoring unit

16. As reported to the 93rd meeting,⁹ of the US \$1,892,056 allocated to the project implementation and monitoring unit (PMU) under the first three tranches, US \$2,510,004 was disbursed for staff (US \$1,508,038), domestic travel (US \$59,679), domestic meetings (US \$36,541), consulting services (US \$44,315), and shared costs (US \$861,431) across the six other sectors in the HPMP and the production sector. As the Government provides annual reports on PMU disbursement, an update on disbursement for the PMU since the 93rd meeting was not available.

Level of fund disbursement

17. As of February 2024, of the total US \$36,062,981 approved so far (US \$34,821,089 for UNIDO, US \$350,000 for the Government of Austria, and US \$891,892 for the Government of Italy), US \$24,496,124 (68 per cent) had been transferred to FECO, and US \$14,544,159 (40 per cent) disbursed to final beneficiaries, as shown in table 4.

Table 4. Status of disbursements for stage II of the RAC sector plan as of 5 May 2024

Particulars		Tranche 1	Tranche 2	Tranche 3	Total
Funds approved (US \$)		15,562,981	16,000,000	4,500,000	36,062,981
Disbursement from UNIDO to FECO	Amount (US \$)	14,571,089	7,900,000	2,025,035	24,496,124
	Disbursement ratio (%)	94	49	45	68
Disbursement from FECO to beneficiaries*	Amount (US \$)	6,837,995	5,974,407	1,731,757	14,544,159
	Disbursement ratio (%)	44	37	38	40

* Disbursement from FECO to final beneficiaries includes disbursement related to the PMU.

⁷ At the 86th meeting, it was reported that the budget for the 13 R&D projects was US \$3,393,142. The increase in budget was due to the reformulation of two projects to focus on refrigerant charge reduction and improvement of year-round energy efficiency, in line with the new energy efficiency standard that came into effect in July 2021 that was based on an annual performance factor (APF).

⁸ Each RAC unit will include a Wi-Fi module to enable operation monitoring and data collection; the 10,000 units in the pilot installation will not be included in the IOC incentive scheme.

⁹ Annex II of document UNEP/OzL.Pro/ExCom/93/47.

Implementation plan for the fourth tranche of stage II of the RAC sector plan

18. FECO will continue enforcing the quota permits to RAC enterprises consuming more than 100 mt of HCFCs per year, finalize conversion of the remaining enterprises in table 1 (TCL Wuhan) and table 2 (Wuhu Midea (two lines) and Chongqing Haier) that had not yet completed their conversion, and convert the two RAC and five HPWH manufacturing lines to R-290 that would result in an additional reduction of at least 1,449.88 mt of HCFC-22.

19. The following TA will be implemented:

- (a) Verifications of baseline information (i.e., non-Article 5 ownership, baseline equipment, HCFC consumption, and financial data) of manufacturing lines prior to signature of contracts for conversion;
- (b) Revision of standard QB/T4975-2016, Safety technical specification for manufacturing household and similar use room air conditioners using flammable refrigerants, expected to be completed by October 2025;
- (c) Completion of the remaining six R&D projects on R-290 technology, followed by a virtual meeting to share final reports between the project teams;
- (d) Promotion of R-290 through public outreach and workshops at trade fairs and related events. Discussions will take place on how to implement two tasks planned under the third tranche, the promotion of R-290 RAC split units through a pilot installation of 10,000 R-290 RAC units in an apartment building and promotion of the 2017 ecolabel for R-290 RAC units, that have not yet started; and
- (e) Strengthen cooperation with Southeast Asian countries to share information and facilitate the HFC phase-down.

20. The China Household Electric Appliances Association (CHEAA) will continue to assist UNIDO and FECO in the day-to-day operational management of the HPMP, including providing policy recommendations and market analysis; reviewing information provided by beneficiaries; supporting, as required, on-site verifications, project reviews, implementation, and commissioning; and providing other assistance as related to the HCFC phase-out in the RAC sector.

21. As was also planned under the third tranche, in cooperation with the Government of Austria, a “Clean Cooling Hub” to identify and remove barriers to the global uptake of R-290 in RAC will be implemented and will include:

- (a) Capacity-building for stakeholders from the private and public sector, including development of an online platform and e-tools for training; showcase of alternative technologies in the training centre and on the online platform, allowing manufacturers to display R-290 products; expert advice on improving energy efficiency and reducing the climate impacts of RAC equipment;
- (b) Technician training and certification;
- (c) Development of guidelines for the storage of R-290-based equipment and training of distributors of equipment; and training and assistance on issues related to the transportation and storage of R-290-based RAC units; and

- (d) Assistance in policy development, including lessons learned from the European Union (EU) F-gas regulation, including strategies used in the HFC phase-down and technical background papers, and assistance to harmonize with EU and international standards.

22. Table 5 presents the budget of the activities to be implemented during the fourth tranche.

Table 5. Budget for the fourth tranche of stage II of the RAC sector plan

Activity	Budget (US \$)
Conversion of at least two RAC manufacturing lines and five HPWH lines to R-290	4,771,285
Technical assistance activities	1,843,715
Verification	79,000
Research and development	805,715
Study tour to Japan	20,000
China-Austria bilateral cooperation	700,000
Promotion of technology	120,000
Support by CHEAA	119,000
Project management unit	385,000
Project staff	223,146
Domestic travel	1,694
Domestic meetings	270
Consulting services	3,465
Operating costs: daily operating expenses, support staff, office facilities and equipment	156,425
Total	7,000,000

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

Report on HCFC consumption and verification

23. China reported RAC manufacturing consumption in 2022 of 1,595 ODP tonnes, well below the 2022 target of 2,259 ODP tonnes for the sector. The 2023 sectoral target for the RAC sector is 1,614.1 ODP tonnes. At the time of finalization of the present document, the 2023 sectoral data was not yet available; however, UNIDO estimated the consumption would be below the control target.

24. The verification noted that the R-290 compressors developed by Shanghai Highly Electrical Appliances Co., LTD have reduced physical properties (i.e., are smaller and lighter), improved cooling capacity, increased energy efficiency and reduced charge of the refrigeration oil relative to the baseline HCFC-22 compressors manufactured by the enterprise. In 2023, the enterprise had manufactured approximately 200,000 R-290-based compressors, most of which were for dehumidifiers, and the rest for split air conditioners, heat-pump clothes dryers and heat-pump space heating systems. Approximately 20 per cent of the compressors manufactured by the enterprise were inverter compressors. While the national standard for compressors (GB/T 15765-2021: Hermetic motor-compressors for room air conditioners) does not specify an energy efficiency classification, it provides limits to the co-efficient of performance (COP), which is 3.85 for R-290 inverter compressors. The COP of the inverter compressor manufactured by the enterprise is approximately 4.72.

Progress report on the implementation of the third tranche of stage II of the RAC sector plan*Revision to the IOC incentive scheme*

25. At the 93rd meeting, UNIDO had submitted, and subsequently withdrawn, the request for the fourth tranche of stage II of the RAC sector plan.¹⁰ That withdrawn request included a proposal to revise the IOC incentive scheme agreed under decision 88/62(b) to further incentivize the sale of R-290 split AC units with the highest energy efficiency rating, and not incentivize those units with the lowest energy efficiency rating for those units sold between 1 January and 31 December 2024. As the request was withdrawn, UNIDO has asked the Secretariat whether the revised IOC incentive scheme could nonetheless be used.

26. On an exceptional basis, and with a view to facilitating the uptake in the market of energy efficient R-290 technology and the successful implementation of the project in China, the Secretariat recommended that UNIDO use the flexibility provided in paragraph 7(a)(iv) of the Agreement between the Government and the Executive Committee for stage II of the HPMP. In line with that flexibility, the revised IOC incentive scheme could be used up to US \$900,000 (i.e., 20 per cent of the third tranche) on the understanding that should the US \$900,000 be exhausted for IOC payments prior to the 94th meeting because of sufficient sales of R-290 units, all subsequent IOC incentive payments would follow the IOC scheme agreed under 88/62(b) until the Executive Committee considered the revised scheme during the 94th meeting.

27. The revised IOC incentive scheme is presented in table 6 below. As was the case for the IOC incentive scheme approved under decision 88/62(b), the revised IOC incentive scheme would only apply to the sale of split R-290 AC units in China and other Article 5 countries, will not be paid on equipment with fixed-speed compressors, and would decrease by 50 per cent annually (e.g., the incentive provided for a split AC unit with the highest energy efficiency sold in China in 2025 would be 55 Renminbi (RMB)). Manufacturers that converted their lines to R-290 with their own resources would be eligible for IOCs for R-290 RAC split units manufactured on their converted lines, subject to the Article 5 ownership of those manufacturers. IOCs would not be paid on sale of factory-sealed units, such as portable AC, window-type AC, and dehumidifiers, which are already established in the marketplace.

Table 6. IOC incentive scheme for units sold between 1 January to 31 December 2024 (RMB/unit)

Split units	Decision 88/62(b)*	Revised scheme ^{*,**}
Grade 1 energy efficiency	80	110
Grade 2 energy efficiency	55	55
Grade 3 energy efficiency	30	0
Export to Article 5 countries	20	20
Kits to Article 5 countries	15	15

* Incentive will be reduced by 50 per cent annually.

** On the understanding that once US \$900,000 for IOCs had been disbursed, the IOC incentive scheme agreed under decision 88/62(b) would apply until the 94th meeting, at which time the Executive Committee could consider whether it wishes to continue to use the revised scheme.

Conversions at enterprises without assistance from the Multilateral Fund

28. Recalling that 90 per cent of the phase-out under stage II (i.e., 40,514 mt) would be achieved through conversions at enterprises without assistance from the Multilateral Fund, the Secretariat asked whether any information was available on those conversions. While data on the technology selection of enterprises that converted without assistance from the Multilateral Fund had not been collected, UNIDO indicated that most of those lines likely converted to HFC-32, and a small number of lines likely initially converted to R-410A and subsequently converted to HFC-32. HFC-32 is now the dominant market

¹⁰ Paragraph 8 of document UNEP/OzL.Pro/ExCom/93/31.

technology, though enterprises may keep a few manufacturing lines capable of swinging between HFC-32 and R-410A in case there is demand for the latter technology.

29. UNIDO also highlighted that in addition to the manufacturer AUX that had converted its RAC manufacturing line to R-290,¹¹ one RAC manufacturer had converted five of its manufacturing lines with an aggregated manufacturing capacity of 3 million units per year to R-290, and two HPWH manufacturers had converted seven of their manufacturing lines with an aggregated manufacturing capacity of 90,000 units to R-290 with their own resources. The Secretariat considers the decision by manufacturers to convert 13 RAC and HPWH manufacturing lines to R-290 to be an important signal by industry of confidence that the market is ready to accept R-290 technology.

30. UNIDO confirmed that the manufacturing line at AUX was eligible. Accordingly, R-290 split AC units manufactured on that line would be eligible under the IOC incentive scheme. In contrast, the other 12 manufacturing lines would not be eligible to participate in the IOC incentive scheme. UNIDO confirmed that as CHEAA would pay close attention to those manufacturing lines, future progress reports will include updated information on the status of manufacturing at those lines.

Market acceptance of R-290 split air-conditioning units

31. The Secretariat noted that the lines converted to R-290 remain largely idle and sales of R-290 split AC units continue to account for an insignificant proportion of sales in the market. However, the Secretariat noted with appreciation the decision by two RAC manufacturers and two HPWH manufacturers to convert 13 of their manufacturing lines to R-290, which suggested increasing confidence by manufacturers in the readiness of the market to accept R-290 split air conditioners; the promulgation of the list of recommended ODS alternatives, which included R-290 among the list of recommended alternatives for the sector, and excluded HFC-32, the dominant technology in the sector; the revised IOC incentive scheme, which the Secretariat considered could help facilitate the sale of energy efficient, R-290 split AC units; and the continued efforts by the Government, CHEAA, manufacturers and UNIDO to facilitate the uptake of R-290 technology.

32. While supporting the revised IOC incentive scheme, the Secretariat remained skeptical on whether the scheme would by itself meaningfully change the trajectory of technology uptake in the market, and inquired whether assisted enterprises could commit to, as long as the converted R-290 line was idle, reduce their manufacturing of HFC-based equipment by the same volume as the capacity of the idle converted R-290 line. In addition, the Secretariat inquired whether the Government had considered other measures to facilitate the uptake of the agreed technology by discouraging sales of high-GWP HFC-based RAC equipment, including for example, a tax on R-410A-based equipment, where the revenue from that tax is used as a subsidy for R-290-based RAC units; to strengthen the use of the 2017 ecolabel for example by implementing a label on R-290-based equipment that results in encouraging its sale; and mandating that the Government, including provincial governments, follow the recommended list of ODS alternatives for their procurement decisions. UNIDO noted the Secretariat's suggestions and indicated it would carry out the necessary consultations and feasibility studies related to their implementation. In addition, UNIDO highlighted that the Government was considering implementing its HFC consumption quota.

Return of remaining balances from stage I of the RAC sector plan

33. As was reported at the 93rd meeting for the industrial and commercial refrigeration and air-conditioning (ICR) sector plan,¹² and as further discussed in document UNEP/OzL.Pro/ExCom/94/10, the financial audit report presents the balances of stage I of the ICR sector plan in two currencies that do not correspond to each other. Similarly, the financial audit report presents the balances of stage I of the

¹¹ See paragraph 6 of the present document.

¹² Paragraph 86 of document UNEP/OzL.Pro/ExCom/93/47.

RAC sector plan in two currencies that do not correspond to each other. In line with the approach described in UNEP/OzL.Pro/ExCom/94/10, it was agreed that the return of the remaining balances from stage I of the RAC sector plan would be calculated based on the remaining balances held by FECO in RMB and the exchange rate on 13 May 2024, resulting in a return of US \$2,053,955, plus agency support costs of US \$148,765 for UNIDO, to the 94th meeting. The Secretariat notes that in line with decisions 69/24(b)(ii) and 77/49(b)(iii), UNIDO would continue to report the interest generated on the remaining balances of stage I of the RAC sector plan after December 2022, until that interest had been returned to the Multilateral Fund.

Risks due to currency exchange losses

34. UNIDO transferred a total of US \$24,496,124 to FECO, and FECO has disbursed a total of US \$14,544,159. Accordingly, the total balances held by FECO under the first three tranches is US \$9,951,965. As further described in document UNEP/OzL.Pro/ExCom/94/10, all funds held by FECO are in RMB and, in order to mitigate further currency exchange rate losses, FECO has proposed a set of over-arching principles for the implementation modality of Multilateral Fund-supported projects in China.

35. In line with those principles, and noting the balances of US \$9,951,965 held by FECO that had already been converted to RMB, it was agreed that the Secretariat would recommend the approval of the fourth tranche on the understanding that UNIDO would not transfer any of that approved funding until the Executive Committee had considered the additional details on the implementation of the overarching principles that will be submitted to the 95th meeting by UNDP as lead implementing agency for stage II of the HPMP.

Project implementation and monitoring unit

36. The cumulative disbursement for the PMU under the first three tranches of US \$2,510,004 was higher than the agreed allocation for the PMU. That higher level of disbursement was temporarily covered by FECO's budget and would be reimbursed from the PMU of future tranches.

Gender policy implementation

37. While stage II of the RAC sector plan was approved prior to decision 84/92(d),¹³ the Government of China nonetheless had been incorporating gender mainstreaming into its implementation to the extent possible, including by fostering the engagement of women in planning, policy and decision-making, training and workshops, brainstorming and advisory services, and monitoring and evaluation. Under the third tranche, and in line with decision 90/48(c), both UNIDO and FECO/MEE followed the Multilateral Fund Secretariat's gender policy by requesting equal opportunities be given to women and men in all areas of implementation; promoting and encouraging women's participation in events, workshops, field visits, and training activities; and tracking gendered participation for evaluation and continued improvement. Information on gender will continue to be collected throughout stage II, and gender aspects will be incorporated into training and awareness-raising activities to promote women's participation in the RAC sector.

Sustainability of the HCFC phase-out and assessment of risks

38. The most significant risk to the project is not related to the sustainability of HCFC phase-out: it is unlikely that converted enterprises will revert to manufacturing HCFC-22-based equipment. Rather, the most significant risk to the project is that RAC manufacturing lines that converted to R-290 could continue

¹³ Bilateral and implementing agencies were requested to apply the operational policy of the Multilateral Fund on gender mainstreaming throughout the project cycle.

to be idle due to continued limited uptake of R-290-based RAC equipment in China and in markets around the world.

39. UNIDO highlighted that many of the manufacturing lines that converted to R-290 are manufacturing portable R-290 air conditioners, which will build confidence in the technology and help build up the supply chain for R-290 products; that the price of HFCs had substantially increased in 2024 given the implementation of China's HFC production and consumption quota; that there had been a substantial increase in European demand for R-290 heat pumps, which had stimulated manufacturers to invest in the technology; and compressor manufacturers in China have been involved in the development of R-290-based compressors for mobile AC, which could help further build the R-290 supply chain. UNIDO considered the biggest challenge to the successful uptake of R-290 technology was the cost of the technology relative to the lower cost of HFC-32. Enterprises were investing in research and development to reduce costs and, therefore, UNIDO considered the risk to be short-term.

40. The Secretariat considers the over-arching principles proposed by China to mitigate future currency exchange rate losses to be meaningful, though additional details are required to understand how those principles will be applied to the RAC sector; those details will be provided to the 95th meeting. Funds approved at the present meeting would be transferred by the Treasurer to UNIDO, who would hold those funds in a US dollar bank account, which would continue to generate interest. Accordingly, the Secretariat does not see a risk of additional currency exchange rate losses in the approval of the fourth tranche at the present meeting, noting that UNIDO and the Government of Austria would not transfer any of the approved funds to FECO until the Executive Committee considered the additional information on the implementation of the overarching principles to the RAC sector at its 95th meeting. Approval of the fourth tranche at this meeting would also help minimize the risk of a delay in the transfer of funding from UNIDO to FECO in the event there was a rapid uptake of R-290 split ACs in the market.

Conclusion

41. Implementation of the first three tranches of stage II is progressing, including the conversion of ten RAC manufacturing lines, four compressor manufacturing lines, and two HPWH manufacturing lines; an additional two RAC manufacturing lines and three HPWH manufacturing lines have already been identified for participation under the fourth tranche, and a further two HPWH lines may participate. A broad range of technical assistance activities have either been completed or are in an advanced stage of implementation. The level of disbursement is 38 per cent of the funds approved in the third tranche.

42. Notwithstanding continued efforts by the Government of China, CHEAA, industry and UNIDO, manufacturing of R-290 RAC split units on the converted lines continues to be very low, reflecting limited local and global market penetration; in contrast, R-290 is well-established for factory-sealed equipment, which is being manufactured on the lines converted under the HPMP to R-290; R-410A-based equipment is not being manufactured on those lines. The decision by the Government of China not to use the IOC incentive scheme for factory-sealed equipment, but to instead focus the IOC incentive scheme on R-290 split units, reflects the Government's commitment to ensure the successful uptake of the technology; the conversion by manufacturers of six RAC and seven HPWH manufacturing lines to R-290 with their own resources is an encouraging signal of expected market acceptance. The Secretariat further considers that the promulgation of the list of recommended ODS alternatives, which includes R-290 among the list of recommended alternatives for the sector, and excludes HFC-32, and the revised IOC incentive scheme will help facilitate the sale of energy efficient, R-290 split AC units. The continued implementation of activities, including research and development activities to help lower the cost of R-290 technology, and development of policies and regulations to promote the market uptake of R-290 split RAC units in China, including those planned under stage II, will likely be required to ensure a sustained and substantial market uptake of R-290. The sustained manufacturing of R-290 split AC equipment in China will also be furthered by the acceptance of the technology in other markets.

RECOMMENDATION

43. The Executive Committee may wish:

- (a) To note the progress report on the implementation of the third tranche of the room air-conditioning manufacturing and heat pump water heaters sector plan (RAC sector plan) of stage II of the HCFC phase-out management plan (HPMP) for China;
- (b) To note:
 - (i) The agreed revision to the incremental operating cost incentive scheme for the RAC sector plan, as reflected in document UNEP/OzL.Pro/ExCom/94/29;
 - (ii) That UNIDO would return to the 94th meeting US \$2,053,955, which was calculated on an exceptional basis using the exchange rate on 13 May 2024, representing the remaining balances from stage I of the RAC sector plan, plus agency support costs of US \$148,765 for UNIDO; and
- (c) To approve the fourth tranche of the RAC sector plan of stage II of the HPMP for China, and the corresponding 2024-2025 tranche implementation plan, at the amount of US \$7,524,667, consisting of US \$6,300,000, plus agency support costs of US \$441,000 for UNIDO and US \$700,000, plus agency support costs of US \$83,667 for the Government of Austria, on the understanding that UNIDO and the Government of Austria would not transfer any of those approved funds to the Foreign Environmental Cooperation Centre of the Government of China until the Executive Committee had considered the report to be submitted by UNDP as referred to in document UNEP/OzL.Pro/ExCom/94/10.