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EXECUTIVE COMMITTEE OF
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IMPLEMENTATION OF THE MONTREAL PROTOCOL
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Montreal, 22–26 June 2026
Item 11 of the provisional agenda[1]

UPDATE ON THE LOCAL INSTALLATION AND ASSEMBLY SUBSECTOR (DECISION 95/89(c))

Introduction

1. At its 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, as there appeared to be a significant level of HFC consumption in that sector that was not identified separately from the consumption for servicing. Accordingly, the Committee requested the Secretariat to prepare a document describing the subsector and identifying the types of equipment manufactured and refrigerants used, as well as the challenges in transitioning to alternatives with low global-warming potential (GWP) (decision 91/39(b)).

2. At its 92nd meeting, in considering document UNEP/OzL.Pro/ExCom/92/49, 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 were required and further discussion was needed inter alia on the technical capacity of local assemblers, the sustainability of conversions, supply-chain issues, the possibility of funding the subsector separately from the servicing sector and the risk of double-counting, and the role of end users and standards. As a result, the Executive Committee took a series of decisions on the matter (decision 92/39).

3. At its 93rd meeting, the Executive Committee discussed the issue in light of document UNEP/OzL.Pro/ExCom/93/99. Members emphasized the importance of reaching out to end users through demonstration projects, the need for supportive regulations and incentives, and the desirability of targeting high-priority applications such as supermarket refrigeration. Other members stressed the importance of collecting more information before agreeing to provide additional funding and suggested drawing on lessons learned from non-Article 5 countries. The Executive Committee took further decisions on the matter (decision 93/94).

[1] UNEP/OzL.Pro/ExCom/98/1

4. At its 95th meeting, the Executive Committee considered document UNEP/OzL.Pro/ExCom/95/89, which reported on the situation across KIPs approved up to the 94th meeting and those submitted to the 95th meeting. The document noted that while many countries still faced challenges in clearly defining the subsector and collecting reliable data, several KIPs had begun to include concrete activities targeting it. The Secretariat recommended continuing to consider projects on a case-by-case basis to compile additional data and understanding of the subsector. The Executive Committee took further decisions on the matter (decision 95/89), including requesting the Secretariat to provide an update at the 98th meeting.

5. In response to decision 95/89(c), the Secretariat prepared the present document based on additional information provided by Article 5 countries through their KIPs submitted to the 96th and 97th meetings.

Updated information on projects in the local installation and assembly subsector approved at the 96th and 97th meetings

General findings

6. A total of 83 KIPs were approved from the 92nd to 97th meetings. The information contained in the 63 KIPs submitted to the 92nd through the 95th meetings was analyzed in previous documents.[2] The present analysis is based on the information contained in the 20 KIPs submitted to the 96th and 97th meetings, as well as on information on the implementation of activities on the local installation and assembly subsector in approved KIPs.

7. While it was expected that more information on this subsector would become available as more Article 5 countries submitted their KIPs,[3] the information collected so far remains limited. Most of the 20 KIPs did not separate the HFC consumption associated with the local installation and assembly of RAC systems (first charge) from the refrigeration servicing or manufacturing sectors, acknowledging that it was difficult to collect the data. Although some countries provided confirmation of consumption and qualitative descriptions of the subsector, only three countries (15 per cent of countries that submitted KIPs) provided preliminary estimates of HFC consumption in the subsector, systems installed and types of applications. Several countries also indicated that they would undertake detailed studies and assessments during stage I of their KIPs to gain a better understanding of the subsector.

8. Based on the three KIPs that included quantitative data, the HFC consumption in the local installation and assembly subsector varies widely, from 62.15 metric tonnes (mt) (243,727 CO_2-equivalent (CO_2-eq) tonnes) to 313.57 mt (1,028,604 CO_2-eq tonnes). As a percentage of total HFC consumption in the RAC servicing sector, this consumption fluctuates greatly, from 1.56 per cent to 16 per cent in mt, or from 13 per cent to 25 per cent in CO_2-eq tonnes, depending on the substances used. As noted at the 95th meeting, the consumption in this subsector may fluctuate significantly with a country's economic development. The Secretariat further notes that expressing assembly sector consumption as a percentage of servicing sector consumption appears to offer limited value in assessing the true scale of consumption in the subsector, given the significant variation depending on the types of substances used, for example the percentage in CO_2-eq tonnes increases with the use of higher GWP refrigerants.

Countries with detailed information

9. The following KIPs provided detailed information on the subsector and proposed concrete activities to assist it:

[2] UNEP/OzL.Pro/ExCom/93/99; UNEP/OzL.Pro/ExCom/95/89.

[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.

(a) Fiji: In Fiji, HFCs are consumed in the local assembly and installation of various commercial and industrial RAC systems. The HFCs used include HFC-134a, HFC-23, HFC-32, R-404A, R-407C, R-410A, R-427A, R-449A and R-507A. However, it was challenging to accurately determine the levels of HFC consumption in these installations during the KIP survey. Awareness materials targeting large users, equipment designers and installers, and servicing technicians, on low-GWP RAC alternative technologies were included in the KIP;

(b) Georgia: The KIP for Georgia identified that HFC consumption in the local installation and assembly subsector is mainly in commercial refrigeration (condensing units and small and large central systems). While an exact amount could not be quantified during the survey, R-404A and small amounts of HFC-134a and R-507A are believed to be consumed in this subsector. A detailed study is planned during stage I of the KIP;

(c) Morocco: The KIP for Morocco, submitted to the 96th meeting, identified two enterprises producing rooftop units, chillers, industrial cooling units and air handling units, charged in-facility prior to distribution using HFC-134a, R-404A, R-410A and R-507A. Within the servicing sector component, technical assistance activities were planned to support the introduction of low-GWP alternatives, including six training workshops for 120 installers of large RAC systems on low-GWP alternatives to HFCs, the design, installation, operation and maintenance of large RAC systems using low-GWP alternatives, safety considerations and leak prevention;

(d) Serbia: The KIP for Serbia provided quantitative information on the number and type of RAC systems assembled and installed in the country, the quantities of substances used and the total HFC bank in the subsector. However, stage I of the KIP included as part of the servicing activities only a sectoral study on HFC consumption and uses in the local installation and assembly subsector and awareness-raising activities on low-GWP technologies, with specific activities to be implemented during stage II; and

(e) South Africa: The KIP for South Africa, submitted to the 97th meeting, identified the HFC substances (mainly R-507A, R-404A and R-407C, with smaller amounts of R-410A and HFC-134a) and quantities used in the subsector. The KIP included several activities to support the HFC phase-down, including a national survey to collect data on enterprises, training on good servicing practices for installation and assembly enterprises, provision of tools to installation enterprises, and awareness-raising on the latest developments and emerging technologies, focusing on commercial and industrial air-conditioning (AC) applications. The activities proposed were funded at US $5.10/kg as they resembled those typically found in the servicing sector, with no specific strategy defined to ensure that the targeted applications would cease using HFCs following the technical assistance. The Executive Committee encouraged the Government to initiate, during the implementation period of stage I of the KIP, the development of a strategic approach to sustaining the phase-out of HFC consumption in the local assembly and installation subsector for commercial refrigeration, including consideration of incentives and policy measures for possible inclusion in stage II.

Countries with information but no specific activities

10. The following KIPs included some information on the local installation and assembly subsector; however, no concrete activity was proposed to address the consumption for the subsector:

(a) Angola: The installation and assembly subsector in Angola is widespread and demands a range of specialized skills, with equipment ranging from small-scale domestic units to larger

industrial installations. An assessment to estimate consumption data in this subsector has not yet been carried out. No specific activities were planned for the subsector in stage I of the KIP;

(b) Egypt: The KIP for Egypt identified HFC use in the subsector during the baseline years; however, a more detailed analysis was not available. Some enterprises were identified as assembling and installing HFC-based condensing units. Given that the priority of the KIP was given to the manufacturing sector conversion, no activities were approved for addressing these enterprises;

(c) Mongolia: HFC consumption in the local installation and assembly subsector in Mongolia is primarily associated with commercial and industrial refrigeration, including chillers, industrial refrigeration, cold storage and condensing units. As an exact amount could not be quantified during the survey, interventions for this subsector will be addressed under a later stage of the KIP; and

(d) Sri Lanka: The KIP for Sri Lanka indicated that the country experienced an expansion of local assembly and installation in various RAC applications in 2021 and 2022 due to import restrictions on finished/charged RAC equipment. At least 13 enterprises manufacture and/or assemble HFC-based commercial and industrial refrigeration equipment, mainly using R-404A and HFC-134a. Detailed estimates of HFC consumption in these applications are not available. No specific activities were planned for the subsector in stage I of the KIP.

Information collected through bilateral and implementing agencies

11. To prepare the present document, the Secretariat consulted bilateral and implementing agencies on examples and challenges encountered in data collection, identification of the subsector, development of registries of installations and identified needs for assistance distinct from that provided for the servicing sector. The following summarizes the key findings from questionnaire responses and discussions at the inter-agency coordination meeting.

Challenges in data collection

12. The following challenges related data collection were identified:

(a) Classification ambiguity: The lack of clarity on the scope of the subsector makes it difficult to classify consumption correctly, as some manufacturing and servicing enterprises also assemble and install new systems, and not all RAC installations belong to this subsector (e.g., split AC units);

(b) Lack of baseline data: Many countries do not have reliable data on equipment assembled or charged onsite, as end-users do not keep detailed logbooks;

(c) Absence of tracking registry: There is no system to monitor refrigerant charging during installation or to track assembled equipment with the exception of a few countries in the Europe and Central Asia region. The amount provided to the KIPs for the low-volume-consuming countries do not provide sufficient opportunity to pursue more accurate registry and data collection systems that are also acceptable to enterprises; and

(d) Sector fragmentation and task overlap: The subsector consists of numerous enterprises and contractors of different sizes and types (designers, installers, contractors, components suppliers that design and install, servicing enterprises that also design and assemble, manufacturers that also design and install tailored equipment) geographically dispersed and

difficult to be grouped into a single category. In addition, some enterprises in the subsector also service installed equipment, making it difficult to distinguish whether refrigerants are used for maintenance or for new installations.

Approaches to data collection and better identification of the subsector

13. Bilateral and implementing agencies have supported Article 5 countries in data collection and better identifying the subsector through the following approaches:

(a) Leveraging existing programmes by collecting data and connecting with installers and assemblers through activities under the HCFC phase-out management plans, KIPs and institutional strengthening projects;

(b) Collaborating with national statistics offices and sector authorities conducting top-down inventory surveys;

(c) Conducting bottom-up surveys during the KIP preparation phase; and

(d) Using import licensing databases to capture declared uses of HFCs and other environmental registries.

Needs for assistance beyond the servicing sector

14. Bilateral and implementing agencies identified the following reasons why assistance provided to the subsector differs from what is being provided to the servicing sector.

(a) Equipment design, commissioning procedures, initial charging, components choice, and the execution of leak-tight assembly and installation practices differ from maintenance and repair work in the servicing sector;

(b) Installers require specific safety training, tools and clear protocols for handling and charging systems that use flammable, toxic or high-pressure refrigerants; and

(c) For enterprises that undertake system assembling and prototype development, support is required in areas such as equipment design, plant adaptations, energy efficiency improvements, and establishing safe partial-charging procedures during factory testing.

Secretariat's observations

15. Based on the analysis of information available in 83 approved KIPs and the information received from bilateral and implementing agencies, the following observations are made:

(a) Many countries still face challenges in clearly defining this subsector and collecting relevant data on HFC consumption, covered applications, and the types of enterprises involved. Several countries have included studies, surveys or awareness raising activities in their stage I KIPs to enable data collection. The Secretariat highlights the importance of bilateral and implementing agencies continuing to provide technical assistance to help countries better understand this subsector and establish systems and registries for effective data collection and consumption monitoring;

(b) Once the consumption in the local installation and assembly subsector is identified, it is important to report it consistently in the country programme reporting, especially for countries that are considering a specific activity for this subsector. From 2022 to 2024,

three countries reported such consumption under "other" and specified the subsector in the remarks column;

(c) Several countries have started to establish registries of equipment installed in the local installation and assembly sector. The Secretariat considers such equipment registries to be a useful instrument, as they can help countries understand the types of equipment installed, the types of enterprises providing that service, and which refrigerants are being used, thereby enabling countries to make more informed interventions to support the HFC phase-down;

(d) As observed in the previous analysis[4] and the projects submitted so far, given the wide variety of RAC applications in the local installation and assembly subsector, it would not be possible for Article 5 countries to address the entire subsector at once. Countries may therefore consider adopting a staged approach and implementing a sector- or application-specific phase-down strategy, prioritising applications where low-GWP technologies are already available, followed by policy and regulatory measures to ensure the sustainability of the HFC phase-down in those applications;

(e) Several countries have implemented technology demonstration projects in the commercial and industrial RAC sectors using low-GWP technologies such as CO_2, R-290, and NH_3 in single-stage or cascade systems. These demonstrations have provided valuable opportunities to connect with end users who own similar equipment and are seeking conversion solutions, as well as with potential installers and assemblers who offer related services. Through training and awareness-raising activities conducted as part of each demonstration project, these stakeholders can help scale up the replication of the technologies demonstrated;

(f) Despite the lack of concrete data, reliable methods to measure impact and mechanisms for monitoring sustainability in most countries still pose significant challenges for planning interventions; developing equipment registries to collect information on the type of equipment installed, refrigerants used and installers and assemblers can help to better understand the subsector. Meanwhile, activities, such as technology demonstration, training of assemblers and installers and leakage control for large equipment would provide opportunities to collect information and accelerate the transition of the sector to low-GWP alternatives; and

(g) As mentioned in document UNEP/OzL.Pro/ExCom/98/60 on the strategic approaches for the Kigali Amendment implementation, the Secretariat identified as an opportunity area for such approaches accelerating the adoption of low-GWP, energy-efficient technologies in manufacturing through complementary measures to strengthen supply chains, improve market intelligence, support small and medium-sized enterprises, and extend attention to the local installation and assembly subsector. Given the wide range of equipment and applications in commercial and industrial refrigeration and commercial AC, many of which require tailored solutions, attention should be extended beyond manufacturers to the local installation and assembly subsector so that they can design, supply and install energy-efficient systems based on low-GWP technologies. The Secretariat considers that additional information collected on this subsector could be incorporated into the assessment

[4] UNEP/OzL.Pro/ExCom/93/99, UNEP/OzL.Pro/ExCom/95/89.

proposed in document UNEP/OzL.Pro/ExCom/98/60 (paragraph 92(b)), [5] should the Executive Committee request such an assessment.

Recommendation

16. The Executive Committee may wish:

(a) To note the update on the local installation and assembly subsector in line with decision 95/89(c) contained in document UNEP/OzL.Pro/ExCom/98/58;

(b) To continue considering projects in the local installation and assembly subsector in the context of Kigali HFC implementation plans (KIPs) on a case-by-case basis, in line with decision 95/89(b); and

(c) To request the Secretariat to continue collecting information on the local installation and assembly subsector provided by Article 5 countries in their KIPs and to provide, at the 101st meeting, an update on the sector, as part of the assessment proposed in document UNEP/OzL.Pro/ExCom/98/60, paragraph 92(b)), should the Executive Committee request such an assessment.

[5] Agenda item 13: Paper regarding strategic approaches to Kigali Amendment implementation in Article 5 countries pursuant to elements referred to in decision 96/57.