



**United Nations
Environment
Programme**

Distr.
GENERAL

UNEP/OzL.Pro/ExCom/93/99
18 November 2023

ORIGINAL: ENGLISH



EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-third Meeting
Montreal, 15-19 December 2023
Item 10(c) of the provisional agenda¹

**PAPER CONTAINING INFORMATION ON THE TYPES OF ACTIVITIES THAT ARTICLE 5
COUNTRIES COULD UNDERTAKE, ON THE NATURE OF THE ASSISTANCE REQUIRED
AND ON SUPPLY-CHAIN ISSUES THAT NEEDED TO BE RESOLVED TO ADDRESS
CONSUMPTION IN THE LOCAL INSTALLATION AND ASSEMBLY SUBSECTOR IN THEIR
KIGALI HFC IMPLEMENTATION PLANS (DECISION 92/39(c))**

Introduction

1. At the 91st meeting, in considering the Kigali HFC implementation plan (KIP) for the Niger, the Executive Committee recognized that additional data on the subsector of local installation and assembly of refrigeration and air-conditioning (RAC) systems needed to be collected. This was because there appeared to be a significant level of HFC consumption in that sector in the Niger, although in the project proposal it was not identified separately from the consumption for servicing. Accordingly, the Committee requested the Secretariat to prepare a document, for consideration at the 92nd meeting, describing the subsector and identifying to the extent possible the types of equipment manufactured and refrigerants used that characterized that subsector as well as the challenges in transitioning to alternatives with low global-warming potential (GWP) (decision 91/39(b)).

2. At the 92nd meeting, in considering document UNEP/OzL.Pro/ExCom/92/49 prepared by the Secretariat, the Executive Committee acknowledged that the subsector could play a key role in supporting the transition to low-GWP technologies but indicated that additional data was required and further discussion was needed *inter alia* on the need to increase the technical capacity of local assemblers, the sustainability of conversions in this subsector, the need to address critical supply-chain issues, the possibility of funding the subsector separately from the servicing sector and the associated risk of double-counting; and the role of end users and standards in ensuring the adoption of low-GWP technologies. As a result of the discussion, the Executive Committee decided (decision 92/39):

¹ UNEP/OzL.Pro/ExCom/93/1

- (a) To invite Article 5 countries, through the bilateral and implementing agencies, to provide to the Secretariat, on a voluntary basis, by 20 September 2023, information on the local installation and assembly subsector;
- (b) To request the Secretariat, taking into account the information provided by the Article 5 countries, to prepare for consideration by the Executive Committee at its 93rd meeting a paper containing information on the types of activities that Article 5 countries could undertake, on the nature of the assistance required and on supply-chain issues that needed to be resolved to address consumption in the local installation and assembly subsector in their KIPs; and
- (c) To consider projects in the local installation and assembly subsector in the context of KIPs on a case-by-case basis.

Information on local installation and assembly

Information submitted by Article 5 countries

3. In line with decision 92/39, the Secretariat sent a letter inviting all Article 5 countries to share information on the subsector, on a voluntary basis. To facilitate the collection and provision of information on the subsector, the Secretariat developed a simple format, which was circulated along with the letter. Countries had the option to use the format provided or any other that they preferred.

4. Three Article 5 countries² submitted the requested information. The Secretariat appreciates the information provided by these countries. Regarding consumption, it was in all cases presented within the refrigeration servicing sector, and no information was provided on the number or type of enterprises in the subsector. One country identified the RAC systems installed, which were consistent with those identified in document UNEP/OzL.Pro/ExCom/92/49 (e.g., commercial split and centralized systems using HFC-134a, R-404A and HCFC-22; industrial small, medium and large-sized refrigeration systems using HFC-134a, R-404A, R-507A and HCFC-22; and large air-conditioning (AC) systems using R-410A and R-407C).

5. On the type of activities to be considered to support the introduction of low-GWP technologies in the subsector, one country suggested as a potential activity the provision of financial and technical support to end users in some sectors (assistance to develop credit systems in the country for specific sectors) to acquire RAC systems using low-GWP technologies and operate them with solar energy, which is abundant in that country.

Information contained in the Kigali HFC implementation plans

6. A total of 22 KIPs are being considered at the 93rd Executive Committee meeting. While it was expected that more information on this subsector would become available as Article 5 countries collected HFC consumption data during the preparation of their KIPs,³ the information collected so far is limited.

7. Most of the KIPs submitted did not separate the consumption of HFCs associated with the local installation and assembly of RAC systems (first charge) from the refrigeration servicing sector, acknowledging that it was not possible to collect the data, but that they would undertake additional work during stage I of the KIP to gain a better understanding of the subsector.

² Cambodia, Haiti, and the Philippines.

³ Decision 91/39(a) encouraged Article 5 countries and implementing agencies, in the context of HFC surveys conducted during the preparation of KIPs, to collect information on and provide estimates of any HFC consumption in the local installation and assembly subsector, when it was possible to do so and on a voluntary basis.

8. Some KIPs made an initial attempt to estimate such consumption while acknowledging that the estimates are preliminary and additional work would be required during stage I to gain a better understanding of the subsector. For example, Bolivia (Plurinational State of) and Nicaragua estimated that 2 per cent of the HFCs reported under servicing in metric tonnes (mt) is for first charge by the local installation and assembly subsector, Ecuador estimated 4 per cent, Kyrgyzstan estimated 5 per cent, and the Niger 10 per cent (or 15 per cent of the use on commercial and industrial refrigeration). North Macedonia provided detailed information on equipment that was assembled and installed in the country, the substances used and the enterprises operating in the subsector. While that consumption was reported as manufacturing in the country's country programme implementation report (CP report), stage I of the KIP did not include specific activities for the subsector. Instead, it included support for surveys to explore sectors and subsectors that had so far received less attention and where detailed data were needed to plan for further activities, including the local installation and assembling subsector; and a detailed study of consumption and use of HFCs in the RAC manufacturing and assembling sectors.

9. The KIP of Mexico identified 18 enterprises operating in the subsector including their main operations and provided clear discrimination between identified RAC systems in the country pre-charged by original equipment manufacturers (i.e., domestic fridges, commercial stand-alone units, split AC units, rooftop packaged AC) and those charged onsite (i.e., condensing units and evaporators for refrigeration, centralized systems, and variable refrigeration flow (VRF) AC systems).

10. The following KIPs submitted to the 93rd meeting identified specific enterprises operating in the subsector and proposed concrete activities to assist the subsector, as follows:

- (a) The KIP for Mexico⁴ included a component in the local installation and assembly subsector, consisting of technical assistance and a refrigerant handling package for eight local installation and assembly enterprises combined with demonstrations of the installation at end users' sites of eight centralized systems, chillers, VRF systems, and cold rooms using several technologies (e.g., carbon dioxide (CO₂), ammonia (NH₃), R-290, HFO, and HFC-32). All these activities were integrated as part of the activities for the refrigeration servicing sector, within the same cost-effectiveness threshold applied for the sector (US \$5.10/kg); and
- (b) The KIP for Viet Nam⁵ included assistance for the conversion of one enterprise to NH₃, separately from the refrigeration servicing sector at a cost-effectiveness of US \$18.80/kg, as submitted. The HFC phased out from the project was reported in the country's CP report under the refrigeration servicing sector.

Type of activities that Article 5 countries could undertake to assist the subsector

11. Based on the limited information on the subsector collected from Article 5 countries and the submitted KIPs, it is the Secretariat's understanding that most countries are at an early stage in the process of identifying the consumption of HFCs for first charge in new RAC installations from the consumption in the refrigeration servicing sector. Additional effort would be required to gain a better understanding of this subsector, how to facilitate the introduction of low-GWP technologies, and, if such assistance is provided, how such consumption could be more clearly reported and monitored.

12. For those Article 5 countries that do not have HFC consumption in the manufacturing sector and that rely on technicians' training and certification and refrigerant recovery and recycling as the main activities in the refrigeration servicing sector, the inclusion of activities to facilitate the transition to

⁴ UNEP/OzL.Pro/ExCom/93/70

⁵ UNEP/OzL.Pro/ExCom/93/93

low-GWP technologies in new RAC systems installed may help them in complying with their HFC reduction targets and reducing future growth in HFC banks and servicing needs.

13. The Secretariat discussed with the bilateral and implementing agencies during the inter-agency coordination meeting the type of activities that Article 5 countries could undertake to assist the local installation and assembly subsector in facilitating the transition to low-GWP technologies in new RAC systems. The two main modalities of assistance that could be provided to enterprises operating in the subsector are training and technical assistance in the design and installation of RAC systems using low-GWP technologies, and the provision of tools to handle low-GWP refrigerants and related components and equipment.

14. To address the challenges that these enterprises would face to commit to only using low-GWP technologies,⁶ assistance should be provided to them in conjunction with other activities to be implemented under the KIPs, including policy and regulatory measures to facilitate the adoption of low-GWP technologies and disincentivize the use of high-GWP technologies; the adoption and updating of standards where relevant; and technical assistance to the servicing sector, importers, and distributors to increase the availability of alternative technologies and components.

15. Furthermore, technical assistance to local installation and assembly enterprises is to be complemented by awareness, training, and demonstration activities addressing end users of RAC systems, since they are the final decision-makers in the selection of technology. To ensure sustainability, assistance would likely need to be provided in such a manner to ensure that all eligible enterprises cease to assemble and install high-GWP-based RAC systems for a specific application or group of applications at a time.

16. The subsections below briefly describe the type of activities that could be undertaken to assist the sector, including activities directly addressed to the enterprises (technical assistance and tools) and activities addressed to other stakeholders to support the sustained transition to low-GWP alternatives (demonstration of design, installation and operation of RAC systems using low-GWP refrigerants at key end users, awareness raising and training to end users on the adoption of RAC systems using low-GWP technologies; and adoption of related policy and regulatory measures and standards, where applicable). The activities described below have been identified based on current knowledge of the subsector. As additional information becomes available, more activities may be identified.

Training and technical assistance in the design and installation of RAC systems using low-GWP technologies

17. The local installation and assembly enterprises require technical assistance, capacity building, and training of staff (in many cases engineers) in the design, installation, and commissioning of systems using low-GWP technologies, including software handling, programming of controls, leak detection and component coordination and adjustments during installation to ensure that the RAC systems operate at their optimal energy-efficiency level. Training provided should facilitate the selection and handling of appropriate technologies that can be adapted and maintained in local conditions, taking into account energy efficiency, flammability, toxicity and operation under high pressure. The involvement of component suppliers would also help in ensuring a better understanding of the technologies and their faster adoption.

18. The expertise required to select the appropriate components, and design and properly undertake the installation of new assembled RAC systems is higher than that required for the servicing of installed RAC equipment; therefore, training and technical assistance need to be tailored to the needs and expertise level of the enterprises in the subsector.

⁶ E.g., higher prices of some alternative refrigerants and associated components, and the risk of market-share loss to competitors where the use of low-GWP alternatives is not required for all relevant installations (document UNEP/OzL.Pro/ExCom/92/49).

Provision of tools to handle low-GWP refrigerants and related components and equipment

19. Taking into consideration that the assembly and installation take place at the end-user site, these enterprises may not require large pieces of manufacturing equipment (e.g., automatic charging units installed in manufacturing plants) to replace the refrigerant, but rather tools for installation, which may in a few instances be different to the ones they already have for HFC-based RAC systems. Additional information will be obtained in this area as more projects are submitted; however, based on current knowledge, it is expected that the need for tooling will not be substantial as many of the tools these enterprises already have to install HFC-based systems can also be used in systems using flammable refrigerants, NH₃, or CO₂.

Demonstration of the design, installation, and operation of refrigeration and air-conditioning systems using low-GWP refrigerants at key end users

20. The large end users will decide the selection of technology for the new RAC systems. Demonstration projects of low-GWP technology at end-user sites have been implemented under the HCFC phase-out management plans (HPMPs), with positive results in showcasing the costs, performance, applicability, and potential operating savings of selected technologies. However, the sustained adoption of low-GWP alternative technologies by additional end users still depends on factors such as their price and availability, and how well the alternative technology is known. The technical assistance to the local installation and assembly enterprises will help ensure that the demonstrated RAC systems can be locally designed, installed, and serviced, while awareness, support and information sharing to suppliers will help facilitate their access to components.

21. Given the large variety of RAC applications in the local installation and assembly subsector, it would be not possible for Article 5 countries to address the entire subsector at the same time. Countries may consider targeting the assistance to specific RAC applications and technologies at different stages of the HFC phase-down, prioritizing those where the transition to a low-GWP technology is easier. Focusing only on specific applications with the support of policy measures may ensure their sustained transition to low-GWP technologies.

22. Based on the experience gained in the implementation of demonstration projects under the HPMPs and discussions held with the implementing agencies, supermarkets have been identified as a potential set of end users to consider for the demonstration of low-GWP technologies. Many supermarkets operate a large variety of RAC systems based on R-404A (and some based on R-507A) with large leakage rates that could potentially be replaced by systems based on low-GWP technologies; the subsector generally has a large number of sites owned by a limited amount of enterprises, which can help replicability; and they have the capacity to provide co-financing as they regularly invest in replacing their RAC systems reaching end of life. Nevertheless, the selection of potential end users served by the local installation and assembly subsector and the actual relevance of this subsector will depend on the specific circumstances of each country. For example, food retail in some smaller low-volume-consuming (LVC) countries operates through smaller stores, and a large portion of the imported equipment is already pre-charged.

Awareness raising and training for end users on the adoption of low-GWP technologies

23. The transition of the local installation and assembly subsector to low-GWP technologies is a long-term process that requires the provision of *know-how* to the enterprises in the subsector; ensuring accessibility of refrigerants, equipment, and components in the local market; and raising end users' awareness regarding the selection of technologies that are low-GWP and energy-efficient.

24. The type and target of the awareness-raising activities will depend on the specific applications addressed by the country. For example, large end users with their own technical departments in charge of procuring, installing, and maintaining their RAC systems may require, in addition to awareness, actual

training on the design, installation and servicing of RAC systems using low-GWP technologies. In addition, regional information exchange and the showcasing of approaches being followed by countries to identify the consumption and needs of the subsector through regional network meetings of ozone officers would also help national ozone units identify the opportunities to transition to low-GWP technologies in this subsector.

Regulatory actions related to the assistance to the local installation and assembly subsector

25. To ensure the sustainability of the assistance provided, Article 5 countries may consider establishing regulatory measures supporting the restriction of high-GWP-based RAC systems and the adoption of low-GWP technologies. Given the difficulties in identifying enterprises in the subsector and the large variety of RAC systems involved, an entire subsector-based transition seems challenging as converted enterprises may continue to compete with enterprises that have not yet transitioned. Countries may rather consider focusing on specific applications where the transition to a low-GWP technology is easier and the assistance could be followed by a targeted regulatory measure.

26. During the first stage of their KIPs, Article 5 countries could consider establishing a registry of enterprises in the subsector and what they do, as well as a product registry for RAC systems above a specific capacity to gain a better understanding of the subsector for future assistance and associated regulations.

Nature of assistance required

27. Decision 92/39(d) allows the consideration of projects in the local installation and assembly subsector in the context of KIPs on a case-by-case basis. In line with this decision, Article 5 countries that have identified consumption of HFCs in the local installation and assembly subsector and have an understanding of the local enterprises involved in this activity, the main end users, and the main challenges associated with the adoption of low-GWP technologies in the subsector, may be in a position to include activities to assist this subsector in the context of their KIPs.

28. From the limited experience in reviewing the initially submitted KIPs, it is noted that while in one case specific funding was requested to assist an enterprise in the subsector as an individual project, in another case technical assistance to enterprises in the subsector and end-user demonstration projects associated with this subsector were integrated into the refrigeration servicing sector activities.

29. While the largest Article 5 countries may be able to integrate some of the activities related to the local installation and assembly subsector into the refrigeration servicing sector activities, this may not be the case for countries with lower levels of HFC consumption. Specifically, for demonstrations of low-GWP alternatives on end users' sites, the conversion/replacement of large commercial RAC systems requires a level of investment in equipment and design that is above the level of funds that LVC countries and many non-LVC countries had available under the refrigeration servicing sector, even if the conversions were largely co-financed by the end-user.⁷ In those cases, the provision of funding beyond that provided under the refrigeration servicing sector (e.g. a funding window) would allow countries to undertake demonstrations when end users of large RAC systems prepared to convert and provide the required co-financing have already been identified, and on the understanding that the assistance provided would be aimed at supporting the sustained transition of the local installation and assembly subsector to low-GWP alternatives in specific applications.

30. As a broad point of reference on the need for funding to assist this subsector, the supplement to the Technology and Economic Assessment Panel Replenishment Task Force report⁸ considered at the 35th Meeting of the Parties included a section providing an estimate of additional funding needed to assist

⁷ This issue was identified in document UNEP/OzL.Pro/ExCom/92/43 (Additional considerations emerging from the analysis of end-user incentive schemes).

⁸ "Assessment of the funding requirement for the replenishment of the Multilateral Fund for the period 2024-2026"

the local installation and assembly subsector. The report used two scenarios estimating that the subsector uses between 10 and 30 per cent of the HFC consumption reported in the refrigeration servicing sector. For each of these two scenarios the report applied to the portion of the HFC consumption in local installation and assembly an additional 50 per cent to the cost-effectiveness threshold of US \$5.10/kg agreed by the Executive Committee for the refrigeration servicing sector.⁹ The rationale for adding 50 per cent is that the assistance to local assemblers would cost half of the cost-effectiveness threshold for the commercial refrigeration manufacturing sector of US \$15.2/kg (i.e., US \$7.6/kg).

31. Financial support for local installation and assembly is also being analyzed in the context of energy efficiency in the document on the energy efficiency operational framework prepared by the Secretariat for the present meeting.¹⁰ That document proposes assistance for technical training, information outreach, and awareness activities to support the adoption of energy-efficient technologies in local installation and assembly, in addition to other project activities that may be approved under the KIP for the subsector.

32. The specific needs of the local installation and assembly subsector will be better understood as Article 5 countries collect further data, gain a better understanding of the opportunities that this subsector brings to the transition to low-GWP technologies based on their specific national circumstances, and continue to submit projects in the context of KIPs, in line with decision 92/39(d).

Recommendation

33. The Executive Committee may wish:

- (a) To note document UNEP/OzL.Pro/ExCom/93/99 on the types of activities that Article 5 countries could undertake, on the nature of the assistance required and on supply-chain issues that needed to be resolved to address consumption in the local installation and assembly subsector in their Kigali HFC implementation plans (KIPs);
- (b) To take into consideration the information provided in the document referred to in subparagraph (a) above when discussing issues related to the local installation and assembly subsector and in deciding further steps on the matter;
- (c) To invite Article 5 countries, through the bilateral and implementing agencies or their KIPs, to continue providing to the Secretariat, on a voluntary basis, information on the local installation and assembly subsector; and
- (d) To request the Secretariat to provide an update to the document referred to in subparagraph (a) above, taking into account additional information provided by Article 5 countries on the local installation and assembly subsector to the [94th/95th meeting].

⁹ The Secretariat notes that to estimate funding needs, the report uses US \$5.10/kg as the basis for funding in the refrigeration servicing sector for all Article 5 countries; however, for LVC countries the level of funding for the refrigeration servicing sector is determined by the table in subparagraph (b)(ii) of decision 92/37.

¹⁰ UNEP/OzL.Pro/ExCom/93/98