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# PAPER REGARDING STRATEGIC APPROACHES TO KIGALI AMENDMENT IMPLEMENTATION IN ARTICLE 5 COUNTRIES PURSUANT TO ELEMENTS REFERRED TO IN DECISION 96/57

## Executive summary

1. The present document was prepared pursuant to decision 96/57 and responds to the Executive Committee's request for a paper on strategic approaches to Kigali Amendment implementation in Article 5 countries. It identifies key gaps and barriers in current implementation and proposes five strategic opportunity areas for the Committee's consideration.

2. Notwithstanding meaningful progress achieved through stage I of the Kigali HFC implementation plans (KIPs), significant gaps remain across four interconnected areas. Data systems are weak, with limited sector-level disaggregation of HFC consumption, scarce monitoring tools, and insufficient linkage between refrigerant data and economic sectors, constraining evidence-based policy design. Technical infrastructure and technology transition face uneven challenges related to access to low-global-warming-potential (GWP) refrigerants and components, limited readiness of supply chains, inadequate safety standards for mildly flammable and flammable refrigerants, and incomplete technician training and certification systems. Adoption by end users is hampered by high upfront costs, elevated cost of capital, low awareness of the benefits of low-GWP and energy-efficient technologies, and limited availability of tailored financial products. Policy and institutional coherence are undermined by inconsistent minimum energy performance standards (MEPS), fragmented inter-ministerial coordination, and limited testing capacity.

3. In response to these gaps, the Secretariat has identified five strategic opportunity areas. First, strengthening of the data systems and market intelligence would enable more targeted interventions through standardized methodologies, reporting requirements, digital and artificial intelligence (AI)-based monitoring tools, and enhanced national capacities in statistical analysis. Second, accelerating the adoption of low-GWP, energy-efficient technologies in manufacturing requires complementary measures to strengthen supply chains, improve market intelligence, support small and medium-sized enterprises (SMEs), and extend attention to the local installation and assembly subsector. Third, transforming support to the refrigeration

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

and air-conditioning (RAC) servicing sector calls for a shift from substance-driven to market-driven, application-based approaches structured around workforce, service providers, end users, and institutional stakeholders, while integrating digital tools, AI-assisted diagnostics, and more robust life-cycle refrigerant management (LRM) frameworks. Fourth, scaling up end-user engagement and diversifying funding modalities beyond grant funding, through revolving funds, concessional credit lines, blended finance structures, and performance-based instruments, is essential to moving from isolated pilot projects toward broader sector-level transformation. Fifth, integrating energy efficiency as part of the refrigerant transition and aligning KIPs with national cooling action plans (NCAPs) and energy-efficiency policies would maximize co-benefits, provided that inter-ministerial coordination between national ozone units (NOUs) and energy authorities is strengthened.

4. The document further highlights regional cooperation as a multiplier, noting opportunities for harmonizing standards, sharing reclamation infrastructure, where feasible, combating illegal trade, and establishing regional monitoring platforms. It also proposes that stage II of the KIPs adopt a country programme approach, integrating the five opportunity areas within a coherent national framework while maintaining compliance with Montreal Protocol control measures as the primary, non-negotiable objective.

5. The Executive Committee may wish to note document UNEP/OzL.Pro/ExCom/98/60, and to request the Secretariat to prepare two assessments: for the 101st meeting, on activities to inform future KIPs, including RAC servicing-sector needs for transitioning to low-GWP alternatives; the feasibility of integrating non-manufacturing energy-efficiency activities into future KIP stages based on lessons from projects under decisions 89/6 and 91/65; and elements for preparing future KIP stages under a country programme approach; and for the 102nd meeting, on the activities, financial modalities, and institutional arrangements for scaled-up end-user assistance in future KIP stages, including criteria for selecting priority sectors.

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**Background**

6. At the 93rd meeting of the Executive Committee, two members noted that the Kigali Amendment had added several new aspects to the implementation of the Montreal Protocol, including with regard to energy efficiency and the disposal of refrigerants at end of life; that some activity-based costs consequently needed to be revisited; that rapid decisions were required in order not to miss out on important opportunities to transition to sustainable technologies; that cooling had been recognized as a development need in many countries; that countries would have to adopt a holistic approach to cooling issues; and that the Multilateral Fund (MLF) needed to reorient its project implementation and programming modalities to address those and other issues effectively.

7. Accordingly, the Executive Committee inter alia requested the Secretariat to organize a dedicated half-day session prior to the 94th meeting for an informal discussion on strategic approaches to Kigali Amendment implementation, including issues related to policies and regulations, cooling and phase-down strategies, energy efficiency, sector approaches and LRM (decision 93/103).

8. In the margins of the 94th, 95th and 96th meetings, informal half-day sessions were held on strategic approaches to Kigali Amendment implementation for sustainable HFC phase-down and the contribution of the MLF activities to sustainable cooling, with participation from Executive Committee members, co-opted members, representatives of the bilateral and implementing agencies, the representative of the European Union and its 27 member states, the Ozone Secretariat and other stakeholders.[2]

[2] Document UNEP/OzL.Pro/ExCom/94/63 describes how HCFC phase-out and HFC phase-down activities supported by the Multilateral Fund might contribute to sustainable cooling.

9. At the 96th meeting, the Executive Committee considered the outcomes of half-day sessions[3] and requested the Secretariat, in consultation with bilateral and implementing agencies, to prepare a paper, for the consideration of the Executive Committee at its 98th meeting, regarding strategic approaches for Article 5 countries relating to:

(a) Technical infrastructure, capacities, policy measures, regional cooperation, and data collection and management related to market dynamics and consumption trends in different applications and emerging sectors, related to transitioning to low-GWP refrigerants and blends, taking into account a holistic approach for sustained HFC phase-down, enhanced energy efficiency and promoting sustainable cooling; and

(b) The capacity of end users to adopt sustainable cooling technologies and promote innovation in the RAC service sector, considering digital and AI-assisted tools.[4]

10. Accordingly, the Secretariat prepared the present document, divided into the following sections:

I. The context for a strategic approach

II. Where we stand: Achievements and limitations of stage I of Kigali HFC implementation plans

III. Assessment of key gaps and barriers

IV. Secretariat's observations:

IV.1 Strategic opportunities and five areas for action

IV.2 Regional cooperation as a multiplier

IV.3 Implications for the design of stage II of the Kigali HFC implementation plans

V. Recommendation

## I. The context for a strategic approach

11. As Article 5 countries begin implementing their KIPs to phase down HFC consumption, the context in which those plans must operate is changing rapidly. Several RAC-intensive sectors are expanding due to increased access to comfort cooling (e.g., residential and commercial air-conditioning (AC)), growing food and health cold chains, and the proliferation of data centres among other factors. If not properly managed, this growth in cooling demand will increase HFC consumption, raise energy use, and generate greater direct and indirect greenhouse gas emissions.[5]

12. In many Article 5 countries, rising cooling demand is compounding wider pressures on electricity systems. Governments increasingly prioritise curbing energy demand growth and managing peak loads as urgently as the refrigerant transition itself. The HFC phase-down offers a practical and timely entry point for delivering large-scale energy savings in RAC with technology transitions that are already planned, with financing and technical assistance available, and policy attention focused on the sectors. Aligning Kigali implementation with energy efficiency policies and NCAPs could enable countries to capture multiple benefits through coordinated interventions.

[3] Documents UNEP/OzL.Pro/ExCom/96/63 and Add.1 present summary of the outcomes of the three half-day sessions.
[4] Decision 96/57
[5] According to the Global Cooling Watch report 2025 (Cool Coalition), between 2022 and 2050 the global stock of cooling equipment will be more than triple.

13. The lessons from previously achieved phase-out of ozone-depleting substances (ODSs) under the Montreal Protocol are instructive. Earlier phases were largely focused on refrigerant replacement without a consistent approach towards addressing energy efficiency, avoidance of emissions through proper LRM including disposal of unusable refrigerants, and contribution to long-term market transformation. This focus, while effective in phasing out ODSs, inadvertently resulted in the adoption of high-GWP HFCs by many end users, slower transition to sustainable low-GWP technologies, missed opportunities to establish and upgrade the MEPS and, in some countries, did not reduce the avoidable refrigerant emissions due to weak LRM systems and the absence of viable business models for reclaiming and/or disposing of unwanted refrigerants.

14. The Kigali Amendment provides Article 5 countries with an opportunity to build on previous experience and move toward sustainable cooling. The KIPs can be designed not merely as refrigerant transition projects, but as comprehensive strategies centred on compliance for sustained HFC phase-down, enhanced energy efficiency, and sustainable cooling sector development. The Montreal Protocol's institutional capacity and the MLF financing mechanisms offer a good starting point to support this broader agenda. While MLF resources are limited relative to the overall size of the cooling market,[6] their impact can be amplified into a catalytic role through mobilising complementary financing, enabling policy reform and supporting market transformation while retaining direct funding for compliance-related activities. The recent decision 95/87(c) on a revolving fund modality for energy-efficiency projects addressing end users is one such example, as it mobilizes additional financing through collaboration with national financial institutions to reach a larger number of beneficiaries.

15. Current Executive Committee decisions and ongoing discussions on energy-efficiency pilot projects, revolving funds for end users, the manufacturing operational framework for energy efficiency, local installation and assembly, and inventories of unwanted refrigerants and preparation of national strategies to handle them, have paved the way for a more strategic approach to Kigali Amendment implementation. These activities are currently formulated, approved and implemented largely on a case-by-case basis or through stand-alone projects across multiple funding windows, which may limit scalability in future KIP stages and not adequately support countries seeking to develop a coherent, long-term national vision for a comprehensive and integrated implementation of the Kigali Amendment.

## II. Where we stand: Achievements and limitations of stage I of Kigali HFC implementation plans

16. Through the preparation and early implementation of stage I of the KIPs, Article 5 countries have gained an initial understanding of their inventories of HFC-based equipment in relevant sectors, as well as the types of HFCs used and potential alternative technologies and timelines for transitioning to lower- or low-GWP technologies. Stage I of KIPs have proposed initial actions to curb HFC consumption growth and start HFC reductions from the baseline, or sometimes current, consumption levels.

17. During stage I of their KIPs, Article 5 countries were cautious in proposing phase-down targets beyond the Montreal Protocol control measures for several reasons, including inter alia substantial uncertainty regarding their HFC consumption and market needs, an issue that was exacerbated by fluctuations caused by the COVID-19 pandemic during the baseline years and large increases in imports in some countries in specific years, the ongoing substitution of HCFCs by HFCs in the market, the lack of proper customs classifications of controlled substances, and the short time between the ratification of the Kigali Amendment and its first control measure. Unlike the acceleration of the HCFC phase-out, where

[6] According to the 2025 International Institute of Refrigeration technical brief titled "The Role of Refrigeration in the Global Economy", in 2024 there were approximately 5.4 billion pieces of refrigeration equipment in operation worldwide, including 2.9 billion stationary and mobile AC units and 2.2 billion domestic refrigerators and freezers. Global annual sales of refrigeration equipment total over US $300 billion, excluding the installation and maintenance costs. According to an analysis by the International Finance Corporation and the UNEP-led Cool Coalition, in 2023, developing countries accounted for 40 per cent of the global market for stationary and mobile AC and residential and non-residential refrigeration applications.

countries had already controlled and reported HCFC consumption for more than 10 years prior to the preparation of the HCFC phase-out management plans (HPMPs), group 1 countries had very limited time between the start of HFC control measures and the preparation of country programme and Article 7 data reports that include HFC consumption, and KIP design. In addition, HFCs comprise a larger number of substances and blends, and baseline years distortions created uncertainty regarding the level of HFCs required to meet market needs. Consequently, the preparation of stage I of the KIPs focused on identifying those data gaps, creating systems for data recording and collection, including the establishment and improvements of licensing and quota systems. Some Article 5 countries did not plan the longer-term strategy of their KIPs in detail, even though a general idea of that strategy was presented in their stage I plans.

18. Because funding associated with stage I of the KIPs was primarily linked to meeting the first 10 per cent reduction from the HFC baseline, Article 5 countries focused on activities that could be delivered with available funding while still managing the final stages of total HCFC phase-out. Countries generally did not opt to reduce HFC consumption in advance of Montreal Protocol targets[7] and the additional incentive funding provided for low-volume-consuming (LVC) countries to reduce 10 per cent of their HFC consumption[8] rather than the HFC baseline was rarely used, suggesting that it did not constitute an effective incentive for more ambitious planning. Several final stages of HPMPs and stage I of KIPs that could have been submitted together were not, as it had been challenging for the NOUs and the implementing and bilateral agencies to work on both proposals at the same time.

19. For the remaining implementation period of stage I of the KIPs and in preparation for stage II for group 1 countries and stage I of the KIPs for group 2 countries, there is an opportunity to develop a more strategic and integrated approach. This would require gaining a better understanding of HFC-using sectors, including technologies in use and energy consumption, equipment stocks, available alternatives and potential energy gains, market trends, and rapidly growing or particularly challenging applications/sectors. Such an approach would allow for focused action in high-impact RAC end-user economic sectors while enhancing energy efficiency and promoting sustainable cooling. The preparation of such a strategy would require a different approach to KIP design, including better data from key HFC-using economy sectors, going beyond equipment-based assessment, and a deeper understanding of local market conditions, economic policies, growth projections affecting HFC-using sectors, and choosing plans that can lead countries to a smooth and systematic sustainable cooling trajectory at a minimum cost to the industry and consumers.

## III. Assessment of key gaps and barriers

20. The identified gaps and barriers on strategic approaches to Kigali Amendment implementation are presented in the four following categories[9]:

### A. Data collection and market dynamics

21. Data-related limitations in the strategic approaches to Kigali Amendment implementation include deficiencies in HFC baseline data and in the disaggregation of HFC use by sector and application. Monitoring tools to regularly update data, after the KIPs are prepared, are lacking. Information on and knowledge of calculating refrigerant leakage rates for different applications are limited, as is national data collection on the energy-efficiency performance of RAC equipment. In many countries, consumption data

[7] Decision 92/44 establishes that proposals for projects that reduced HFC consumption in advance of Montreal Protocol targets could be considered on a case-by-case basis for countries that had a strong national level of commitment in place to support such reductions.

[8] Decision 92/37(b)(ii) provides 20 per cent additional funding for countries with average HFC consumption in servicing in baseline years up to 360 mt committing to reduce consumption by 10 per cent of the average HFC consumption in the baseline years instead of 10 per cent of the HFC baseline.

[9] The assessment draws on the three informal half-day sessions on strategic approaches to Kigali Amendment implementation, consultations with experts and industry associations, input from implementing and bilateral agencies, and discussions at the MLF's inter-agency coordination meetings held in September 2025 and March 2026.

estimates are based on applications and not properly linked to economic sectors such as retail, tourism, health, agrifood, urban comfort cooling, and other specific uses. Most countries do not carry out market analyses or trend projections to develop advanced scenario models for different consuming sectors, which limits their capacity to identify HFC phase-down and energy-efficiency opportunities and constrains the design of evidence-based policy frameworks for different sectors. So far, policies in stage I of the KIPs have largely focused on application-specific bans rather than broader strategic measures enabling long-term phase-down.

B. Technical infrastructure and technology transition

22. The challenges and limitations of technology transition vary among countries based on their size, level of industrial development, proximity to other markets offering new technologies, availability of local expertise covering different cooling segments, and existence of local RAC manufacturing.

*Refrigeration and air-conditioning manufacturing sector*

23. Only 16 out of 85 countries with approved KIPs have included activities to reduce HFC consumption in manufacturing sectors where alternatives are available and transition is possible, mostly in domestic and stand-alone commercial refrigeration, and in some cases in residential AC.

24. In countries with local manufacturing of RAC equipment, a key challenge in transitioning to low-GWP alternatives is access to refrigerants and compatible components. While the supply is adequate for some applications (e.g., domestic and stand-alone commercial refrigeration), supply chains remain weak for others, with limited and unreliable availability of equipment, refrigerants and spare parts in many countries. SMEs face significant challenges in adopting new technologies, including limited technical and financial capacity and market-related constraints such as reduced bargaining power and lower manufacturing volumes. Article 5 countries need to gain a better understanding of the global and regional market trends when selecting and adopting technologies. Regular access to updated market information through implementing agencies, experts and refrigeration associations is critical to designing realistic and implementable transition strategies.

25. In large commercial and industrial refrigeration, key challenges include the large variety of equipment and applications, which require multiple solutions, and the need to build technical expertise to design and manufacture systems using low-GWP technologies based on refrigerants that are flammable, toxic or operating at higher pressure. This capacity gap also affects the local installation and assembly subsector, which supplies a significant share of these systems.

26. A common challenge for both manufacturing and importing countries (including most LVC countries) is ensuring adequate safety infrastructure and training for installing and servicing RAC equipment using A2L and A3 refrigerants.[10] Standards and regulations for transport, storage, installation, servicing, and decommissioning need to be updated, along with safety codes and building regulations. Many Article 5 countries are starting to address this through technical assistance in stage I of their KIPs. Energy-efficiency considerations should also be integrated into equipment manufacturing and import regulations, alongside awareness efforts to support end-user acceptance and uptake of energy-efficient, low-GWP technologies.

*Refrigeration and air-conditioning servicing sector*

27. Over the past 15 years, HPMP activities have built a foundation for technician training, certification in good servicing practices and the handling of low-GWP technologies in the RAC servicing sector. Building on this progress, further efforts could expand training coverage, which remains uneven among countries, and strengthen certification schemes, which are still recent or not fully operational or enforced. Recovery,

[10] A2L refrigerants are non-toxic, mildly flammable, and more energy-efficient (e.g., R-454A), while A3 refrigerants are natural, non-toxic, but highly flammable (e.g., R-290).

recycling and, where relevant, reclaim systems have been widely established, but some countries, especially smaller ones, lack the regulatory frameworks and business models needed to sustain these systems; further efforts are needed to support their long-term sustainability.

28. Key areas where continuous efforts are needed to facilitate the sustained adoption of low-GWP alternatives include ensuring that informal technicians are also covered by training, end-user awareness, standards' updates, and design of self-sustained LRM strategies.

29. AI-assisted and digital tools are developing rapidly, creating new opportunities to enhance service delivery, improve equipment reliability, and improve installations and workforce management. Their use in most Article 5 countries is still limited and largely untested. Only a few stage I of the KIPs have begun to address these opportunities. A more systematic assessment of available tools, materials and digital resources should be part of the preparation of the KIPs.

30. While support to the servicing sector has traditionally been substance-driven, the current context calls for a more consistent, market-driven approach. As it has already been proposed in several KIPs for large countries, training and certification should be linked to applications rather than substances or general good practices. End users should be supported in terms of quality, safety and efficiency, and institutional frameworks for servicing and end-of-life refrigerant management should be strengthened. Implementing agencies could also consider systematically identifying, adapting, and deploying the existing tools, training materials, and digital solutions in the implementation of their KIPs, based on the countries' assessment of their relevance for local conditions. Technical assistance activities under the KIPs could also facilitate and test the benefits of using AI-assisted and digital tools by end users to enable their wider adoption where those benefits are demonstrated.

### C. Adoption by end users

31. Activities in the servicing sector under the HPMPs and stage I of the KIPs have included pilot projects to demonstrate alternative technologies in specific applications where these alternatives need to be promoted and known by end users to be adopted. Lately, those projects have been contained in the KIPs or submitted separately as pilot projects under decision 91/65 given the energy-efficiency gains to be achieved. However, these activities are mostly based on specific opportunities identified in the timeline of stage I of the KIP rather than being part of a long-term strategy to promote technology transition in key user sectors.

32. The main barriers to adopting energy-efficient equipment based on low-GWP technologies by end users are high upfront costs and limited access to financing (discussed in more detail in the *Financing and cost-of-capital constraints* section below), combined with a low awareness of the benefits of low-GWP, energy-efficient technologies. Concerns about flammable refrigerants, limited availability of highly efficient equipment across countries and lack of supplier information further deter local suppliers who might not be prepared to serve this market yet. In installations requiring large investments, providers are reluctant to introduce new technologies that may pose uncertainty in terms of operation and after-sales service, thereby perpetuating the installed banks of HFC-based equipment.

33. Another critical challenge is limited consideration of cooling technologies at the building and infrastructure planning stage, particularly in urban planning and major projects' design except where developers prioritize environmental sustainability or seek certifications such as LEED[11] or other green building schemes. When buildings and infrastructure are planned without considering accessible renewable energy, district cooling potential, or passive cooling measures, opportunities to avoid future HFC lock-in may be lost. Once construction is underway, these choices are difficult to reverse. This systemic gap is not addressed in the KIPs.

[11] Leadership in Energy and Environmental Design

*Financing and cost-of-capital constraints*

34. A major barrier to the adoption of low-GWP, energy-efficient technologies is the limited availability of affordable financing for end users and SMEs. High upfront investment costs, combined with the high cost of capital in many Article 5 countries, significantly reduce the attractiveness of replacing the existing HFC-based equipment. Financial institutions often lack the tools, data, and confidence to lend against expected energy-efficiency gains, as savings are not systematically measured, verified, or recognized as a basis for credit worthiness. Cooling-related investments are perceived as high-risk due to limited performance data, uncertainty around technology reliability, and absence of guarantees or de-risking instruments.

35. These constraints are particularly acute for SMEs and commercial end users, who frequently face short payback expectations, limited collateral, and restricted access to concessional credit. The lack of dedicated financial products for sustainable cooling, such as green credit lines, performance-based lending, or risk-sharing mechanisms, further slows down market uptake. Without addressing these financing barriers, the transition to low-GWP, energy-efficient technologies will remain limited to isolated pilots, and the potential for large-scale HFC reduction and energy savings at end-user level will not be realized.

D. Policy and institutional coherence

36. The identified gaps preventing the proper integration of energy efficiency in HFC phase-down include the inconsistent development and enforcement of MEPS among Article 5 countries, the need to strengthen the regulatory basis for measuring, reporting and enhancing energy efficiency in RAC applications, and the limited testing capacity for energy efficiency.

37. Another challenge is in relation to limiting energy efficiency to savings associated to upscaling the energy design levels or promoting energy-efficient service practices. Expanding the scope of energy efficiency to consider cooling loads' reduction, utilization of renewable energy, and other related measures would expand the scope of integration to both maximize energy efficiency and reduce consumption of controlled substances.

38. An additional consideration in integrating energy efficiency into HFC phase-down is the need for stronger coordination among government institutions responsible for the Montreal Protocol and energy efficiency. This is necessary to ensure that low-GWP alternative technologies introduced during the phase-down also deliver energy efficiency gains and that those gains can be properly measured.

39. Table 1 summarizes the key barriers and their implication for a strategic approach to the implementation of the Kigali Amendment.

**Table 1: Key barriers and implications for a strategic approach**

| Area | Key barriers | Implications for strategic approach |
|---|---|---|
| Data and monitoring | Weak HFC baseline and sector-level data; limited monitoring tools; scarce data on energy performance and economic sector transition plans | Limited identification of HFC phase-down and energy-efficiency opportunities; weakened policy design and reduced impact |
| Manufacturing | Limited access to low-GWP refrigerants/ components; poor market intelligence; gaps in standards, safety and energy-efficiency regulations | Constrains posed to an orderly technological transition and to the adoption of best energy-efficiency options |
| Servicing sector | Uneven training, certification and tooling; lack of standards, safety infrastructure and LRM capacity; weak market information | Restrictions on the safe and timely uptake of energy-efficient, low-GWP alternative technologies; undermined recovery, recycling and reclaim of controlled refrigerants |

| Area | Key barriers | Implications for strategic approach |
|---|---|---|
| End of life | Lack of LRM policies and systems | Increased refrigerant emissions and undermined refrigerant recovery potential |
| End users | Low awareness of benefits; safety concerns; limited access to efficient low-GWP products; poor supplier information;<br>*Finance:* High upfront costs; limited access to credit; high cost of capital; lack of financial products tailored to cooling; weak bankability of energy-efficiency investments; limited data for underwriting | Constrains to the adoption of low-GWP, energy-efficient technologies; slower market transformation; required development of alternative financing modalities and stronger engagement with financial institutions |
| Energy efficiency | Inconsistent/weak MEPS; limited testing and enforcement capacity; policy focuses separately on refrigerant phase-out and energy efficiency without integration | Energy-efficiency gains not sustained alongside HFC phase-down |
| Policy | Fragmented and uncoordinated policies | Reduced strategic effectiveness of transition to energy-efficient, low-GWP technologies; non-alignment with NCAPs and nationally determined contributions |
| Institutions and finance | Limited coordination between Montreal Protocol and energy institutions; weak capacity to measure impact; scope of activities may extend beyond the NOU's area of work | Reduced synergies between HFC phase-down and energy-efficiency improvements; difficulties in measuring energy-efficiency results; required institutional adjustments |

## IV. Observations by the Secretariat

### IV.1 Strategic opportunities and five areas for action

40. The following five strategic opportunity areas result from the previous analysis undertaken for the consideration by the Executive Committee. Taken together, they could constitute the building blocks of a strategic approach to Kigali Amendment implementation that is more comprehensive, measurable, and better aligned with national priorities than the current project-by-project model.

Opportunity 1: Strengthening data systems and market intelligence

41. During the KIP implementation, Article 5 countries, with support from implementing agencies, could consider a range of measures to improve regular data recording and maintenance. The initial KIP surveys should serve as the foundation for data collection and should be regularly maintained and updated. Countries would need to adopt standardized methodologies and policies for the routine updating of data on HFC consumption and equipment inventories, as well as strengthen their existing mechanisms to capture market dynamics and consumption trends. Sector-level disaggregation should be progressively refined, and national databases should be adapted to meet these evolving requirements.

42. Additional measures to enhance regular data collection and management[12] include establishing mandatory reporting requirements on refrigerant use for major end users, strengthening technician registries and certification systems, banning disposable cylinders, mandatory refrigerant tracking and reporting

[12] An example of available resources for data management is the Kigali Sim, recently developed by the University of California, Berkeley in collaboration with the MLF Secretariat. It is an interactive, AI-supported open-source tool built to support users to enter country-level data and quickly simulate policies that will lead to compliance with the Kigali Amendment.

frameworks and introducing traceability instruments such as digital logbooks and QR-coded cylinders.[13] This would also allow control of quality of refrigerants entering the markets.

43. Servicing-related data, including refrigerant leakage and servicing consumption, could be systematically integrated. Digital and AI-based monitoring tools, such as mobile platforms for servicing data collection, or sensor-based systems for equipment to continuously measure temperature, pressure, electricity consumption and refrigerant levels and generate data for performance management, maintenance, and compliance, could further support data recording, verification, and long-term maintenance.

44. The implementation of an enhanced data recording and maintenance system will require strengthening national capacities in statistical analysis and forecasting, improving data governance frameworks, including safeguards for data privacy and incentives for data sharing. Standardizing the data and information with local statistical requirements would also facilitate and ease the reporting and share of data with different local entities.[14]

45. Capacity building is also required to improve data collection, data management and monitoring on energy efficiency performance, including tracking co-benefits like energy savings and emission reductions. This should include engaging local industry/trade groups, professional associations, academic institutes to build capacities of local experts in relation to Montrel Protocol data needs.

46. Building on experience from the preparation and implementation of stage I of the KIPs in group 1 countries, bilateral and implementing agencies could update their data-collection methodologies to meet the information needs of stage II (or stage I for group 2 countries). This will require improved understanding of economic and energy-efficiency policies in key sectors, including emerging ones, equipment in operation and energy consumption patterns, accessible technologies and the potential for achievable energy gains. Strengthening the ability of Article 5 countries to collect and manage this information will result in the design of more strategic and targeted interventions under stage II of the KIPs.

Opportunity 2: Accelerated adoption of low-GWP, energy-efficient technologies in manufacturing

47. MLF assistance to eligible manufacturing enterprises has proven effective in supporting technology transitions and remains a key strength of support to Article 5 countries. This assistance should continue, with additional measures to address the issues identified in section III.B to transition to low-GWP, energy-efficient technologies that promote sustainable cooling.

48. Complementary actions could be considered to improve access to refrigerants and components in several applications, strengthen the regional and local supply chains, and expand access to market information to support better decision-making and prioritization of sectors and applications where alternative technologies are available, and transition is technically and economically feasible. Together, these actions could support an orderly transition across manufacturing sectors, taking into account technology accessibility and the readiness of specific users.

49. The Executive Committee has adopted measures to address the specific needs of SMEs. Further targeted support could strengthen their effective participation in the transition and facilitate timely implementation of transition plans. This could include specialized technical assistance on product design, manufacturing processes, and safe handling of low-GWP alternatives in manufacturing and servicing.

[13] Blockchain-based refrigerant traceability is another example, but still experimental. Several non-Article 5 countries are prioritizing digital traceability first. Blockchain is considered a next-step innovation.

[14] Partially standardizing HFC data with the International Standard Industrial Classification (ISIC), which classifies economic activities (e.g., manufacturing of refrigerators, food processing, transport), may be feasible as a step toward linking HFC consumption to economic sectors at an aggregated level. For example, “commercial refrigeration” relates to ISIC wholesale and retail trade, while “industrial refrigeration” relates to food processing, among others.

50. 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 extend 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.[15] As these systems will support the growing cold chain and comfort cooling infrastructure in many Article 5 countries, special attention should also be given to establishing safety infrastructure and to developing, promulgating, and adopting standards for handling flammable or toxic technologies.

51. A comprehensive sectoral strategy for manufacturing-specific applications is a critical enabler of the broader transition to low-GWP, energy-efficient technologies. By integrating policy, technical, and capacity-building components into a single coherent framework, such a strategy would provide all manufacturing enterprises, large and small alike, with clear direction on technology adoption pathways. This clarity is essential for enabling cost-effective planning and investment decisions, reducing uncertainty across the supply chain, and ensuring that no enterprise is left behind in the transition to alternatives.

52. Ultimately, the success of this transition depends on strong coordination across relevant national authorities, including those responsible for energy efficiency. By aligning regulatory frameworks, market signals, and capacity-building efforts, governments can create the conditions necessary for all stakeholders to meet national phase-out targets effectively and on time. Proactive engagement between industry and policymakers will be essential to ensure that sectoral strategies remain responsive to evolving technical and market realities.

Opportunity 3: Transforming support to the refrigeration and air-conditioning servicing sector

53. Implementation experience in the servicing sector suggests that there may be an opportunity to redesign support, so it is more effective, measurable, market-driven, and sustainable. One approach would be to restructure interventions around four key stakeholder groups, workforce (individuals providing servicing and installation), service providers (contractors), end users, and institutions, and anchoring them in sector-wide needs assessments that connect applications with user types, operational requirements, market practices, and the economics of servicing different equipment categories.

54. Technician training could be refocused to be market-driven aligned with specific applications and target groups rather than substance-driven. Manufacturers' after-sales services, contractors, and enterprises with in-house service capacity must be engaged as active participants in promoting good servicing practices and low-GWP technologies. End users and their suppliers play a critical role in creating the market conditions for quality servicing. The institutional dimension is critical to normalise and sustain good servicing practices and adoption of low-GWP technologies, and to create a level playing field in the market.

55. To promote consistency in technician training and certification across countries, and to ensure minimum competencies required to safely work with low-GWP technologies while maintaining energy efficiency, bilateral and implementing agencies could develop global or regional modules that can be adapted nationally, rather than creating new curricula for each country. This would reduce duplication and help ensure comparable training quality, as core competencies are largely determined by the equipment serviced rather than national context. Regionally recognized certification schemes could also support workforce mobility and standardization, where relevant. National technical and research institutes and international or regional RAC associations could support the development, adaptation, and dissemination of these frameworks.

56. More effective and self-sustaining LRM strategies will require the establishment of robust regulatory frameworks tailored to national circumstances and consistent with applicable multilateral

[15] The Executive Committee is considering at the present meeting an update on the local installation and assembly subsector (decision 95/89(c)), discussed in document UNEP/OzL.Pro/ExCom/98/58.

environmental agreements. These should clearly define roles and responsibilities across all stakeholders, ensure private-sector participation in design and implementation, identify appropriate infrastructure needs, address the economic and logistical requirements of LRM operations, secure sustainable financing sources, and incorporate stakeholder feedback mechanisms to support ongoing policy refinement. This may require integrated business models and integrated regulatory frameworks for handling end-of-life management of refrigerants and equipment. The matter is currently being considered by the Executive Committee,[16] and the outcome of these discussions could also be integrated in the strategic approaches for Kigali Amendment implementation.

57. Support for the servicing sector should also strengthen local supply chains by improving access to alternative refrigerants, equipment, and components. This could include linking stakeholders with technology suppliers, distributors, and ongoing or future pilot projects to facilitate access to demonstrated solutions and support supply-chain development. Such efforts have so far been limited. Engaging equipment and component distributors can accelerate the availability and uptake of alternative technologies, influence end-user decisions, and provide platforms for complementary measures such as low-cost financing for energy-efficient low-GWP equipment, and consumer awareness.

58. In relation to innovative approaches in the RAC service sector, considering digital and AI-assisted tools, with the advancement of AI and expansion of monitoring products accessible to a wide range of end users,[17] there is a need to assess opportunities to further integrate such tools in servicing sector activities for enhancing leaks and faults detection, minimize emissions, avoid unnecessary power consumption, and engage end users in the process of smart operation of their investments.

59. The use of these tools in training/certification platforms could accelerate technology uptake and safe deployment of alternatives. To promote innovation in the RAC servicing sector bilateral and implementing agencies are already considering in some countries support for technical schools to incorporate training on AI applications, digital controls, and servicing practices that maintain or enhance energy-efficiency efficiency. This could include virtual and augmented reality training to improve technician safety and skills, digital platforms linking end users with certified technicians, and support for new skilled jobs in digital and sustainable cooling services. Other initiatives include mobile applications for leak reporting, AI-assisted diagnostics, digital technician IDs linked to certification systems, and the promotion of business models based on AI-driven predictive maintenance to optimize system performance, prevent failures, and improve energy efficiency.

60. Based on the information provided in this section, the Executive Committee may wish to consider requesting the Secretariat to prepare an assessment of activities required and not currently implemented in the refrigeration servicing sector to transition to low-GWP alternatives, considering an integrated approach for sustained HFC phase-down, enhanced energy efficiency, linkages to LRM strategies and promoting sustainable cooling.

[16] The Secretariat was requested inter alia to prepare, for the 100th meeting, a document on funding modalities, including elements for draft cost guidelines to implement plans developed in accordance with decision 91/66, with a view to considering the establishment of a funding window in line with decision XXXV/11 of the Thirty-Fifth Meeting of the Parties (decision 97/89).

[17] For example, BACnet (Building Automation and Control Networks) is a standardized, open communication protocol designed for building automation, enabling interoperability between devices from different manufacturers. BACnet and remote operation and monitoring of large installations has so far been limited to high-end products and larger size investment with minimal support to medium and small-scale applications and service providers.

Opportunity 4: Scaling up end-user engagement and alternative funding modalities

*Scaling up*

61. The HPMPs, KIPs and energy efficiency pilots have included projects to demonstrate energy efficient equipment based on low-GWP technologies in a limited number of end users. The report on end-user incentive schemes funded under the approved HPMPs[18] indicated that technology demonstrations have generally been successful from the technical perspective, while replicability has generally been limited, subject to the specific technology selected, application and local markets circumstances. However, the scale-up of end users' equipment replacement often takes place outside of the scope of the MLF.

62. Unlike the manufacturing investment projects, where cost-effectiveness is assessed per kilogram phased out, end-user projects have been funded within the overall servicing-sector budget. While high levels of beneficiary co-financing (50–85 per cent)[19] demonstrate strong commitment to adopting alternative technologies by the participating beneficiaries, these projects have so far reached only a limited number of end users. Facilitating the scaling up from pilot-level support to broad specific sector(s) transformation will therefore require greater effort, as well as the consideration of alternative funding modalities and approaches and strategic partnerships with a greater range of actors.

63. During the discussions held in the half-day sessions participants emphasized the value of engaging end users to have larger impact while noting that having this based on grants would be impractical. Some of the interventions expressed interest in the Secretariat exploring and reporting on more feasible financial methods than subsidies such as microfinancing and revolving funds to enable more end users transition to energy efficient low-GWP technologies.

64. Influencing faster transition to alternative technologies requires more than limited number of pilot or demonstration projects to create sufficient interest for scale-up adoption and induce development of the relevant supply chain. Addressing end users in a more systematic manner would require additional efforts and funding. The Executive Committee could design a scaled-up end-user assistance intervention under the MLF, guided by principles of clear focus, predictability, and the achievement of measurable, quantitative results.

65. Bilateral and implementing agencies would need to undertake additional work to assist Article 5 countries to map end users based on applications and economic sectors to which these users belong, to identify which groups of end users would have larger potential to start transitioning to low-GWP technologies and to support the development of regulations to help ensure the sustainability of the interventions. This will also include addressing a wider audience (e.g., developers, hotels, construction enterprises, among others) to support the transition to low-GWP, more energy-efficient alternatives with awareness campaigns demonstrating their practical economic benefits.

66. A key and immediate benefit of scaling up interventions with RAC end users is the early removal of existing emissive banks of high-GWP HFCs from operating equipment. This results in prompt and measurable reductions in HFC emissions, while also preventing future consumption associated with servicing accelerating HFC phase-down and reducing non-compliance risks. Furthermore, it enables the replacement of old and inefficient systems with energy-efficient ones. End-user interventions also need to be considered in light of the country's LRM strategy, as equipment replacement could provide significant quantities of refrigerant for recovery and reuse and reclamation (or destruction when unusable), and can generate revenue from scrapped equipment.

[18] UNEP/OzL.Pro/ExCom/92/43; an updated report on the matter will be submitted to the first meeting in 2028 (decision 92/36)

[19] UNEP/OzL.Pro/ExCom/92/43

*Sectoral strategies*

67. The process of KIP preparation could serve to identify potential key economic sectors with concentrated HFC use and significant potential for energy savings, where targeted assistance would support a smooth transition to HFC phase-down without undermining core activities and economic contributions. Prioritizing one or two sectors would depend on a combination of local market characteristics and impact, which would be determined based on factors such as HFC consumption, potential energy savings and business case, replicability (e.g., working with chains or fleets), technical readiness, and institutional or governance feasibility (how the sectors are associated and regulated), among others.

68. Potential sectors could include supermarkets, meat or fish processing, flower exporters, cold storage and cold-chain facilities including food distribution centers or ports, food processing and beverage industries, hotels and large hospitality facilities, shopping malls and commercial buildings, hospitals, transport refrigeration fleets, data centres, and others. Because the characteristics and needs of end users in different sectors are different, sectoral approaches would allow tailoring the assistance to address specific needs. For example, a strategy to assist large commercial centres reliant on chiller-based systems would differ significantly from one addressing the fisheries sector, which typically involves a wider range of system sizes and technologies and may require more comprehensive technical guidance and support.

69. A strategy to transition an economic sector (or a specific portion of a sector) from HFC-based equipment to energy-efficient, low-GWP technologies would require a clear assessment of the scale, feasibility, opportunities available, and what can be supported through MLF assistance and through other financing sources. It would also need to consider the availability of alternative technologies and capability to adopt them, financing incentives, robust systems for tracking and reporting results, regulatory support, alignment with energy-efficiency regulations, and awareness-raising to sustain stakeholder engagement.

*Diversifying financing instruments beyond grant funding for compliance*

70. A central constraint to scaling up end user adoption of low-GWP, energy-efficient technologies is the limited availability of affordable financing. High upfront costs, high cost of capital, and the absence of financial products tailored to cooling investments restrict the ability of end users, particularly SMEs, to replace existing equipment or invest in new, efficient systems. Financial institutions often lack the data and confidence to lend based on expected energy savings, and cooling related investments are rarely recognized as bankable assets. Furthermore, they may not be aware of the broader KIP framework under implementation to consider these as priority investments. As a result, even when pilot projects demonstrate strong technical performance, replication remains limited.

71. Given these constraints, diversifying financing instruments beyond traditional grant funding is essential to enable large-scale adoption. The MLF can assist countries in conducting market assessments to quantify potential energy savings from using low-GWP technologies, survey financing conditions, identify gaps, and design action plans tailored to national circumstances. Based on this market assessment, the Fund will be able to act as a catalyst. Its grant resources can facilitate the design and deployment of dedicated blended structures to significantly expand the volume of financing available for sustainable cooling without increasing the grant burden on the Fund.

72. For addressing HFC phase-down and energy efficiency under MLF support, grants continue to cover the incremental compliance costs of HFC phase-down, while a combination of grant and non-grant instruments attract private and institutional capital to the energy efficiency co-benefits. Table 2 shows alternative financing pathways for activities not related to compliance.

**Table 2: Financing diversification pathways not related to compliance**

| Financing pathway | Instrument type |
|---|---|
| Blended finance grant and concessional loan (RAC/industrial) | Grant and concessional loan, blended finance |
| Revolving funds and green credit lines | Revolving funds, concessional credit, leasing, bulk purchase |
| Results-based finance for energy savings | Performance-linked payments |
| Guarantees and de-risking instruments | Partial credit guarantee, first-loss tranche |

73. Revolving funds and green credit lines, seeded by MLF grants and extended through credit lines mobilized by implementing agencies in partnership with national development banks, can be well suited as instruments to end users. Under the guarantees and de risking instruments, partial credit guarantees and first loss tranches reduce the risk premium for commercial lenders, enabling credit to flow to end users and new technologies. The Fund could provide incremental costs for adopting low-GWP technologies to lower the fees of guarantees for end users, especially the small and medium-sized ones.

74. These instruments would be structured and deployed by implementing agencies in partnership with relevant financial institutions. This structure can increase total financing available per project without increasing MLF grant expenditure. Article 5 countries choosing to pursue the approach of diversifying financial instruments would need to assess the existing capacity of their NOUs to manage the additional coordination required with a broader range of end users and financial institutions.

75. Based on the information provided in this section, the Executive Commtiee may wish to request the Secretariat to prepare an assessment of activities, alternative financial modalities and institutional arrangements required to design scaled-up assistance to end users to transition to low-GWP alternatives under future stages of the KIPs, including criteria for the selection of priority sectors.

Opportunity 5: Integrating energy efficiency as part of refrigerant transition and aligning with national policies

76. The MLF has an operational framework for energy efficiency while phasing down HFCs in several equipment- and component-manufacturing sectors with its associated funding window (decisions 94/60 and 95/87(a)), a funding window on pilot projects for energy efficiency in the servicing sector that is extended up to the 100th meeting of the Executive Committee (decisions 91/65 and 95/87(d)) and a pilot funding window on revolving fund modality for end users (decision 95/87(c)). Moreover, decision 97/88(b) considers providing funding to strengthen or upgrade existing energy-efficiency testing centres in manufacturing countries, in the context of proposals made or submitted under decision 94/60, while document 98/59, considered at the present meeting, discusses the viability of establishing regional energy-efficiency testing centres suitable for LVC countries.

77. Building on this foundation, two directions merit consideration. First, the scope of the manufacturing operational framework could be assessed for possible extension to larger custom-designed equipment in the commercial RAC sectors, where a substantial share of high-GWP HFC consumption occurs. Such an extension would require careful consideration of the technical complexity involved, including the absence of MEPS for tailor-made systems and the challenges of measuring and verifying energy efficiency improvements. The option of considering low-cost financing support to end users of such equipment where MEPS are not readily available, based on specific higher energy-efficiency performance can be considered; this could catalyse adoption of energy-efficient technologies. Thus, manufacturing and/or end users could be considered for support.

78. Second, the outcomes and lessons from current additional energy-efficiency activities in servicing for LVC countries (decision 89/6) and the servicing sector pilot projects (decision 91/65) could potentially inform the design of a more systematic approach to non-manufacturing energy efficiency activities in stage II of KIPs. The funding window for pilot energy-efficiency projects in the servicing sector supports activities such as demonstrations of energy-efficient, low-GWP RAC technologies; updates to technician training

curricula and materials to integrate energy-efficiency and safety considerations; establishment or strengthening of technician certification schemes; and institutional coordination with national energy-efficiency authorities on measures including MEPS, labelling, testing, and standards.

79. These pilot projects are still under implementation and are expected to strengthen the integration of energy-efficiency considerations into HFC phase-down efforts. However, experience from project proposals indicates wide variation in national capacities to develop, update, and enforce MEPS and labelling programmes: some countries lack MEPS for commonly used appliances, while in others existing MEPS are outdated or weakly implemented and enforced. In addition, constraints remain in national testing infrastructure and in broader policy frameworks needed to support energy-efficient HFC phase-down. Based on the outcomes and lessons learned from these pilot projects, further support for non-manufacturing activities could be considered as an integral part in future stages of the KIPs to ensure that these gaps are addressed more systematically and that energy efficiency is enhanced or maintained in the context of HFC phase-down.

80. KIPs could also be aligned with national energy-efficiency policies and, where available, NCAPs. NCAPs provide a strategic framework that connects cooling objectives with national development priorities, helping identify high-impact sectors, opportunities for energy-efficiency gains, and the end-user segments most relevant to KIP interventions. They can therefore inform KIP design by clarifying where action is most needed and how interventions should be sequenced. Strengthening inter-ministerial coordination between NOUs and energy authorities is essential to ensure that incoming low-GWP technologies also deliver energy efficiency gains and that these gains are properly measured. This may require institutional adjustments beyond the conventional scope of NOU work, including formal coordination mechanisms with energy regulatory agencies and, in some countries, engagement with finance ministries and urban planning authorities.

81. Based on the information provided in this section, the Executive Committee may wish to consider requesting the Secretariat prepare an assessment of the feasibility of integrating non-manufacturing activities to enhance energy efficiency during HFC phase-down in future stages of KIPs based on the outcomes and lessons learned from the pilot projects under decisions 89/6 and 91/65 including required measurement and verification proposals.

### IV.2 Regional cooperation as a multiplier

82. One of the identified limitations to use regional cooperation as a channel to support Kigali Amendment implementation is the wide variation in institutional and technical capacities across countries. These differences include, inter alia, disparities in technician training and certification systems, national standards and regulatory frameworks, energy-efficiency testing capabilities, access to reliable market information, and enforcement capacity to address illegal trade in controlled substances. While Article 5 countries assess their local markets when developing new stages of HPMPs or KIPs, market dynamics are often influenced by the availability of technologies beyond national borders. Therefore, expanding regional coordination to assess market and technology trends is critical, particularly given the wide range of options available for different categories of RAC applications and the need for robust monitoring of HFCs.

83. The OzonAction regional networks and thematic meetings provide opportunities for NOUs to exchange information and promote cooperation, while initiatives such as iPIC enable voluntary information sharing on trade in ODSs. Building on these mechanisms, additional regional cooperation approaches could include assessing the feasibility of regional procurement schemes to improve access to alternative equipment, refrigerants, and components, leveraging regional associations for technical knowledge and promote harmonization at the regional level.

84. Further to the already ongoing information exchange and thematic regional workshops, other cooperation initiatives that could be considered include exploring shared reclamation facilities, service

infrastructure, and refrigerant banks among countries in the same region; supporting structured knowledge-transfer initiatives in partnership with specialized organizations; reinforcing collaboration to combat illegal trade and equipment dumping; establishing regional monitoring, reporting and verification platforms alongside cross-border customs cooperation; and enhancing customs training through regional networks. In relation to energy efficiency, regional collaboration could be strengthened through shared testing facilities, the development of regional certification and labelling schemes, and greater harmonization of refrigerant and energy-efficiency standards and codes, including MEPS wherever feasible.

### IV.3 Implications for the design of stage II of the Kigali HFC implementation plans

85. The five strategic opportunity areas outlined in Section IV.1 have direct implications for how stage II KIPs could be designed. Stage II KIPs could adopt a country programme approach, integrating the five strategic opportunity areas into a coherent national framework rather than submitting stand-alone activities across multiple funding windows. This approach would be aligned with NCAPs where available, linked to national energy-efficiency policies, and grounded in the stronger sectoral data systems that opportunity 1 identifies.

86. The design of stage II could include a sectoral mapping exercise drawing on stage I data collection, identifying one or two priority economic sectors where concentrated HFC use, energy-efficiency potential, technical readiness, and institutional feasibility can be combined to offer the highest impact. The selection of priority sectors should be based on agreed criteria, and the resulting sectoral components should include clearly defined results with quantitative targets for both HFC phase-down and energy savings.

87. Servicing sector components in stage II could reflect the redesigned approach described in opportunity 3, which is market-driven, application-based, organised around the four stakeholder groups of workforce, service providers, end users, and institutions, and incorporating digital and AI-assisted tools where feasible. End-user components could be designed from the outset with scale and sustainability in mind, incorporating alternative financing modalities such as revolving funds, concessional credit and guarantees. Linkages to LRM strategies should be built into project design.

88. The NOU capacity is a critical factor in determining the feasibility of a more complex, multi-stakeholder stage II approach. In particular, the integration of alternative financing modalities, such as revolving funds, concessional credit lines, guarantees, and performance-based mechanisms, will require the NOUs to coordinate more closely with national development banks, commercial lenders, energy-efficiency agencies and financial regulators. Many NOUs currently have limited experience engaging with financial institutions or assessing the bankability of cooling related investments. Countries will therefore need to evaluate whether their current NOU structures possess the institutional capacity to manage these additional responsibilities and identify where targeted institutional strengthening, technical assistance, or dedicated financial coordination support is required. Finally, stage II should incorporate a monitoring and evaluation framework that goes beyond compliance tracking.

89. While this paper proposes a more comprehensive and ambitious strategic approach to Kigali Amendment implementation, it is important to affirm that compliance with Montreal Protocol control measures remains the central obligation and primary objective of KIPs through grant funding. The strategic approach is designed to strengthen compliance. Compliance can also be strengthened through a long-term approach planned beyond the next HFC reductions step. Expanding the scope of KIPs to address energy efficiency, end-user engagement, and financing diversification adds complexity and requires additional coordination. There is a risk that broadening the agenda could divert attention from core compliance activities, particularly in countries where administrative capacity is limited. The design of stage II of the KIPs could therefore maintain a clear hierarchy: compliance is non-negotiable, and strategic activities are additional, complementary and voluntary, not substitutes for mandatory phase-down measures.

90. The Executive Committee should ensure that any new funding modalities, operational frameworks, or partnerships introduced in support of the strategic approach include appropriate safeguards to preserve the integrity of compliance financing. The establishment of a robust monitoring and evaluation framework is an important safeguard in this regard, enabling the Committee to track whether strategic activities are delivering on their stated objectives without compromising the compliance mandate.

91. Based on the information provided in this section, the Executive Committee may wish to consider requesting the Secretariat to prepare an assessment of elements required to prepare and submit future stages of the KIPs following a country programme approach, aligned with NCAPs where feasible, and considering an integrated approach for sustained HFC phase-down, enhanced energy efficiency and promotion of sustainable cooling.

## V. Recommendation

92. The Executive Committee may wish:

(a) To note document UNEP/OzL.Pro/ExCom/98/60 on the strategic approaches to Kigali Amendment implementation in Article 5 countries pursuant to elements referred to in decision 96/57;

(b) To request the Secretariat to prepare, for the consideration of the Executive Committee at its 101st meeting, an assessment of the following components that could inform preparation of future Kigali HFC implementation plans (KIPs):

(i) Activities not currently implemented in the refrigeration servicing sector but required to transition to alternatives with low global-warming potential (GWP), considering an integrated approach for sustained HFC phase-down, enhanced energy efficiency, linkages to life-cycle refrigerant management strategies, and promotion of sustainable cooling;

(ii) The feasibility of integrating non-manufacturing activities to enhance energy efficiency during HFC phase-down in future stages of the KIPs based on the outcomes and lessons learned from pilot projects approved under decisions 89/6 and 91/65, including the required measurement and verification proposals;

(iii) Elements required to prepare and submit future stages of the KIPs following a country programme approach, aligned with national cooling action plans where feasible, and considering an integrated approach for sustained HFC phase-down, enhanced energy efficiency and promotion of sustainable cooling; and

(c) To also request the Secretariat, taking into account the updated version of document UNEP/OzL.Pro/ExCom/92/43, requested by decision 92/36, to prepare, for the consideration of the Executive Committee at its 102nd meeting, an assessment of activities, alternative financial modalities and institutional arrangements required to design scaled-up assistance to end users for transitioning to low-GWP alternatives in future stages of the KIPs, including criteria for the selection of priority sectors.