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Item 7(b)(ii) of the provisional agenda¹

**REPORTS ON PROJECTS WITH SPECIFIC REPORTING REQUIREMENTS
WITH OUTSTANDING ISSUES FOR INDIVIDUAL CONSIDERATION****An overview**

1. The present document contains a report on a project with specific reporting requirements submitted to the 95th meeting which, after the Secretariat's review, presents outstanding issues and requires the Executive Committee to consider it individually. The report is related to an HFC investment project in Jordan.

Jordan: Report on the project for the conversion from HFC to propane of the facility manufacturing large commercial unitary roof-top air-conditioning units of up to 400 kW at Petra Engineering Industries Co. (UNIDO)

Background

2. At its 81st meeting, the Executive Committee approved a project for the conversion from HFC (HFC-134a, R-407C, R-410A) to propane (R-290) of the facility manufacturing large commercial unitary roof-top air-conditioning (AC) units of up to 400 kW at Petra Engineering Industries Co. (Petra) in Jordan, in the amount of US \$1,637,610, plus agency support costs for UNIDO (decision 81/62).

3. Petra is the largest manufacturer of AC units and the only manufacturer of unitary roof-top AC units in the country. The project was designed to simulate, design, test, and convert the production of unitary roof-top AC units using R-290 to replace HFC-based units of up to 400 kW (114 tonnes of refrigeration (TR)) used for commercial and industrial applications and achieve an energy efficiency ratio (EER) 10 to 15 per cent higher than the minimum EER in the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) 90.1 standard. Of its eight assembly lines and eight charging areas, two were to be converted to R-290. The two prototypes were planned to have a capacity of 80 kW and

¹ UNEP/OzL.Pro/ExCom/95/1

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185 kW, cover the whole range of unitary AC units manufactured at Petra, and include two different designs with all related safety measures.

4. The project was to be completed by July 2020 and a comprehensive completion report submitted within six months of project completion. On behalf of the Government of Jordan, UNIDO submitted a progress report on the implementation of the project to the 90th meeting.² In considering that report, the Executive Committee noted that Petra Engineering Industries Co. would report, through UNIDO, separately and for each year, through the completion of the project, the annual sales of R-290-based large commercial unitary roof-top AC units in Article 5 countries and in non-Article 5 countries (decision 90/25(b)(ii)).

5. The Secretariat received the report of annual sales R-290 based large commercial unitary roof-top AC units in Article 5 countries and in non-Article 5 countries in line with decision 90/25(b)(ii) for Jordan on 27 March 2024. As noted by the Executive Committee at its 94th meeting,³ the Secretariat is presenting the report and its review thereof to the present meeting.

Progress report

6. The enterprise has had no sales of R-290-based large commercial unitary roof-top AC units since the 90th meeting. Of the remaining balance of US \$113,089 to be disbursed exclusively for incremental operating costs (IOCs), none has been disbursed.

7. The order for two R-290 commercial rooftop units (a PPS 360 and PPH 450 model) for Jordan that had been pending and awaiting final confirmation, as reported to the 92nd meeting, did not go through. As of October 2024, an order for an R-290 commercial rooftop unit (PPH 105 model) for a marine reserve in Jordan is pending.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

8. The Secretariat discussed with UNIDO whether it is realistic to expect the enterprise to have sufficient sales of R-290-based units to complete the project by 31 July 2025.⁴ While acknowledging the uncertainty in sales of R-290-based units, UNIDO preferred to continue observing the market and regulatory situation to be able to make an informed decision; if there is no change by December 2024, UNIDO would then consider alternative strategies.

9. The Secretariat further sought to better understand the reasons why the enterprise had not been able to sell R-290-based units. UNIDO had previously noted that Petra had faced a challenging business environment throughout its operations, including a decrease in HFC-based manufacturing and sales attributed to the COVID-19 pandemic, the economic situation in the region, and changes in market demand, and that sales following the pandemic were not expected to recover until after 2024. However, UNIDO has reported that sales of all HFC-based units continue to decrease annually, with sales of HFC-based units in 2024 73 per cent below those in 2021. In the case of the cancelled order of the two R-290 commercial rooftop units, the client decided to redesign their system and instead purchase standard split AC units from an Article 5 country.

10. A significant challenge Petra is facing is an overall decreased demand for large commercial unitary roof-top AC units, irrespective of the type of refrigerant. There has been an increased demand for chilled water systems, particularly for data center units, as well as variable refrigerant flow (VRF) systems, leading to a reduction in the market share of large commercial unitary roof-top AC units in the country and globally.

² Paragraphs 219-237 of document UNEP/OzL.Pro/ExCom/90/9

³ Paragraph 63 of document UNEP/OzL.Pro/ExCom/94/67

⁴ At the 90th meeting, the date of completion of the project was extended to 31 July 2025 through decision 90/25(c).

The absence of legislation and regulatory codes in Article 5 countries governing the use and features of R-290-based units further contributes to the challenge.

11. The Secretariat considers the best outcome for the project is to enable the enterprise to use the converted manufacturing lines to manufacture R-290-based equipment. Accordingly, and in order to avoid requesting the closure of the project, and the return of the remaining balances, the Secretariat considered it meaningful to explore with UNIDO whether the enterprise could, notwithstanding decision 90/25(b)(i),⁵ use the remaining balances to enable the enterprise to use the converted lines to manufacture R-290-based chillers or VRF systems rather than the large unitary roof-top AC units originally envisioned under the project. UNIDO discussed with the enterprise and presented two options, one for the manufacture of chillers and one for the manufacture of VRF systems; upon further discussion, it was clear that the remaining balances would be insufficient for the manufacturing of VRF systems, and the Secretariat and UNIDO instead focused on developing a possible proposal for the 96th meeting involving the manufacture of R-290-based chillers.

12. UNIDO and Petra proposed to replace an existing chiller at the enterprise with an R-290-based chiller to demonstrate the effectiveness of the R-290 technology. In particular, the enterprise would replace one of the three R-134a-based air-cooled chillers currently serving the management and engineers' building, each with a capacity of 300 kW and refrigerant charge of 110 kg, with an R-290-based unit; install a data logging system to monitor its performance and compare it against that of the remaining HFC-134a-based chillers; and assess the replacement unit's efficiency and operational benefits. The chiller would be used for employee training, marketing, and end user demonstrations. UNIDO further clarified that the primary focus of a project that could be submitted to the 96th meeting would be to encourage adoption of R-290-based chillers and increase awareness of their benefits, and not for the conversion of manufacturing lines for the full manufacture of these units.

13. The Secretariat observed that, rather than proposing to use the remaining balance towards technical assistance to enable the enterprise to use the converted lines to manufacture and sell R-290-based chillers, as previously discussed, UNIDO presented a proposal more akin to an end-user demonstration project. While such an end-user demonstration project could be useful, the Secretariat considered that it would be beneficial if the enterprise could commit to manufacturing and selling R-290-based chillers after the completion of the project, that there may also be benefit from the inclusion of components associated with system design and performance optimization, and that some of the remaining balances should be set aside for IOCs to facilitate the introduction into the market of R-290-based chillers.

14. While acknowledging that the enterprise was unable to estimate future sales of R-290-based chillers, the Secretariat explored with UNIDO whether Petra would be able to provide assurance that the enterprise would make best efforts to sell such units in the near future (i.e., within the next three years or so). For example, if Petra could commit to ensuring that R-290-based chillers are available at the same price, or cheaper, than the equivalent HFC-based-model manufactured by the enterprise for a period of two years after the completion of the project. However, UNIDO explained that the enterprise could neither commit to manufacturing and selling a specific number of R-290-based chillers in the next two to three years, nor could it commit to selling R-290-based chillers at a certain price.

15. The Secretariat notes with appreciation the willingness of the enterprise to further explore the option of using the remaining balances to enable it to manufacture R-290-based chillers. Noting the substantial investment already made to convert the enterprise (US \$1,524,521) and the relatively small balances remaining from the project (US \$113,089), the Secretariat considers such an option, if sustainable, to be a substantially better outcome than closing the project and requesting the return of the remaining

⁵ The Executive Committee noted inter alia that the remaining balance of US \$113,089 would be disbursed exclusively for IOCs related to the manufacture of large commercial unitary roof-top air-conditioning units based on R-290, in line with decisions 81/62(b)(iv) and 77/35 (decision 90/25(b)(i)).

balances. However, with no firm commitments in place, the Secretariat considers there is a significant risk that the enterprise would manufacture, install, and demonstrate a single R-290-based chiller and, upon completion of the project, face similar challenges selling R-290-based chillers as it currently faces selling R-290-based large unitary roof-top AC units.

16. In light of that significant risk, the Secretariat is seeking the Executive Committee's guidance whether to invite UNIDO to submit a proposal to the 96th meeting to allow the enterprise to use the remaining balances to demonstrate an R-290-based chiller, on the understanding that it would not be for the full remaining balances, but a portion thereof, so that IOCs could still be provided for R-290-based chillers after completion of the demonstration project; or to close the project and have UNIDO return the remaining balances to the 95th meeting.

RECOMMENDATION

17. The Executive Committee may wish to consider whether to:

- (a) Invite UNIDO, on behalf of the Government of Jordan, to submit a proposal to the 96th meeting to use part of the remaining balances from the project for the conversion from HFC to propane of the facility manufacturing large commercial unitary roof-top air-conditioning units of up to 400 kW at Petra Engineering Industries Co. to demonstrate the manufacture and use of an R-290-based chiller at Petra, as described in document UNEP/OzL.Pro/ExCom/95/21; or
- (b) Request UNIDO to return the remaining balances of US \$113,089 plus agency support costs of US \$7,916 from the project for the conversion from HFC to propane of the facility manufacturing large commercial unitary roof-top air-conditioning units of up to 400 kW at Petra Engineering Industries Co. to the 95th meeting.