

COOL BUSINESS: ENERGY EFFICIENCY & THE MULTILATERAL FUND

81ST MEETING OF THE EXECUTIVE COMMITTEE, 18-22 JUNE 2018

SUMMARY & RECOMMENDATIONS

Parties to the Montreal Protocol have taken several decisions over the years that have directed the Multilateral Fund's Executive Committee to consider the energy use and energy efficiency of refrigeration, air conditioning, foam products, and servicing. The most recent of these, Decision XXVIII/2, calls for an increase in funding for the servicing/end-use sector in low volume consuming countries (LVCs) to maintain energy efficiency and requests cost guidance on maintaining and/or enhancing the energy efficiency of low-GWP or zero-GWP alternative technologies and equipment when phasing down hydrofluorocarbons (HFCs).

EIA and NRDC recommend the following guiding principles be considered by the Executive Committee as it formulates an approach to address energy efficiency and elaborates further on these recommendations in the following pages.

1. The Montreal Protocol should promote energy efficiency within its existing institutional framework and apply its decisions to projects under the hydrochlorofluorocarbon (HCFC) phase-out as well as the HFC phase-down;
2. The Executive Committee should define energy efficiency in the context of the Multilateral Fund and consider cost-effective investments in 'avoidable technology upgrades'¹ related to the energy efficiency of appliances' refrigeration systems, up to 25% above the refrigerant cost-effectiveness threshold;
3. Decision XXVIII/2(22) guides the Executive Committee to consider supporting energy efficiency for manufacturing projects and servicing activities that are transitioning or supporting the transition to low- and zero-global warming potential alternatives to HCFCs and HFCs only. A generally accepted definition of low-GWP, one that conforms with the objectives of the HFC phase-down, is <150;
4. Activities to promote energy efficiency in servicing should be added to the list of eligible activities under the refrigeration servicing sector, and funding to LVCs for the HCFC phase-out in the servicing sector should be increased in light of the servicing sector report being prepared for the 82nd meeting;
5. The Executive Committee should ensure that the conditions for market uptake of the higher energy efficiency products be either already in place or that commitments be made to put them in place as a condition of project approval, possibly with Multilateral Fund non-investment support, *e.g.* through minimum energy performance standards, labelling programmes, and other incentives;
6. Energy efficiency should be included as an element of the cost structure for funding the preparation of HFC phase-down management plans;

¹ 'Avoidable technology upgrades' are technology improvements resulting from a refrigerant transition that are not incidental to the conversion project but rather are explicitly undertaken to gain a competitive advantage.

7. The Executive Committee should encourage implementing agencies to seek opportunities for co-funding energy efficiency investments and non-investment activities during project preparation;
8. The Executive Committee should request the Secretariat to carry out additional work to better understand energy efficiency, particularly to assess the cost-effectiveness of technology upgrades, based on the conference room paper submitted by the Government of Austria at the 80th meeting and taking into account the report of the Montreal Protocol's Technology and Economic Assessment Panel, which will be submitted to the 40th Open-Ended Working Group under Decision XXIX/10.

ENERGY EFFICIENCY IN THE CONTEXT OF THE MLF

Energy efficiency is an important, emerging topic at the Montreal Protocol and the Multilateral Fund (MLF). Two key decisions taken by the Montreal Protocol have brought energy efficiency within the mandate of the Executive Committee discussions with respect to hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs),² namely:

<p>Decision XIX/6 (HCFC Phase-Out)</p>	<p>Paragraph 11: To agree that the Executive Committee, when developing and applying funding criteria for projects and programmes... give priority to cost-effective projects and programmes which focus on, inter alia... [s]ubstitutes and alternatives that minimize other impacts on the environment, including on the climate, taking into account global-warming potential, energy use and other relevant factors.</p>
<p>Decision XXVIII/2 (HFC Phase-Down)</p>	<p>Paragraph 16: To request the Executive Committee to increase in relation to the servicing sector the funding available under Executive Committee Decision 74/50 above the amounts listed in that decision for parties with total hydrochlorofluorocarbon baseline consumption up to 360 metric tonnes when needed for the introduction of alternatives to hydrochlorofluorocarbons with low-GWP and zero-GWP alternatives to hydrofluorocarbons and maintaining energy efficiency also in the servicing/end-user sector.</p> <p>Paragraph 22: To request the Executive Committee to develop cost guidance associated with maintaining and/or enhancing the energy efficiency of low-GWP or zero-GWP replacement technologies and equipment, when phasing down [HFCs], while taking note of the role of other institutions addressing energy efficiency, when appropriate.</p>

Energy efficiency is a broad term covering multiple sectors and activities. The Executive Committee should define energy efficiency in the context of the MLF, particularly as it pertains to cost guidance for the HFC phase-down.

EIA and NRDC **recommend** that the Executive Committee primarily contemplate energy efficiency in the context of the energy performance of refrigeration and air conditioning (RAC) products and components that reach end-users and whose manufacture is subject to refrigerant conversion investment projects funded by MLF. For these products, energy efficiency is a performance metric, based on a prescribed test procedure, that represents the ratio of the product's heat transfer capacity to the product's energy

² Although energy efficiency has been considered in HCFC demo projects and several other stand-alone investment projects as early as the 12th Executive Committee meeting.

consumption. Where the conversion of foam insulation blowing agents materially impacts a finished product's energy efficiency, Executive Committee may also wish to consider supporting foam insulation conversion systems as energy efficiency-related.

This recommended energy efficiency framework focuses on technologies where the MLF has expertise; it excludes design options for appliances, buildings, etc., that do not directly relate to refrigerants, refrigeration systems, or insulating foam systems of finished RAC products and components. For example, when dealing with large and complex cooling systems (*e.g.* in supermarkets), there may be design options to reduce energy load that are not connected to the actual refrigeration system (*e.g.* installation of cabinet doors and LED lighting). In such cases, EIA and NRDC suggest that the Executive Committee consider funding for technology upgrades to components related to the refrigeration system etc., but not for other design changes. The Executive Committee may wish to help facilitate enterprises seeking outside finance and/or funding for these additional measures.

MANDATE AND BACKGROUND

The transition away from HCFCs and HFCs under the Montreal Protocol comes at a critical time. Demand for cooling is rapidly growing as the developing world urbanizes, economies grow, and the planet heats up. More cooling is needed, particularly in developing countries, but most cooling is energy intensive and thus exacerbates both carbon dioxide and non-carbon dioxide greenhouse gas levels. There is a significant gap between current emission reduction pledges under the Paris Agreement and what is needed to put the world on a pathway to staying well below 2°C. The Montreal Protocol can ensure that opportunities to enhance energy efficiency are not lost and that it does its part to set the developing world on a path towards sustainable RAC.³

The opportunities to increase energy efficiency are vast, and the term can apply to everything from thermal power plants and industrial processes to commercial buildings and computer algorithms. The RAC sector, a principal focus of the Montreal Protocol, is a major energy consumer and thus energy efficiency is an important opportunity to avoid climate change.

The primary mandate of the Montreal Protocol is to phase out or phase down the production and consumption of fluorinated gases that contribute to ozone depletion and climate change. Done correctly, this transition can also enhance energy efficiency of the products that are converted to new refrigerants and insulating foams. Some changes made during conversion projects inherently result in better energy efficiency because they entail, for example, replacing an old compressor model with a new one that features a better design. The MLF does not provide extra support for discretionary technology upgrades for the sole purpose of improving the energy efficiency of a finished RAC product. However, there are conversion projects where choices can be made to further increase energy efficiency, beyond this inherent improvement. MLF support for those energy efficiency technology upgrades would encourage manufacturing enterprises to make better design choices that they would not otherwise make because of higher upfront costs.

EIA and NRDC recommend the following guiding principles be considered in formulating an approach to addressing energy efficiency within the MLF:

- The Montreal Protocol should strive to promote energy efficiency within its existing institutional framework, which includes: (i) the expertise of its national ozone units and bilateral and

³ See UN Environment, *Emissions Gap Report*, (2017). Available at: <https://www.unenvironment.org/resources/emissions-gap-report>

implementing agencies; and (ii) its experience with funding investment and non-investment projects in the RAC and foam sectors.

- Executive Committee decisions on energy efficiency should apply both to the existing HCFC phase-out as well as the HFC phase-down. In 2010, the Executive Committee agreed in the context of the HCFC phase-out management plans that “funding of up to a maximum of 25% above the cost-effectiveness threshold will be provided when needed for the introduction of low-GWP solutions.”⁴ This fulfilled part of the obligation under Decision XIX/6(11) to “minimize other impacts on the environment, including on the climate, taking into account global warming potential” but this did not address the mandate to minimize “energy use,” which is also explicitly mentioned in Decision XIX/6(11). That energy efficiency is to be taken into account - and promoted - during the ongoing HCFC phase-out is further supported by Decision XXVIII/2(16), which requests Executive Committee to increase Stage II HCFC phase-out funding to maintain energy efficiency in the servicing sector in low-volume consuming countries.
- Decision XXVIII/2(22) states that manufacturing projects and servicing activities that are transitioning or supporting the transition to low- and zero-GWP alternatives to HCFCs and HFCs should be eligible for energy efficiency funding. A generally accepted definition of low-GWP, one that conforms with the objectives of the HFC phase-down, is <150.⁵

EIA and NRDC make the following additional recommendations on measures that can be taken to address energy efficiency within the cost guidelines of the Multilateral Fund.

INCENTIVIZE COST-EFFECTIVE TECHNOLOGY UPGRADES FOR ENERGY EFFICIENCY

In 1995 at its 18th meeting, the Executive Committee made the decision not to consider avoidable technological upgrades as eligible incremental costs. Technological upgrades were defined as “additional advantages which the enterprises may obtain, such as superior quality in their products, increased production capacity or flexibility, reduced energy consumption and labour and/or other advantages as a result of conversion to non-ODS (or low-ODS) technology.”⁶ In Decision 18/25, Executive Committee decided “that costs associated with avoidable technological upgrades should not be considered as eligible incremental costs and therefore should not be funded by the Multilateral Fund,” and further decided to use as guidance in the calculation of incremental costs the methodologies for the quantification of technological upgrades outlined by the Secretariat in an accompanying policy paper.”⁷

⁴ United Nations Environment Programme, *Report of the Sixtieth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol*, UNEP/OzL.Pro/Executive Committee/60/54, (15 April 2010), Executive Committee/60/44 ¶198. Available at <http://www.multilateralfund.org/sites/60/Document%20Library2/1/6054.pdf>

⁵ The average GWP of HFCs in use is approximately 2,000, therefore, in order to phase down to 15 percent of the baseline, average GWP, without any growth in use, would need to be reduced to 300. It is well known that the air-conditioning sector is growing rapidly, at an estimated 15 percent per year in some countries. The global stock of air conditioners has doubled since 2005 according to IEA. Therefore, a doubling of refrigerant use (requiring the average GWP to reduce from 300 to 150) between now and the end of the phase-down is a very conservative estimate. International Energy Agency, *Energy Snapshot*, 2017. Available at: <https://www.iea.org/newsroom/energysnapshots/air-conditioner-sales-growth.html>

⁶ United Nations Environment Programme, *Report of the Eighteenth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol*, UNEP/OzL.Pro/Executive Committee/18/7, (24 November 1995), ¶ 56. Available at <http://www.multilateralfund.org/MeetingsandDocuments/meetingsarchive/reports/English/1/1875.pdf>

⁷ United Nations Environment Programme, *Report of the Eighteenth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol*, UNEP/OzL.Pro/Executive Committee/18/75, (24 November 1995), Executive Committee Decision 18/25 ¶157. Available at <http://www.multilateralfund.org/MeetingsandDocuments/meetingsarchive/reports/English/1/1875.pdf>

In 2010, in Decision 61/44, Executive Committee reaffirmed established practice as it relates to component upgrades proposed during HCFC conversion projects, deciding:

[T]o request the Secretariat to maintain the established practice when evaluating component upgrades in HCFC conversion projects for the refrigeration and air-conditioning sectors, such that after conversion the defining characteristics of the components would remain largely unchanged or, when no similar component was available, would only be improved to the extent necessary to allow the conversion to take place, and to keep the Executive Committee informed of any deviation from this practice.

With the adoption of Decision XXVIII/2, Executive Committee is requested to produce cost guidance that will require establishing a baseline for energy efficiency to measure whether it is maintained and/or enhanced. In the process of developing that baseline, at the very least, the Executive Committee should devise a mechanism for preventing energy efficiency backsliding, when a refrigerant or foam blowing conversion would not maintain the energy efficiency baseline. When and how to fund technology upgrades, particularly for components such as compressors, heat exchangers, and controls where those upgrades can enhance energy efficiency, are key questions the Executive Committee should answer.

Several of the major components in question, compressors and heat exchangers, are produced by the original equipment manufacturers (OEMs) (in which case costs are likely to be incremental capital costs), or are sourced from an external component manufacturer (in which case additional costs are likely to be reflected in higher incremental operating costs (IOCs)). Assuming the HFC phase-down follows the same integrated approach as the HCFC phase-out, in which a number of projects are combined under a country-wide HCFC phase-out management plan (HPMP), conversion activities for component manufacturers would ideally be presented at the same time as conversion activities for the sector using these components.

Eligible technology upgrades could include, for example:

- Redesign/modification of the heat exchanger (*e.g.* through microchannel heat exchangers);
- Redesign/modification of the compressor (*e.g.* variable speed);
- Redesign/modification of thermostatic expansion valves/electronic expansion valves;
- Redesign/modification of fan and compressor drives;
- Improved insulation (where phasing out an HCFC or HFC foam)

In keeping with agreed practice to fund low-GWP alternatives through the HCFC phase-out, EIA and NRDC **recommend** that the Executive Committee consider additional funding of up to a maximum of 25% above the cost-effectiveness threshold for avoidable technology upgrades that will bring about cost-effective enhancements in energy efficiency.

EIA and NRDC further **recommend** that avoidable energy efficiency technology upgrades be eligible for MLF support if they fulfill the following conditions:

- The technology upgrade has a higher cost-effectiveness, in terms of USD/CO₂e, compared to the refrigerant transition (and/or be supported by co-funding);
- The project plan demonstrates that the conditions for market uptake of the higher efficiency products be either already in place or that commitments have been made to put them in place as

a condition of project approval, *e.g.* through minimum energy performance standards (MEPS), labelling programmes, and other incentives.

PROMOTE ENERGY EFFICIENCY IN THE SERVICING SECTOR

A quality service infrastructure is essential for maximising the efficiency of cooling appliances. Several factors contribute to inefficient operation and reliability of equipment. For example, over- and under-charging systems can significantly reduce energy efficiency by increasing the load on the compressor, causing it to run for longer periods of time and resulting in suction and head pressures that disrupt the ability of the refrigeration system to maintain required temperatures.⁸ Ensuring a proper refrigerant charge is therefore critical, starting with installation and continuing during operation of the equipment.

Several factors contribute to leakage, including vibration, frictional wear, poor connections, and improper materials.⁹ Other factors unrelated to leakage can also result in inefficient operation, such as dirty condenser and evaporator coils and, where applicable, ineffective door operation and cabinet loading and location.¹⁰

The Montreal Protocol has the opportunity to implement installation, servicing and maintenance practices that promote efficiency through its network of national ozone units and established training and certification programmes. Additional funding for national ozone units and phase-out management plans will be required to achieve this objective; however, this work can be carried out cost-effectively by integrating energy efficiency into existing servicing activities for HFCs and HCFCs.

At the 80th meeting, the Executive Committee agreed that the Secretariat, in cooperation with bilateral and implementing agencies, would prepare a preliminary document for the 82nd meeting on all aspects related to the refrigeration servicing sector that support the HFC phase-down, including “if and how energy efficiency was addressed in the servicing/end-user sector.”¹¹ This report should be used as a basis for a decision as to what additional activities will be required (*e.g.* the development of training modules on servicing for energy efficiency) and the extent to which funding for the servicing sector should be increased, in particular for LVCs.

EIA and NRDC **recommend** the following:

- Activities to promote energy efficiency in servicing should be added to the list of categories of eligible activities under the refrigeration servicing sector currently in paragraph (8) of the draft template cost guidelines for the phase-down of HFCs;¹²

⁸ Shecco, *Global Corporate and Policy Measures to Incentivise Highly Efficient HFC-Free Cooling: Technical Report on Energy Efficiency in HFC-Free Supermarket Refrigeration*, (February 2018), p. 45.

⁹ See *e.g.* GIZ PROKLIMA, *Natural Refrigerants: Refrigeration systems for warm climates using only CO₂ as a working fluid*, (2008); Shecco, *Global Corporate and Policy Measures to Incentivise Highly Efficient HFC-Free Cooling: Technical Report on Energy Efficiency in HFC-Free Supermarket Refrigeration*, (February 2018), pp. 45-46.

¹⁰ Ciconkov S., Ciconkov V., *SuperSmart Report 6: Eco-Friendly Operation and Maintenance of Supermarkets* (2016). Available at <http://www.supersmart-supermarket.info/downloads/>; see also Shecco, *Global Corporate and Policy Measures to Incentivise Highly Efficient HFC-Free Cooling: Technical Report on Energy Efficiency in HFC-Free Supermarket Refrigeration*, (February 2018), p. 46.

¹¹ United Nations Environment Programme, *Report of the Eightieth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, UNEP/OzL.Pro/Executive Committee/80/59*, (23 November 2017), Executive Committee Decision 80/76(c) ¶243. Available at: <http://www.multilateralfund.org/80/Document%20Library1/1/8059ri.pdf>

¹² United Nations Environment Programme, *Report of the Eightieth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, UNEP/OzL.Pro/Executive Committee/80/59*, (23 November 2017), Annex XXVIII. Available at: <http://www.multilateralfund.org/80/Document%20Library1/1/8059ri.pdf>

- Funding available to LVCs for HCFC phase-out in the servicing sector should be increased in light of the servicing sector report being prepared for the 82nd meeting.

STRENGTHEN THE POLICY LANDSCAPE

Manufacturing conversions and servicing alone will not be sufficient to transform the RAC market towards higher energy efficiency; market demand for the higher efficiency low-GWP equipment is also needed. In this regard, minimum energy performance standards (MEPS) or incentives (*e.g.* rebates or direct subsidies) should be required or encouraged in tandem with manufacturing conversions. Market-oriented techniques are the only feasible interventions in countries that import equipment. The Executive Committee should consider ways that it can bring its expertise in the RAC sector to inform activities happening in other fora, for example within the UN Framework Convention on Climate Change, and explore joint work streams with ozone and energy officers to develop national strategies for advancing energy-efficient, low-GWP technologies in the RAC sector. This area of work will be informed by the upcoming TEAP report responding to Decision XXIX/10, however additional work could be carried out by the Executive Committee Secretariat in order to respond specifically to the need to address the cost-effectiveness of additional funding to support energy efficiency.

Any additional funding for energy efficiency will require the relevant implementing agency to incorporate related information into the project submission and the Secretariat having to review it. It is therefore critical that energy efficiency is included as one of the elements of cost structure for funding the preparation of an overall HFC phase-down management plan.

EIA and NRDC **recommend** the following:

- The Executive Committee should examine non-investment opportunities to support energy efficiency-related policies that will ensure market uptake of higher efficiency RAC equipment, *e.g.* MEPS, labels, incentives, etc.;
- Energy efficiency should be included as an element of the cost structure for funding the preparation of HFC phase-down management plans;
- The Executive Committee should encourage implementing agencies to seek opportunities for co-funding energy efficiency during project preparation;
- The Executive Committee Secretariat should be requested to carry out additional work on energy efficiency, in particular to assess cost-effectiveness of technology upgrades, based on the conference room paper submitted by the Government of Austria at Executive Committee 80 and taking into account the report of the TEAP which will be submitted to the 40th OEWG under Decision XXIX/10.¹³

¹³ See United Nations Environment Programme, *Report of the Eightieth Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol*, UNEP/OzL.Pro/Executive Committee/80/59, (23 November 2017), Annex XXIX. Available at: <http://www.multilateralfund.org/80/Document%20Library/1/8059ri.pdf> – Text for discussion related to the development of the cost guidelines for the phase-down of HFCs in Article 5 countries: Draft criteria for funding