

Ambitious National Cooling Policy: Development and Implementation of Model MEPS

16 June 2020



#ClimateWiseCooling

CLASP is conducting a communications campaign focused on the climate implications of growing global cooling demand.

Goals:

- Foster engagement with urgent topics in cooling and climate
- Promote new and existing cooling analysis and insights developed by CLASP and other practitioners



Program

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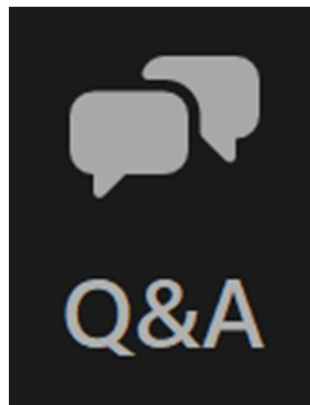
Leader, Global Cooling Efficiency Program, Lawrence Berkeley National Laboratory

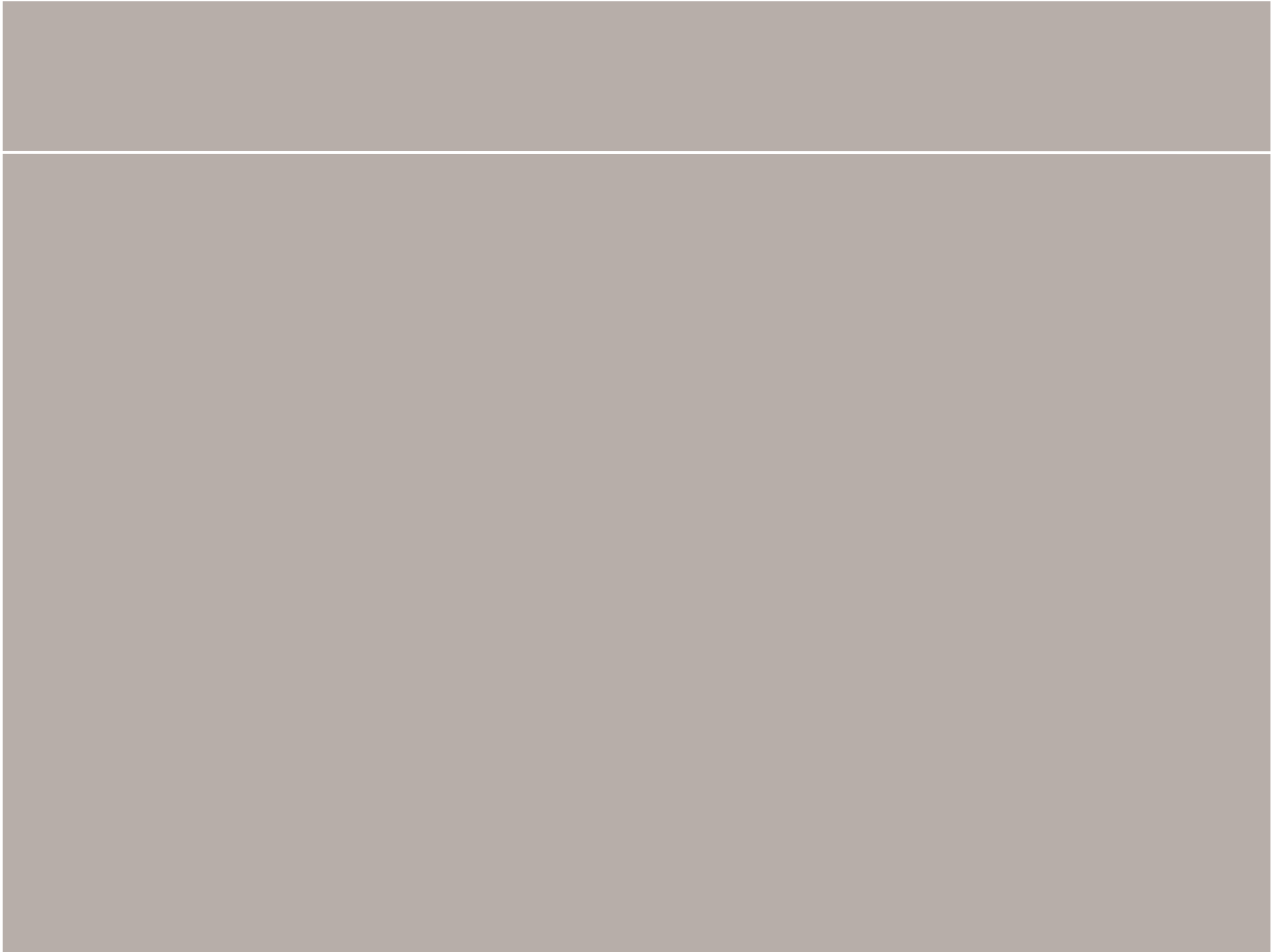
Panel Discussion (30 min)

Notes

The webinar is being recorded, and you will receive an email with a link to it following the event.

To submit questions during the presentations, use the Q&A button at the bottom of your screen.







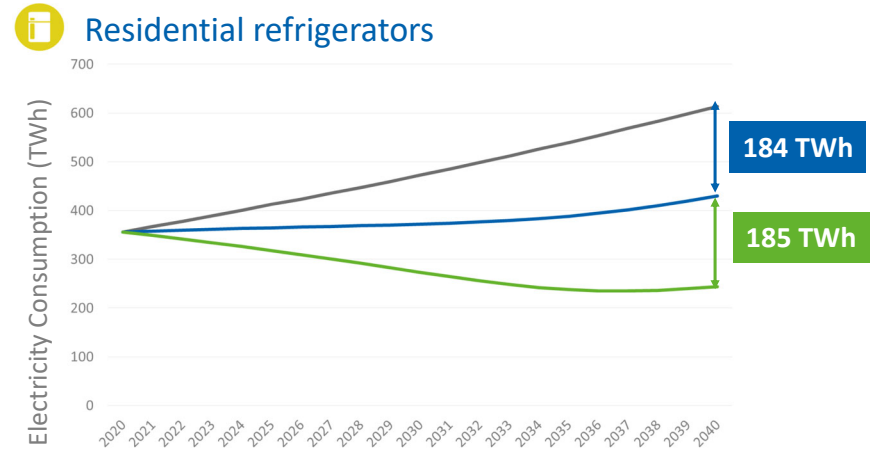
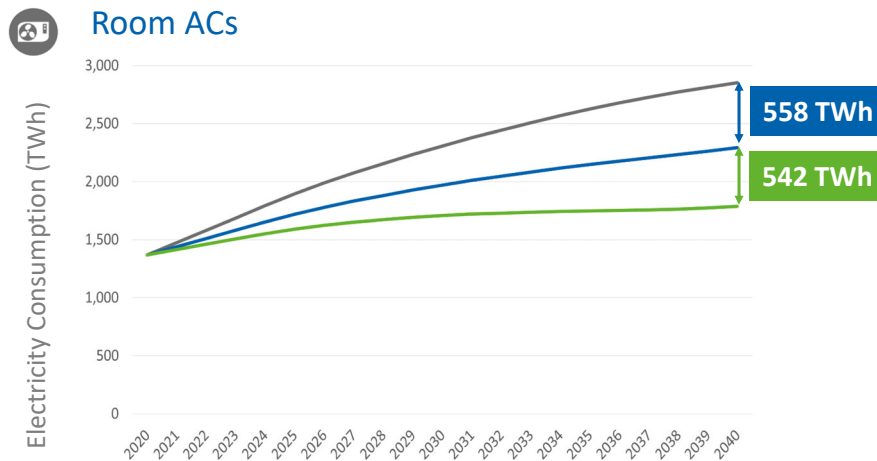
Model Regulation Guidelines for Energy-Efficient and Climate-Friendly Air Conditioners and Refrigerators

Patrick BLAKE



UN Environment Programme (UNEP)





16 June 2020

Savings potential of assessed countries of room ACs and residential refrigerators by 2040*



Electricity consumption growth by 2040

		
Business As Usual Scenario (BAU)	108 %	72%
With Minimum Ambition Scenario (MEPS)	68%	21%
With High Ambition Scenario (HEPS)	31%	(31%)

Ann	Scenario	on Scenario
 Electricity savings (TWh)	558	184
equivalent to:		
 Power Stations [500 MW]	255	84
 Millions of CO ₂	516	155
 billions of USD in electricity bills	51	17

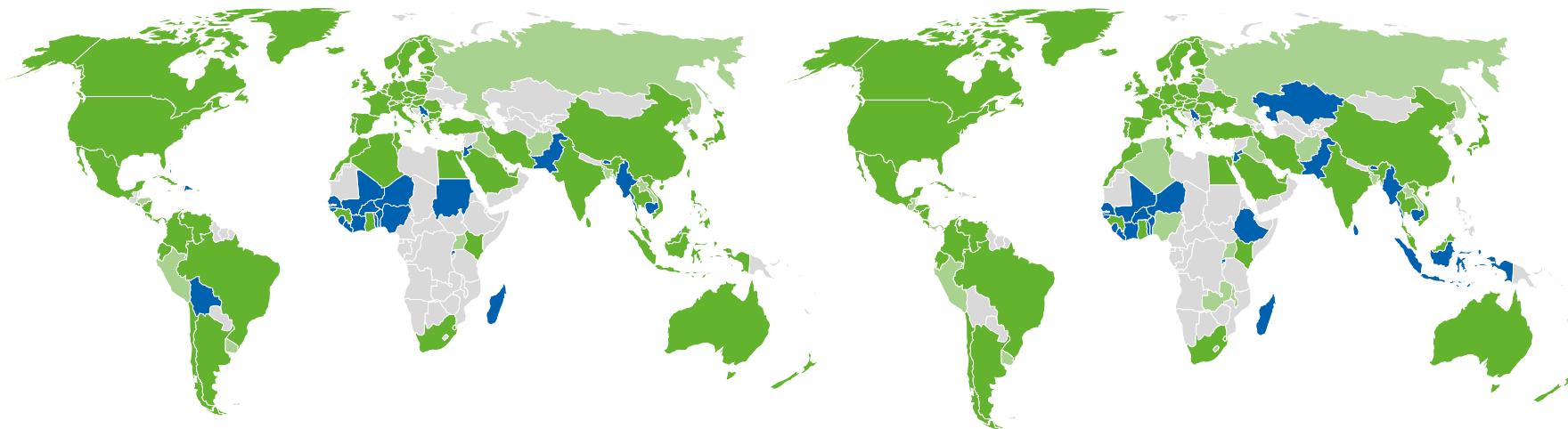
* Graph refers to the 156 developing countries and emerging economies that had been assessed for the U4E Country Saving Assessments.
 ** With Minimum Ambition Scenario

BACKGROUND: OPPORTUNITIES AND CHALLENGES

Policy gaps exist on MEPS and labelling

Room ACs MEPS & Labels Status

Residential Refrigerator MEPS & Labels Status



Yet many are:
Out of date, unenforced, circumvented,
Varying in stringency



OPPORTUNITY TO LEVERAGE U4E's TOOLS

U4E Model Regulation Guidelines for ACs and Refrigerators



- intended as guidance to help **inform regulatory authorities and policy makers**
- sets a **minimum efficiency floor** to prohibit future sales of inefficient products from the market.
- References global technology and policy trends
- Deployed in various countries and multiple regions (including ASEAN in addition to EAC, SADC)

Available in English Spanish, Chinese, French, Arabic versions upcoming

Resources: <https://united4efficiency.org/resources/model-regulation-guidelines-for-energy-efficient-and-climate-friendly-air-conditioners/>
<https://united4efficiency.org/resources/model-regulation-guidelines-for-energy-efficient-and-climate-friendly-refrigerating-appliances/>



OPPORTUNITY TO LEVERAGE U4E's TOOLS

60+ Expert Reviewers for U4E Model Regulation Guidelines

FUNDERS

GLOBAL MANUFACTURERS & INDUSTRY ASSOCIATIONS

TECHNICAL ORGANISATIONS & INITIATIVES

REGIONAL INTERGOVERNMENTAL ORGANISATIONS



Benefits for supporting the adoption of Model Regulation Guidelines



Simplify **adoption and implementation of a robust regulation**

- Target energy-efficiency + lower-GWP refrigerants simultaneously
- Encourage higher performing products through labelling
- Vary requirements to capture climatic differences
- Use proven best practices and tap into global policy and technology trends



Catalyze **product innovation**, giving consumers more choice



Easier to harmonize requirements to **reduce trade barriers and unlock economies of scale** to make products more affordable



Enable more **effective market enforcement** using proven test procedures and an easier exchange of compliance info





Contact

united4efficiency.org

TRANSFORMING MARKETS TO ENERGY-EFFICIENT PRODUCTS



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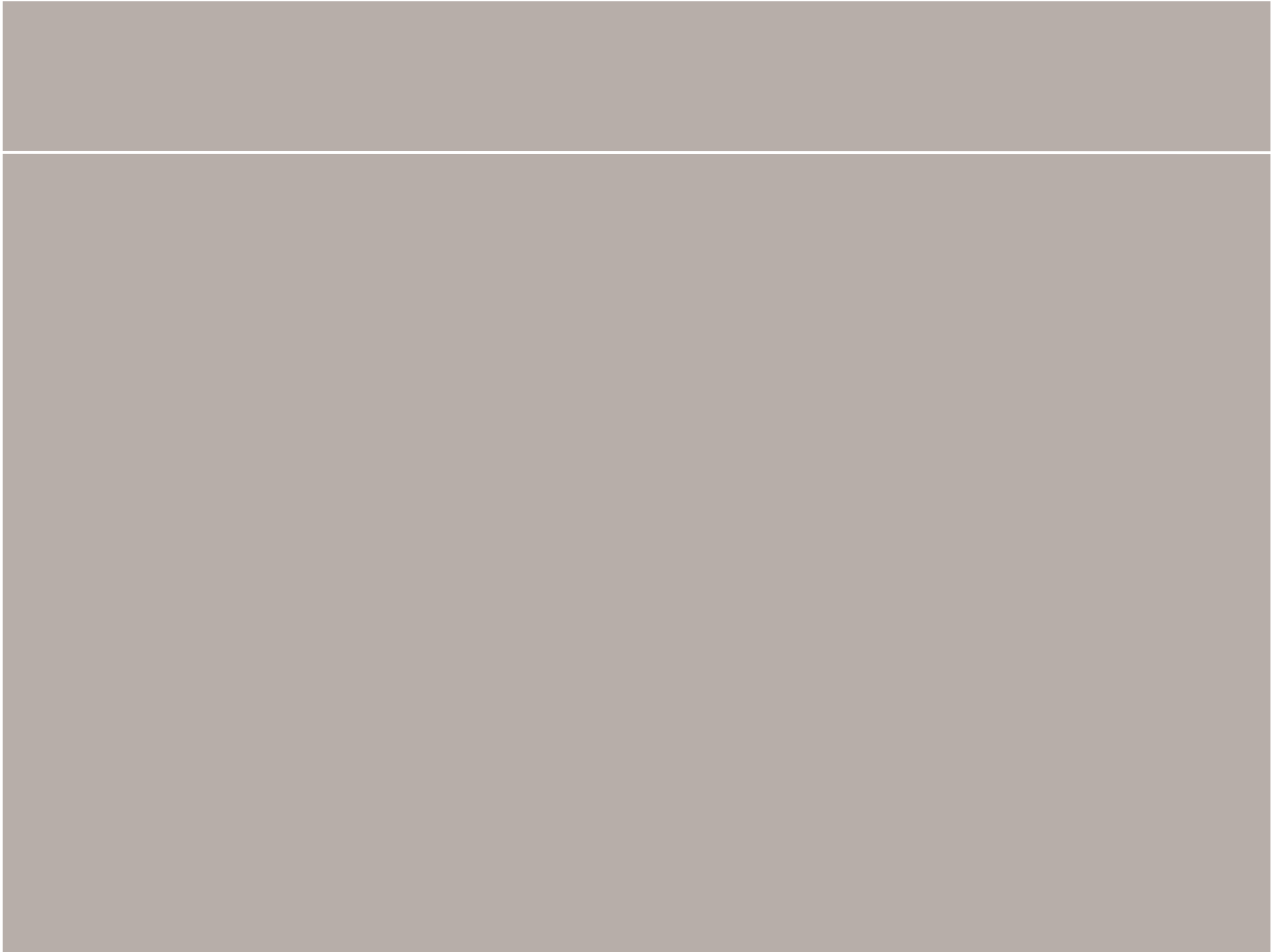
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POSITION

Programme Officer





Energy Technologies Area

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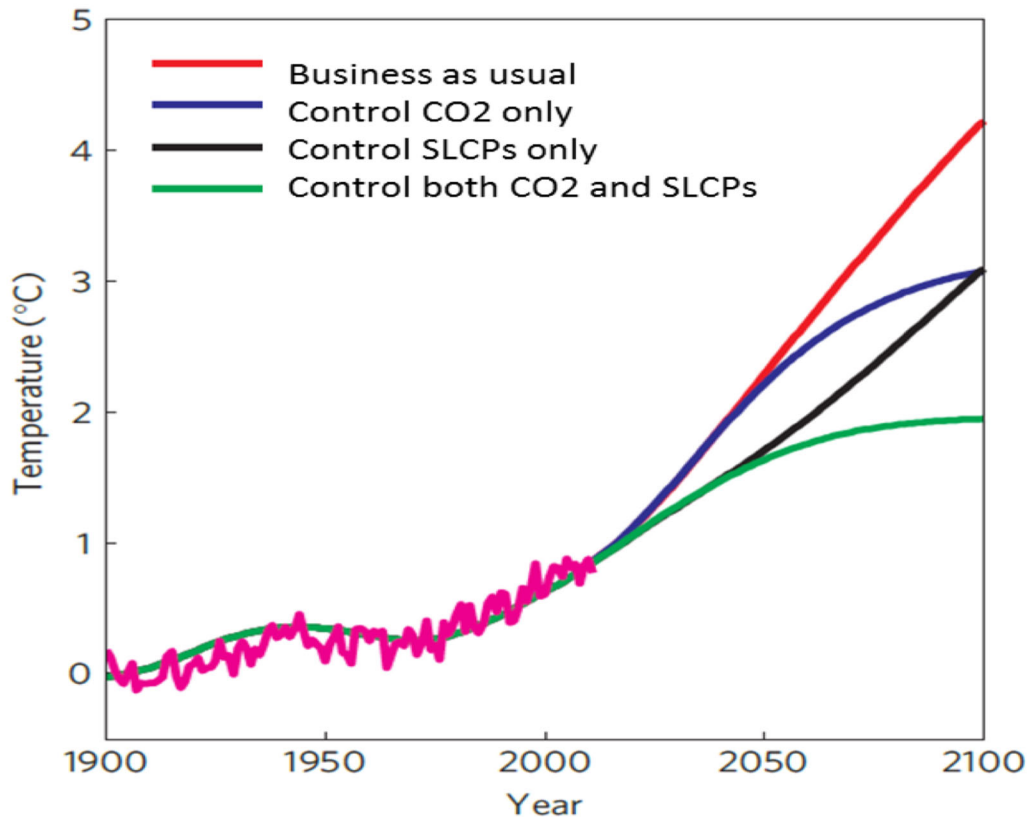
Implementation of the U4E Model MEPS for Air-Conditioners: Broader Implications

Nihar Shah, PhD, PE

Director, Global Cooling Efficiency Program
Lawrence Berkeley National Laboratory

June 16, 2020

Cooling the planet requires reduction in both CO₂ and HFC emissions

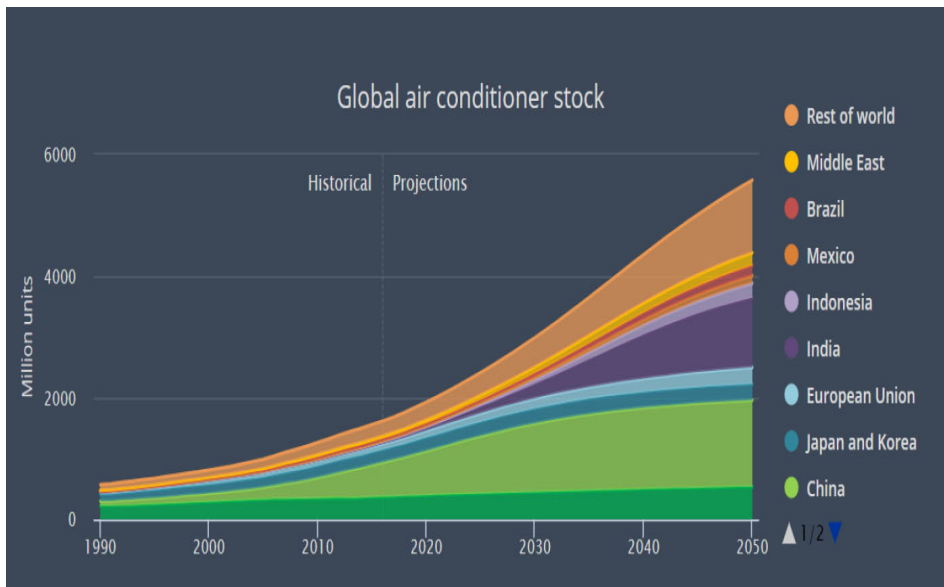


Source: Hu et al, 2013, Nature Climate Change

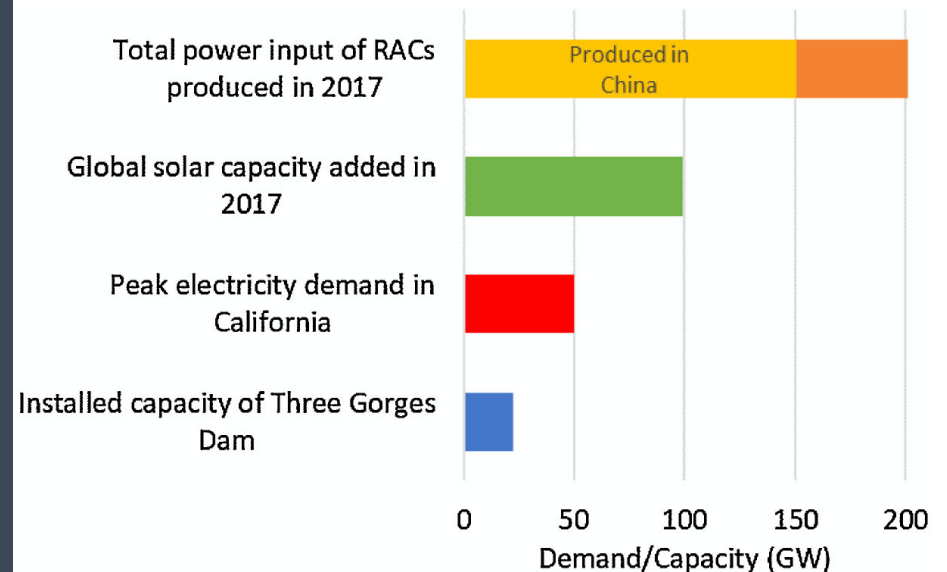
Refrigerant	100 yr GWP
R134a (HFC)	1430
R404A (HFC)	3900
R410A (HFC)	2100
R22 (HCFC)	1810

- Kigali Amendment estimated to save ~0.4 deg of global average temperature rise (Velders, 2015)
- Efficiency improvement in tandem with the refrigerant transition can more than double the total CO2 equivalent emissions from refrigerant transition alone (Shah, 2015; WMO,2018)
- The UNEP U4E Model MEPS include suggested requirements for both refrigerant and energy efficiency.

Growing Air-Conditioner Demand



Source: IEA, [Future of Cooling](#), 2018



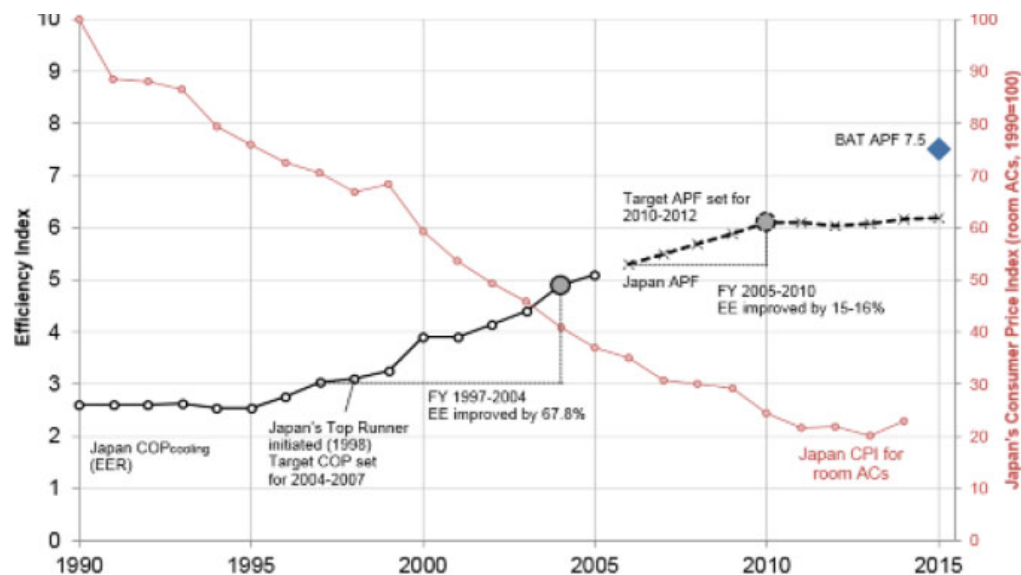
Source: [Phadke et al 2020, Energy Research & Social Science](#)

- Total air conditioner stock is expected to grow to over 4.5 billion by 2050
- Driven by electrification, urbanization, increasing incomes in countries with hot-dry or hot-humid climates including China, India and other emerging economies
- Total power input from RACs produced in 2017 is comparable to total solar generation capacity added in 2017.
- Total impact from the transition to the U4E model MEPS for ACs by 2030 is estimated to be about 337 terawatt-hours, equivalent to electricity generation from 154 500MW power plants and over 300 million tons of CO2 emissions. ([U4E savings assessments](#))

Efficiency Improvement and Refrigerant Transition

- Air Conditioners and refrigeration appliances are often first products regulated for energy efficiency and will also undergo refrigerant transition under the Montreal Protocol.
- refrigerant transition and efficiency improvement both typically require redesign of appliances and retooling of manufacturing lines.
- Combining refrigerant transition with energy efficiency improvement can save costs for consumers and manufacturers.

Prices driven by scale: Example from Japan

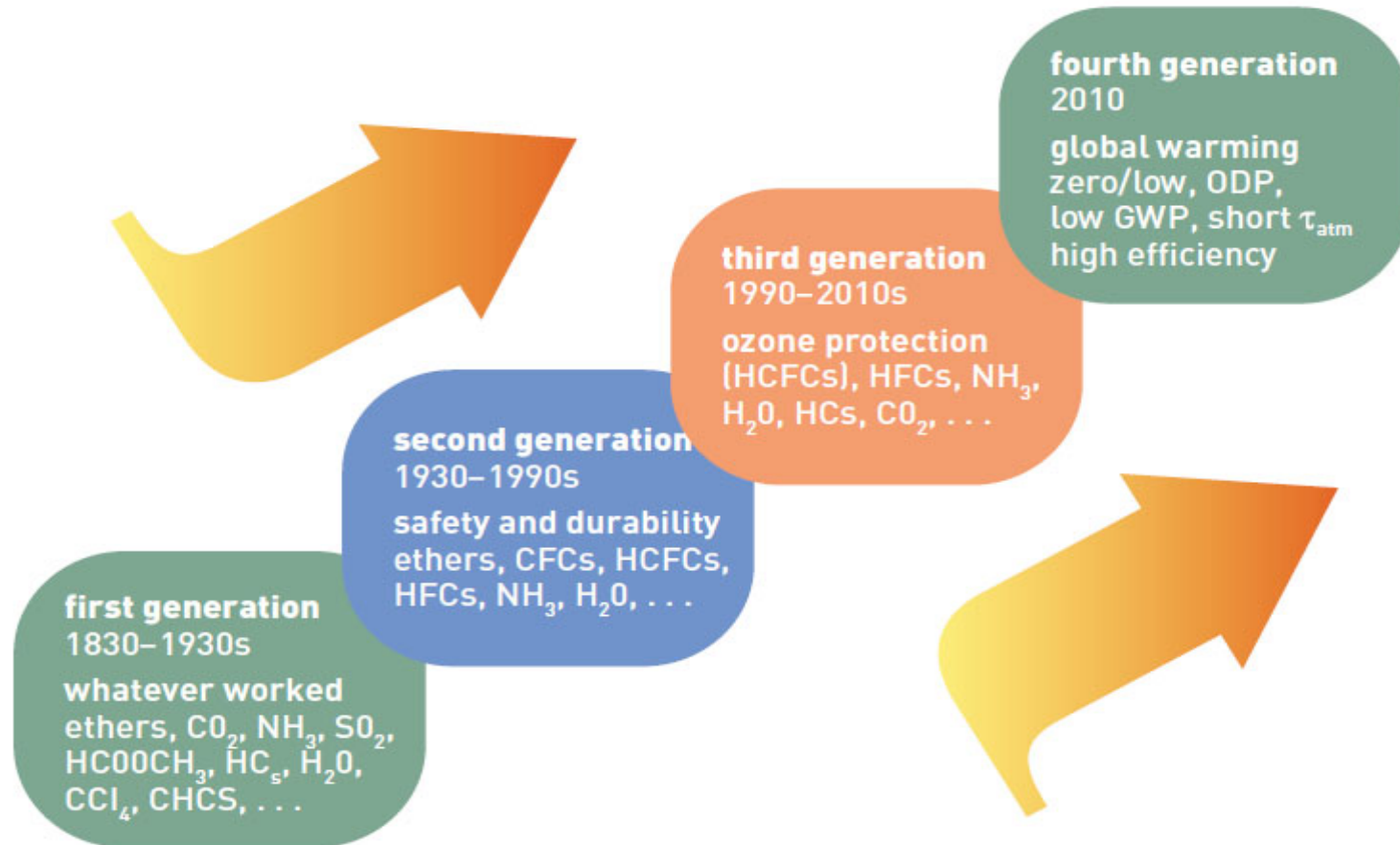


- Japan's Top Runner Program (1997) mandated a sales weighted average fleet COP of 5.3 (W/W) for small room ACs and 4.9 (W/W) for larger room ACs by 2004
 - This was ~60% more efficient than the market average efficiency in 1997
 - The target was determined by the COP of the most efficient AC model in the market
- Between 1995 and 2005, room AC efficiency in Japan improved by ~100% (from COP of 2.55 to 5.10 improving at a rate of 7.2% per year)
 - In the same period, inflation adjusted prices declined by over 80%
- Post-2009, consumer financial incentives (Eco-Point System) helped uptake of efficient ACs

Summary

- Reduction in both direct refrigerant emissions and indirect emissions from energy consumption is essential to keep global average temperature increase below 2 deg C.
- Large expected increase in demand for cooling driven by urbanization, electrification particularly in emerging economies in hot, dry and hot, humid climates.
- Significant opportunity to keep costs low by co-ordinating efficiency improvement with refrigerant transition.
- Capturing economies of scale through harmonized requirements with large markets will help keep costs low.
- Adoption of U4E model regulations are an opportunity to:
 - Mitigate negative impacts of increased cooling demand(emissions, peak load, energy costs).
 - Keep costs low by co-ordinating efficiency improvement with refrigerant transition to the extent possible.
 - Keep costs low by capturing economies of scale through harmonization with trends in large markets.

Evolution of Refrigerant Use




Source: Adapted from Calm, *International Journal of Refrigeration*, 2008,
<http://www.sciencedirect.com/science/article/pii/S0140700708000261>



Global AC Market and refrigerant alternatives

Table ES-1: Status of A/C Equipment Categories with Low-GWP Refrigerant Options Showing Comparable or Improved Performance and Efficiency¹⁰

Residential	Status	2012 Global Annual Sales (US\$B)	Commercial	Status	2012 Global Annual Sales (US\$B)
Room & portable		\$3.4	Packaged terminal		\$0.2
Ducted split & single-package		\$3.3	Packaged rooftop unit		\$4.6
Ductless split system		\$48.5	Ductless (VRF/VRV)		\$10.7
			Scroll / recip. chiller		
			Screw chiller		\$8.3 (All chillers)
			Centrifugal chiller		

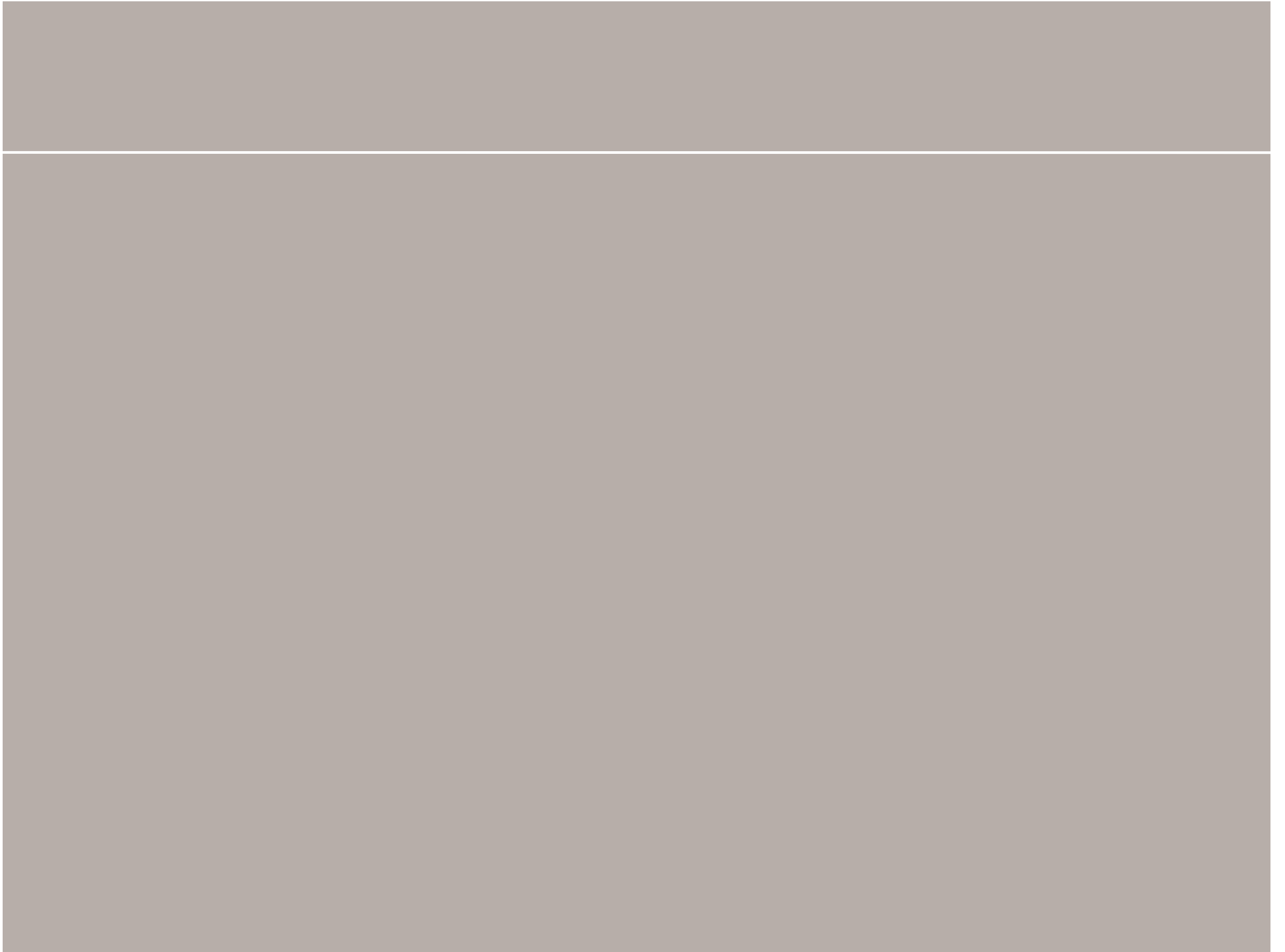
Green signifies that equipment operates using refrigerants with GWP as low as 10 or less

Blue signifies that equipment operates using refrigerants with GWP as low as 700 or less

 Commercially available in some global markets;  Product under development;  Tested in Lab

Source: DOE, "Future of Airconditioning for Buildings" , 2016

- The industry has developed alternative technologies for many categories and is in the process of developing further alternatives.



Policy and Regulatory Infrastructure for Efficient Cooling in Sub-Saharan Africa

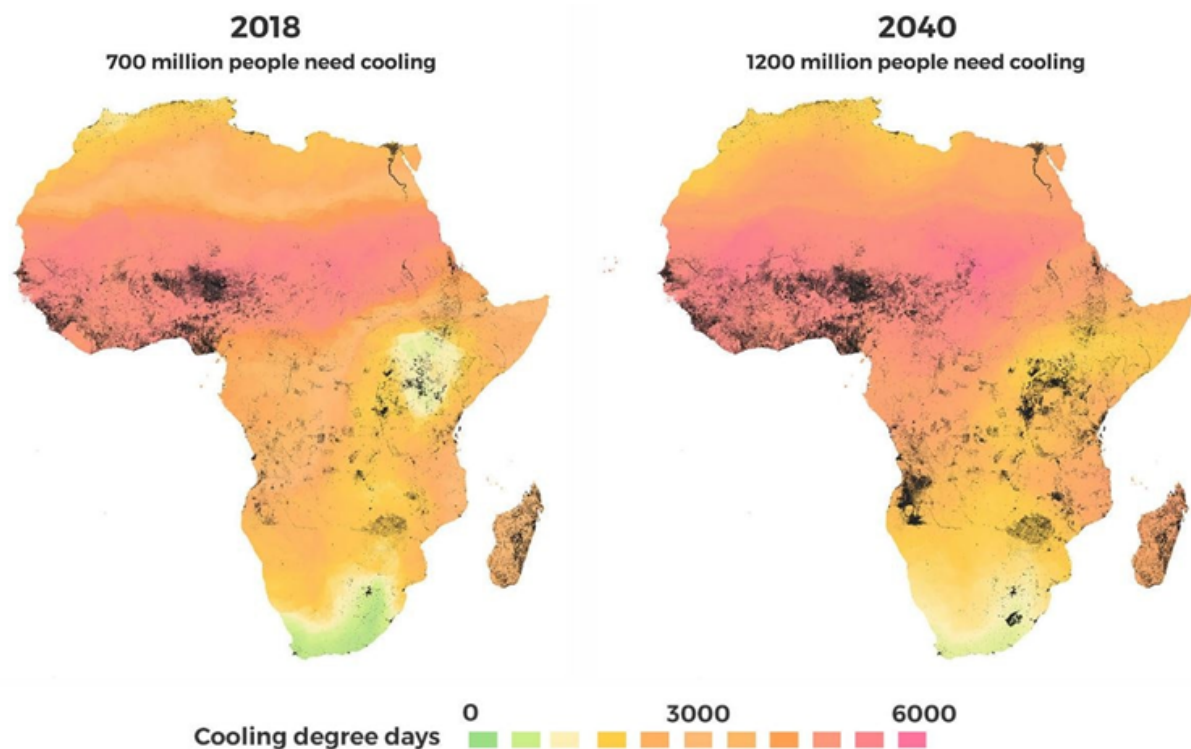
Michael Kiza,

East African Centre of Excellence for Renewable Energy and Efficiency
(EACREEE)

The Drivers for Growing Cooling Demand in Africa

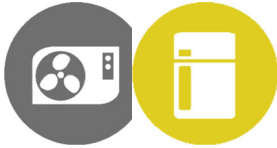
- Rapid urbanization and population growth,
- Loss of forest cover
- Economic growth,
- Warmer temperatures as the earth heats up.

Space Cooling Demand in Africa is Increasing

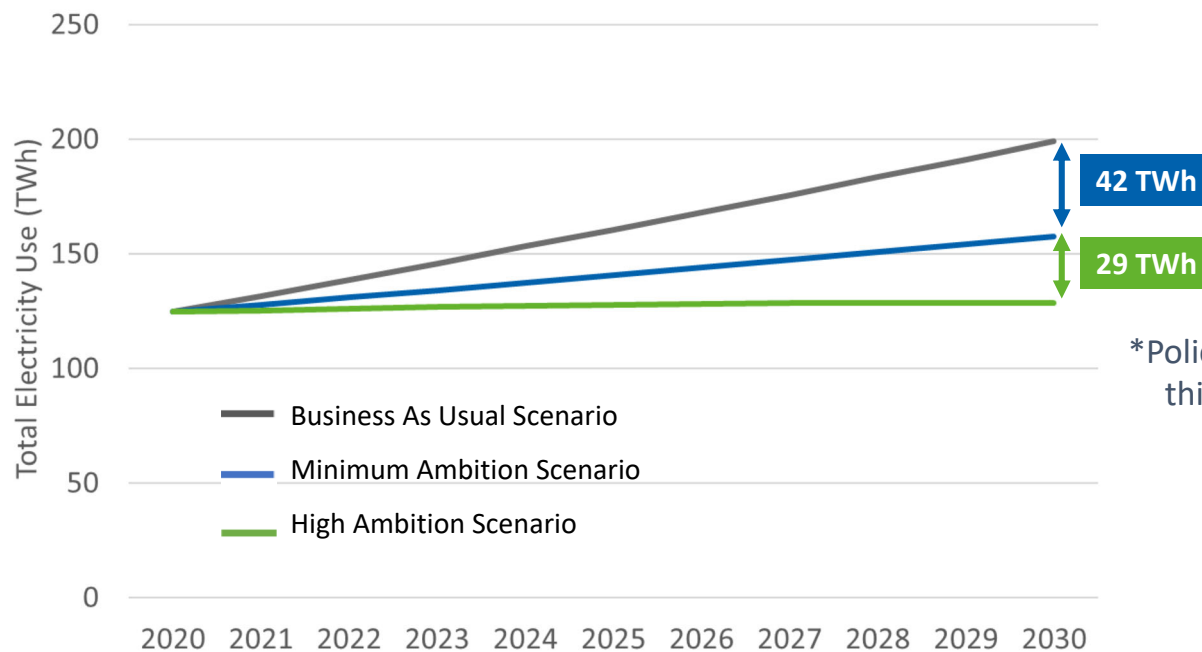


“Without appropriate regulations on the type of equipment used for cooling, this would create a very strong increase in electricity demand.”

Source: IEA, Africa Energy Outlook 2019



Saving Opportunities in Africa in Cooling (Air Conditioners and Refrigerators)



By 2030 the electricity consumption used for cooling is forecasted to increase by over

60%

*Policies can reduce this increase to

26%

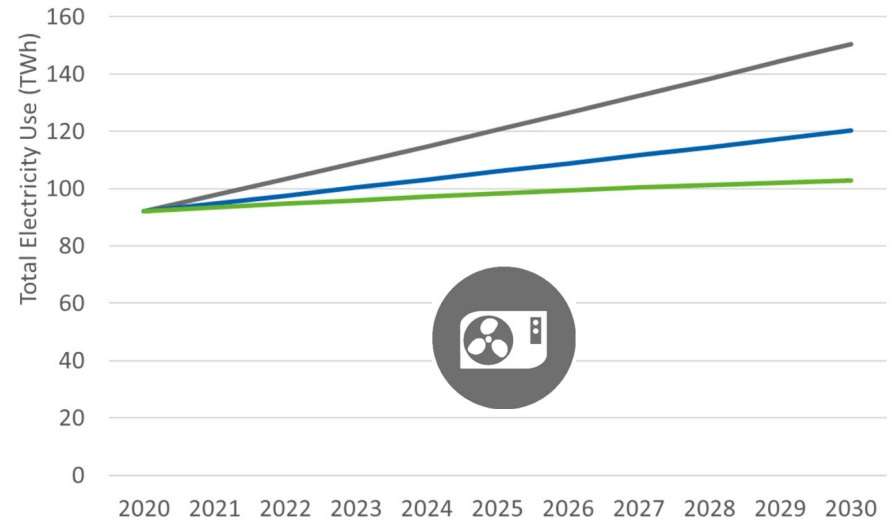
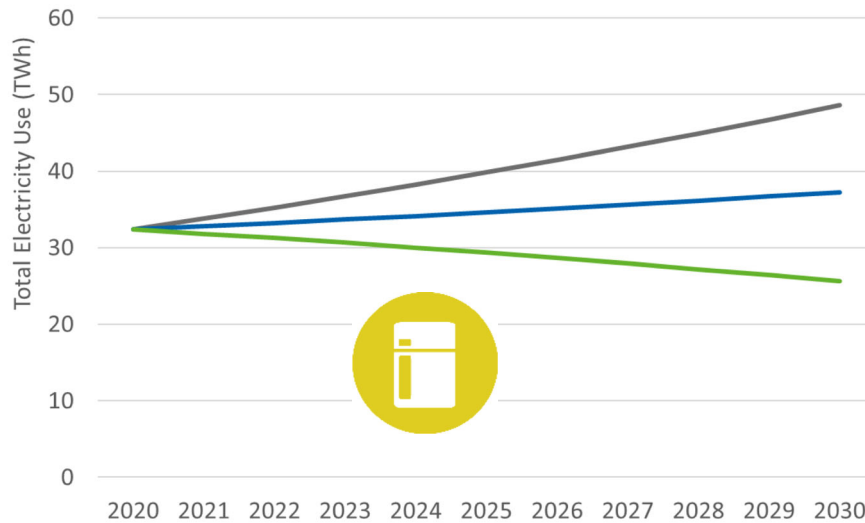
**More stringent policies reduce this increase to

3%

For more information and data see the U4E Country Savings Assessments:
<https://united4efficiency.org/countries/country-assessments/>

*Minimum Ambition Scenario
**High Ambition Scenario

Saving Opportunities in Africa for Room Air Conditioners and Residential Refrigerators



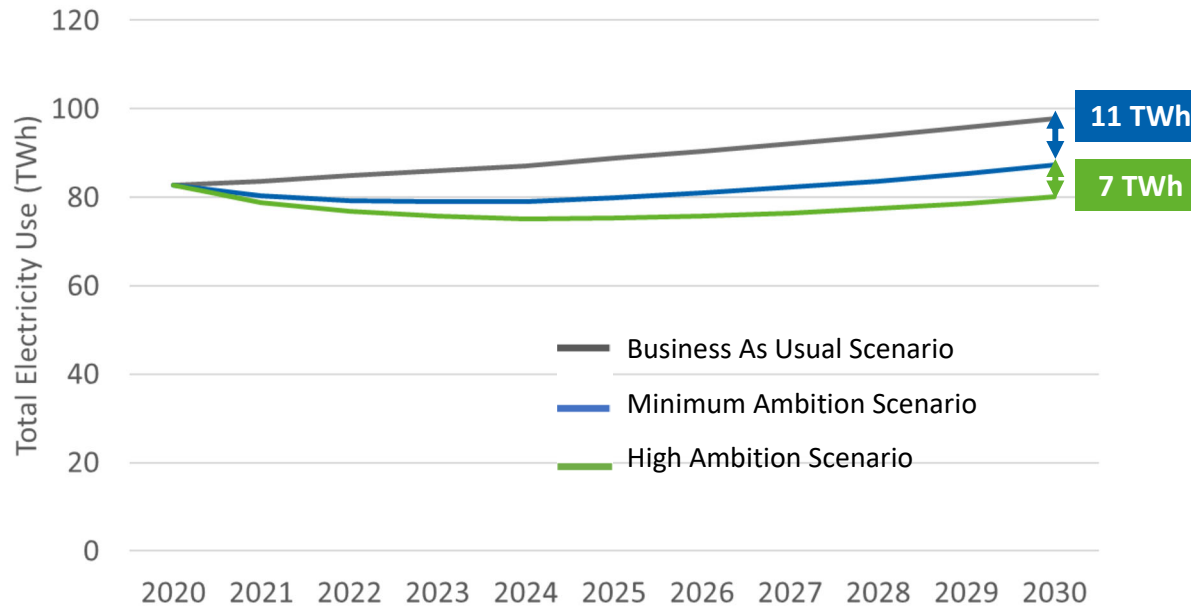
Annual Savings for both products in 2030:

42 TWh of electricity consumption, which is equivalent to:

- **19 Power stations** [500 MW each]
- **28 Million tonnes of CO₂**
- **4 Billion USD on electricity bills**

For more information and data see the U4E Country Savings Assessments:
<https://united4efficiency.org/countries/country-assessments/>

Saving Opportunities in East Africa from Energy-Efficient Lighting, Appliances and Equipment



Annual Savings in 2030*:

11 TWh of electricity consumption, which is equivalent to:

- **5 Power stations** [500 MW each]
- **6 Million tonnes of CO₂**
- **1 Billion USD on electricity bills**

*Savings of all five products with Minimum Ambition Scenario, displayed savings in 2030

Growing Cooling Demand = Growing Problem

- Inefficient technologies dominate the markets,
- Dumping of old (used) products
- No Minimum Energy Performance Standards (MEPS).
 - In some countries are voluntary/ No enforcing regulations
- Many African countries still have to put in place and enforce regulations to control the importation of ACs and refrigerators that use HCFCs.
- **What is being done?**



Some Steps in the Right Direction

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989
- In August 2012, EU directive aimed at curbing illegal dumping of used refrigerators (and other electronic wastes) in developing countries entered into force.
- Some countries in Sub-Saharan Africa (e.g. Ghana, Nigeria, Cote d'Ivoire, Kenya, Rwanda, Uganda, etc) announced banning importation of second hand ACs and refrigerators.
 - But these have largely never been enforced.
- Some countries in Sub-Saharan Africa (e.g. Ghana, Nigeria, Kenya, Rwanda, South Africa, etc.) have MEPS on refrigerators and ACs.
- Ghana introduced subsidies to support purchasing of new efficient refrigerators and ACs.

Role of EACREEE and other SECs

The East African Centre for Renewable Energy and Energy Efficiency (EACREEE) is an EAC regional platform for collaboration on RE&EE initiatives.

A member of the Global Network of Sustainable Energy Centres – CCREEE, EACREEE, ECREEE, PCREEE, RCREEE, SACREEE, SICREEE,

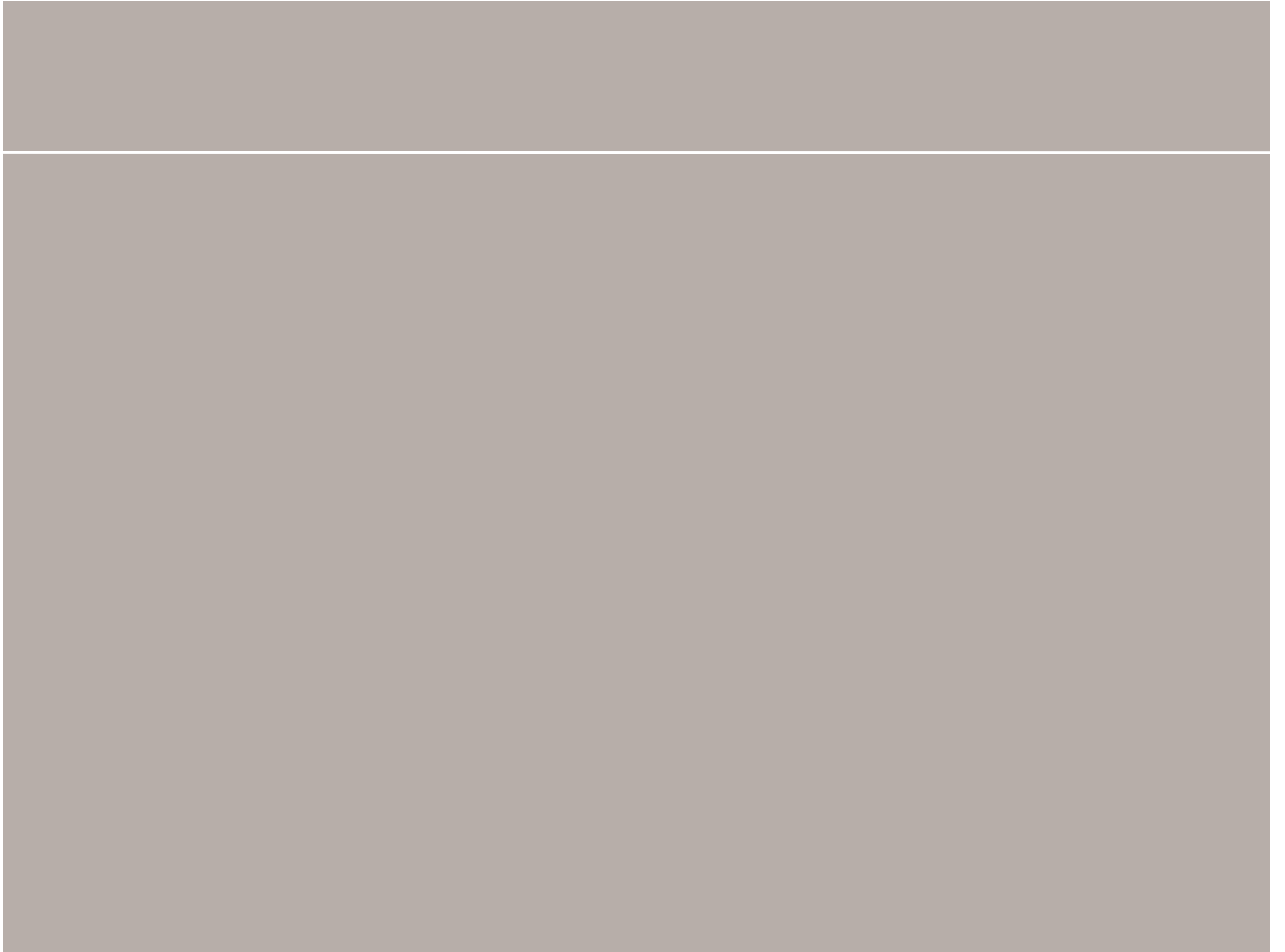


EACREEE-U4E Collaboration

- Collaborated with U4E in implementation of Rwanda Cooling Initiative.
 - Developed regulations for refrigerators and ACs based on the U4E model regulations.
 - National Cooling Strategy for Rwanda was approved
 - Currently supporting the implementation.
 - Participated Twinning Workshop held on 21-22 January 2019 in Paris France
 - Started a new project “Building High-Level Support and National Capacities to enhance Climate and Ozone Protection through Cooling Efficiency”.
 - Objective is to promote regional adoption/adaptation of the model regulations in the EAC region, as well as SADC region – in collaboration with the EELA project.
- *U4E also working with SACREEE to develop and implement GCF projects in 8 SADC countries;

Energy Efficient Lighting and Appliances (EELA) Project

- Funded by Sida through UNIDO. Executed by EACREEE and SACREEE, with CLASP and SEA as technical partners.
- The objective is to create market transformation for energy efficient lighting and appliances in the EAC and SADC regions to stimulate their increased diffusion across all sectors.
- Through:
 - Policies and regulations
 - Building the capacity of key stakeholders
 - Market incentives
 - Raising awareness

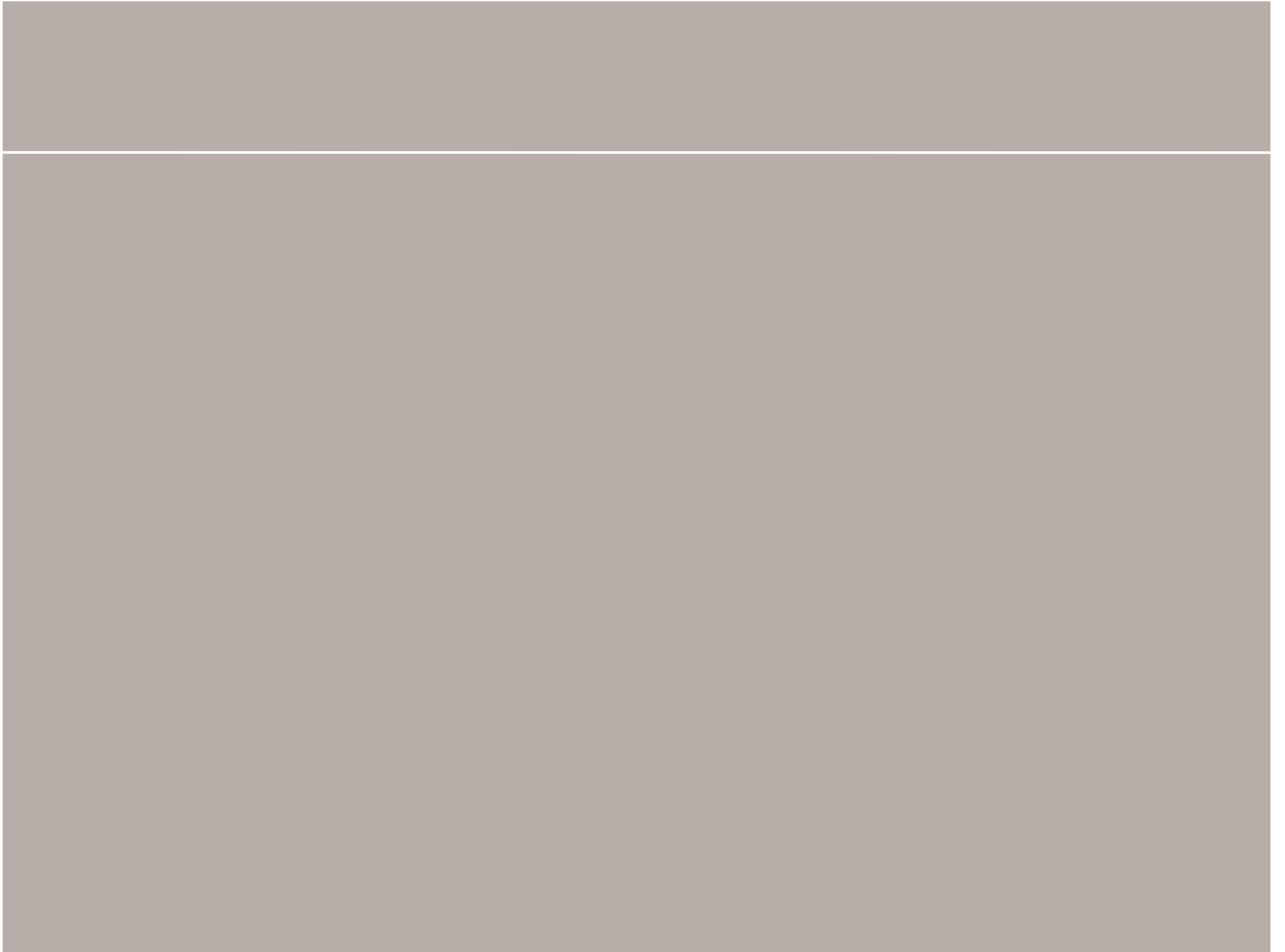


Discussion

To ask a question, use the Q&A function at the bottom of your screen.

You can direct your question to a specific panelist or pose it to the group as a whole.





Conclusion

Thank you for participating in this event,
**Ambitious National Cooling Policy: Development
and Implementation of Model MEPS**

At the end of this session you will be presented with a link to a brief evaluation survey. We appreciate your responses, which will help us plan future events.

You will also receive a follow-up email with a link to a recording of today's session.