

# **International Conference on Sustainable Cooling and 5<sup>th</sup> Annual CO<sub>3</sub>OL Workshop**

**Energy Efficiency and the Montreal Protocol  
Agenda: Rationale and Experiences**

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# Climate Impact of the Kigali Amendment to the Montreal Protocol

- The Kigali Amendment to the Montreal Protocol describes a timeline to phase down high GWP HFCs, which will avoid up to 0.5°C of total global warming by 2100

# Montreal Protocol TEAP Task Force( TFEE) on Issues Related to Energy Efficiency (1)

If HFC phase down took place with:

**less energy-efficient equipment** – the direct benefits from the reduction in use of high-GWP refrigerants during the phasedown might be offset

**more energy-efficient equipment** - the total reductions in GHG emissions both from direct and indirect sources, could as much as double the climate benefits of the phasedown

# Issues Related to Energy Efficiency: TEAP TFEE (2)

## Technology Options/ Opportunities

- Technologies resulting in EE improvement opportunities available for high global warming potential (GWP) refrigerants are also applicable to low-GWP refrigerants
- The large majority of any improvement in EE of RACHP systems can be achieved through the optimisation and use of new and advanced components, particularly compressor, heat exchanger and controls
  - These can yield efficiency improvements (compared to a baseline design) from 10% to 70% (for “best in class” unit)
  - The impact of refrigerant choice on the EE of the units is usually relatively small – typically ranging from  $\pm 5$  to 10%.

# Issues Related to Energy Efficiency: TEAP TFEE(4)

## Energy Savings and Corresponding Manufacturing Costs of Various Efficiency Improvement Options

Efficiency improvement options	Energy Saving Compared with Baseline	Incremental Manufacturing cost (US\$)
Improved compressors	5.5% – 15%	<5 - 15
Variable speed compressors	21% – 23%	30 – 120
Variable speed drives for both fans and compressors	~26%	50 – 140
Heat Exchanger improvement	7.5% – 24%	10 – 165
Expansion valve	3.5% – 6.5%	<5 – 35

Country: India; System capacity: 5.27 kW; System type: Mini Split

Shah et al, 2016

# Issues Related to Energy Efficiency: TEAP TFEE(5)

## Servicing Sector Role to Improve EE

- Improved training and education of installation and service technicians, system operators, and refrigerant handlers
  - New courses and curricula
- Certification of technicians and other entities on handling refrigerants
- Policies to encourage regular maintenance and servicing
  - Maintenance contracts or warranties could be included as part of a government procurement

# Issues Related to Energy Efficiency: TEAP TFEE(6)

## Enabling Activities and Associated Cost Examples

Bridging Enabling Activities	Number countries	Fund	Cost Example – US\$/country
Capacity Building	14	K-CEP	44,000-430,000
Institutional Strengthening	147	K-CEP	12,000
Consumer Awareness	2	GEF	150,000 and 446,341
Demonstration Projects	14	K-CEP and GEF	208,000-400,000
Development of National Strategies	27	K-CEP	139,000
Design Procurement, market transformation	12	K-CEP	226,750
Design of Certification, monitoring, enforcement mechanism	6	K-CEP and GEF	100,000-319,000

# Issues Related to Energy Efficiency: TEAP TFEE(7)

## Importance of Enabling Activities

- Capacity building, institutional strengthening, demonstration projects, and national strategies and plans are critical to compliance with the Montreal Protocol
- Additional enabling activities under the Kigali Amendment can bridge the current Montreal Protocol activities with those destined towards EE and serve as examples of potential synergy between HFC phasedown and EE opportunities
- A number of enabling activities supported by the other funds, such as the Kigali Cooling Efficiency Programme and the Global Environment Facility, have advanced both MP and EE goals

# Issues Related to Energy Efficiency: TEAP TFEE (8)

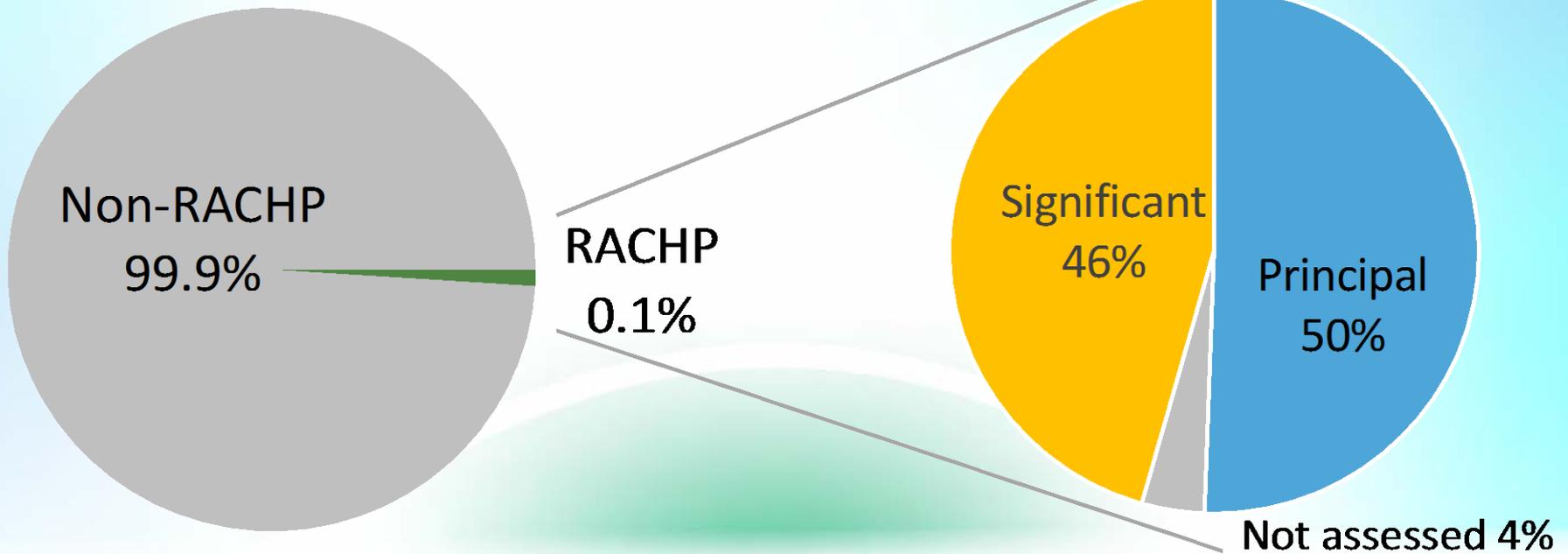
## Funding Sources linked to EE in the RACHP Sector

- The TEAP Task Force Performed a search (supported by K-CEP) of the Organization for Economic Cooperation and Development (OECD) database of funding covering Official Development Assistance (ODA)
  - Keywords used were related to the RACHP sector and tagged to climate mitigation
  - As a snap shot, the Task Force looked at funded projects in 2014-2015 for institutions other than the MLF, to illustrate the types and scale of funding for cooling/refrigeration sectors for EE
- Known philanthropic funding was included
- Institutions that started funding projects related to EE in the RACHP sectors after 2015, including GCF, Climate Investment Funds, and K-CEP were also included

# ***ODA Funding for Cooling: 2014-2015***

Refrigeration and Air Conditioning is a very small percent of development aid

\$19 million for RACHP mitigation excluding Multilateral Fund, half is principally mitigation



# Issues Related to Energy Efficiency: TEAP TFEE (9)

## Funding related:

- Less than one-thousandth of ODA (in 2014 and 2015) are focusing on RACHP, indicating there is extremely low international focus on RACHP relative to other development topics
- The majority of large multilateral climate funds operate in sectors other than RACHP, such as infrastructure, energy access, renewable energy transmissions and other related projects. Barriers need to be addressed in coordination with existing financial organisations (e.g. The GEF, GCF, CIF, WB etc.)

# Financing Barriers: Blind Spots or Hot Spots?

- ODA community outside MP: Lack of general awareness of size of climate impact of Kigali Amendment and opportunities to focus on speed/ action on low hanging fruits
- GEF: Low country prioritization under climate mitigation window-quota exists. Finance cycle difficult to coincide with MLF and MP control measures. Implementing/bilateral agencies select country and control project entry into work programme
- Green Climate Fund- recent initiated-very large projects, TBD
- In general: Lack of allocated funds earmarked for EE as co-benefit of HCFC phase-out and HFC phase-down ( e.g. special window for MP and EE co-benefit)
- Financing Institutions- not clear how to access funding for EE in RACHP sector, country eligibility of some funds, project duration etc. Products offered not easily understood/ or palatable to environment focal points

# Funding Experience on EE Projects: demand side

- CFC-Chillers Replacement Projects- Performance Guarantee Fund and other schemes (MLF, GEF, Regional Banks, Utilities, ESCOS, Building Owners, Public and Private funding, Carbon Funds etc.)- Long preparation and implementation time (5-10 years). Coordination issue/multiple players.
- Fridges Replacement Projects-Recover and Destruction Schemes ( GEF, Carbon Funds, GIZ, Utilities, Public and Private funds etc.)- Long preparation and implementation time ( 5 to 10 years). Coordination issue/multiple players
- End-User Incentive Programmes for equipment replacement for LVCC ( MLF grant, private sector funding -focusing on refrigerant but with EE co-benefit)- Short to Medium time depending on (2-5 yr)
- Room AC Buyers Clubs/Public and Private Bulk Procurement (e.g. India, Morocco room AC, public green procurement )- short preparation and implementation time depending on country selected (1-3 yr)

# Need for Speed!

- K-CEP: only philanthropic fund with specific focus on Kigali and EE in the RACHP sector! Not enough funding to eligible countries ( like in the MLF model). Replenishment?
- Developing countries preference for “one stop shop”: Size of MLF Replenishment “limited”; and limited support to EE funding by donors -discussions underway
- Different business models?
- Alternative financing models?

## MOP 30: MLF and Ozone Secretariat Tasks

- “To request the Executive Committee of the Multilateral Fund, in dialogue with the Ozone Secretariat, to liaise with other funds and financial institutions to explore mobilizing additional resources and, as appropriate, set up modalities for co-operation such as co-funding arrangements to maintain or enhance energy efficiency when phasing down HFCs, acknowledging that activities to assist Article 5 parties comply with their obligations under the Montreal Protocol will continue to be funded under the Multilateral Fund in accordance with its guidelines and decisions;”

# Energy Efficiency Under Discussion by MLF ExCom

- The MLF Secretariat was requested to provide to ExCom 82 the summary of the Parties' deliberations at OEWG-40 and MOP-30 in relation to the report by the TEAP on issues related to energy efficiency in response to decision XXIX/10
- The discussions on energy efficiency at MOP-30 will be included in an update to the document submitted to ExCom 82

**THANK YOU !**

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