The Buyers Club Handbook: Affordable Super-Efficient Room Air Conditioners For All Parties and All Regions

Buyers Club Handbook

Based on the OzonAction/IGSD Publication Authored by:

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Handbook Preview: Context

- Air Conditioning Impact on Ozone Depletion and Climate Change
- Kigali Super-Efficient AC Imperative w/Lower-GWP Refrigerants
- Available and Emerging Lower-GWP Refrigerant Choices
- Opportunities for Affordable and Efficient Room ACs
- Old and New Approaches for Improving Energy Efficiency
  - Minimum Energy Performance Standards (MEPS), labelling, and incentives
  - Life-Cycle Climate Performance (LCCP) for MLF and carbon finance
  - Prior Informed Consent and other tools to stop dumping of obsolete, inefficient or unsafe equipment
- Buyers Club for Affordable, Super-Efficient, Lower-GWP ACs

Handbook Preview: Buyers Club Detail

- What is a Buyers Club?
- When is a Buyers Club the Best Approach?
- Buyers Club Planning Process
- Key Provisions of a Basic Buyers Club Tender
- General Considerations for Specifications of a First Tender
- OzonAction, South-South and NGO Start-Up Assistance
- Case Study: Bankers Buyers Club for ATM Room AC
- Lessons of Learning by Doing: EESL India Bulk Procurement
- Starting a Buyers Club is Easier than You Think!

The A5 Room AC Vicious Cycle

Key Demand Drivers

- A5 economies, populations, and incomes are growing rapidly
- Growth increases building construction and AC demand
- Many A5 Parties experience long, hot and humid cooling seasons and are driven into air conditioned retail buildings, offices, and homes
- Windows are closed against air pollution, noise, insects and crime
- Global warming from climate change requires more cooling
- More cooling increases air pollution from electricity generation

➢Who Can Consider This Progress?

AC Efficiency and Cost

- Customers for air conditioners are often more interested in purchase price than ownership cost and can easily be fooled into buying inefficient models
- Efficient and cost-competitive ACs are commercially available in the global marketplace, but usually not offered at affordable price in A5 markets
- Room ACs sold in developing country export markets without stringent energy efficiency standards are typically less efficient than the ACs sold by the same companies in their home countries!
- Most developing countries have choice of only low energy efficiency!

Importance of More Efficient ACs

- Every low-efficiency AC purchased harms self, community and climate!
- Money spent on imported power plants and fuel would be better spent on super-efficient ACs and low-carbon power supply
- Money saved on energy is spent locally
- Clean Air for healthy people and crops, health care savings….

What is a Buyers Club?

- A Buyers Club is an organization that fosters lowering the price and increasing the quality of selected products by buying in bulk and streamlining distribution and installation
- The Buyers Club can be a government agency or a private organization
- Government Buyers Clubs use “government procurement”
- An AC Buyers Club can make the purchase, take delivery, and distribute the product to subscribers --- or can negotiate a lower price for members who buy from dealers that deliver and install the ACs

Familiar Examples of Buyers Clubs

- Travel clubs offering rental car and hotel discounts for members
- Universities offering computer discounts for their students
- Health authorities offering drug discounts for their patients
- Victims of illness negotiating drug access at affordable prices
- Governments using bulk procurement practices for public services and new facilities
- Military organizations combining and coordinating weapons purchases so each gets a lower price

Montreal Protocol Buyers Club Opportunities

- Now
  - Super-Efficient Room ACs using lower-GWP Refrigerants
- Soon
  - AC manufacturers seeking affordable inverter/motor/compressor modules
  - MLF negotiating affordable leak detection, recovery/recycle and other tools
  - Affordable next-generation refrigerants and equipment as a condition of import or manufacture

EESL Path-Breaking Bulk Procurement (1)

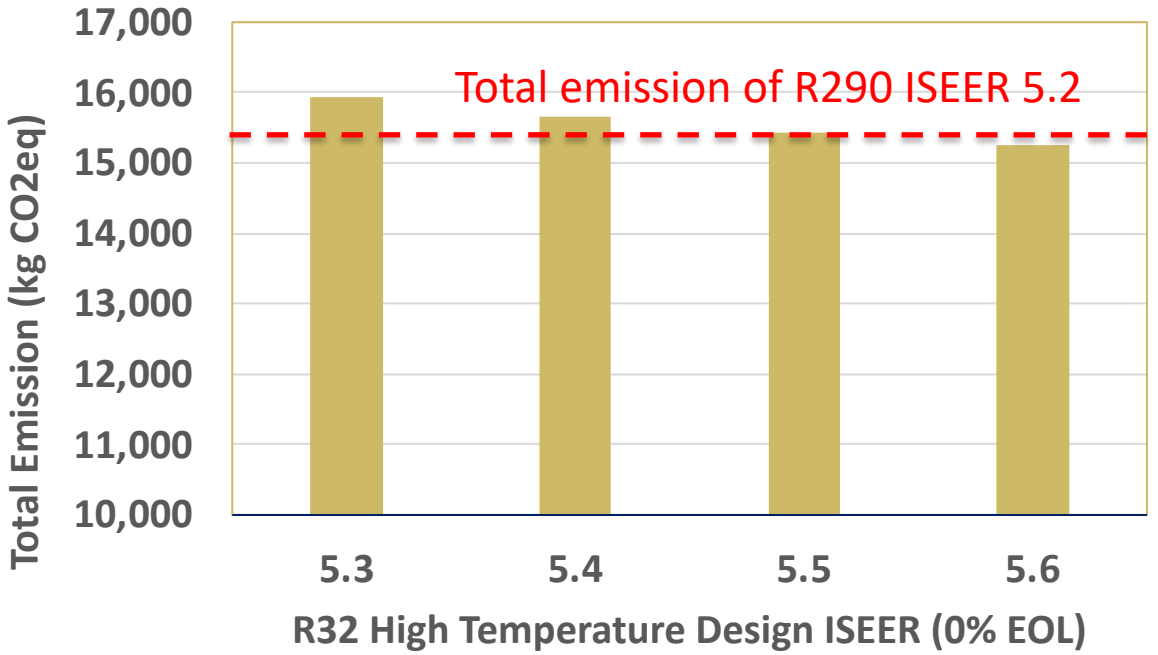
- Energy Efficiency Services Limited (EESL) is a joint-venture company of the Government of India's Ministry of Power and Public Sector Undertakings (PSUs), famous for leapfrogging less-efficient compact fluorescent light bulbs (CFLs) to more-efficient light-emitting diode (LED) bulbs by bulk purchase
- EESL Bulk procurement stimulates price competition, achieves economy-of-scale in domestic manufacturing, saves buyers millions of dollars, and helps clean the air and protect climate
- In 2017, EESL was first to use bulk procurement to make super-efficient room ACs price competitive with less-efficient ACs

EESL Path-Breaking Bulk Procurement (2)

- Now that EESL has demonstrated the power of bulk room-AC procurement, others can proceed confidently to procure higher-efficiency and lower-GWP ACs at affordable prices
- The price, energy efficiency, and GWP of each new bulk procurement are market proof of the affordability every A5 Party can demand in its markets
- The Buyers Club Handbook explains how what was accomplished by EESL can be repeated elsewhere
- OzonAction, EESL, TERI, IGSD, TERRE are Here to Help Jump Start!

LCCP of EESL Contender (High Ambient)

ISSER 5.2 and 15% EOL Scenario	R-410A	R-32	R-290	R-32 ISSER 5.6
Total Lifetime Emission (kg CO_2e)	19,093.4	16,133.3	15,450.3	15,455.7
Total Direct Emission (kg CO_2e)	3,601.8	961.9	1.1	961.9
Annual Refrigerant Leakage (kg CO_2e)	2,881.4	769.5	0.9	769.5
EOL Refrigerant Leakage (kg CO_2e)	720.4	192.4	0.2	192.4
Total Indirect Emission (kg CO_2e)	15,491.6	15,171.4	15,449.2	14,493.8
Energy Consumption (kg CO_2e)	17,790.2	17,412.3	17,740.1	16,612.8
Equipment Mfg. (kg CO_2e)	408.7	408.7	408.7	408.8
Equipment EOL (kg CO_2e)	6.5	6.5	6.5	6.5
Refrigerant Mfg. (kg CO_2e)	39.4	21.9	0.0	21.9



Source: Hwang, Andersen & Wolf 4TH ANNUAL WB COOL WORKSHOP, Dec 2017

Home Case Study

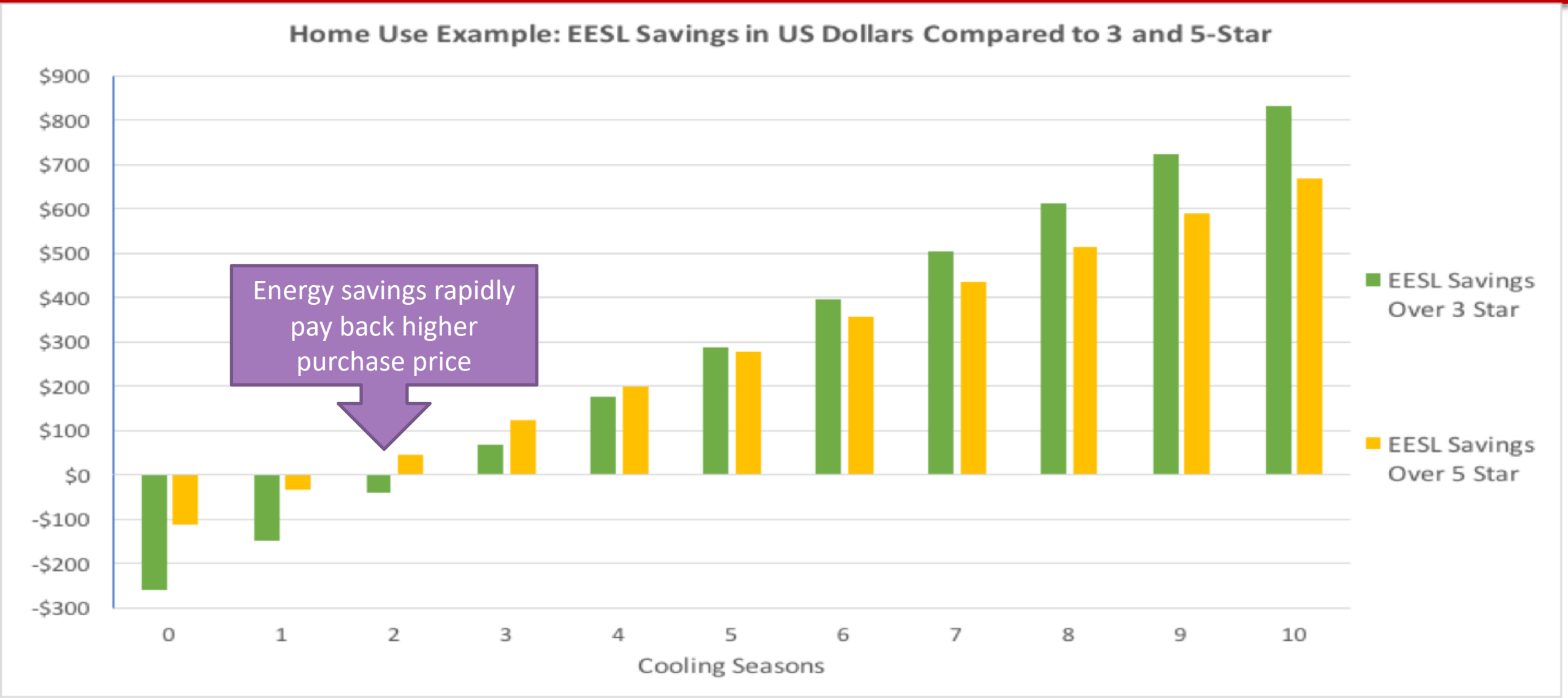
Fast Payback if daily running of about 8 hours for 7 months, Avg. tariff: US$0.095 per kWh

	3-Star 2016 BEE table	5-Star 2016 BEE table	EESL Tender
ISEER	3.1	3.5	5.2
Estimated AC purchase price (US$)	$441	$552	$699
Annual energy use (kWh)	2857	2530	1703
Additional energy expense (US$)	$109 per cooling season $15.57 per month for 7 months	$78 per cooling season $11.14 per month for 7 months	$0
Simple payback of the higher cost 5.2 ISEER RAC from EESL	16.5 months of operation ~ 2.3 cooling seasons	13.2 months of operation < 2 cooling seasons	Saves $78 to $109 per cooling season compared to 5- or 3-Star, respectively
Avoided GHG emission reductions (kg CO_2)	981 kg CO_2	833 kg CO_2	0 kg CO_2

Source: Karan Mangotra edited by Team

Room ACs using HC-290 have additional climate benefits compared to equally efficient room ACs using HFC-410A

Home Case Study: ~$675 to ~$825 Saved in 10 Years!



Note: Cumulative savings depend on product life expectancy

Source: Karan Mangotra edited by Team

Office Case Study

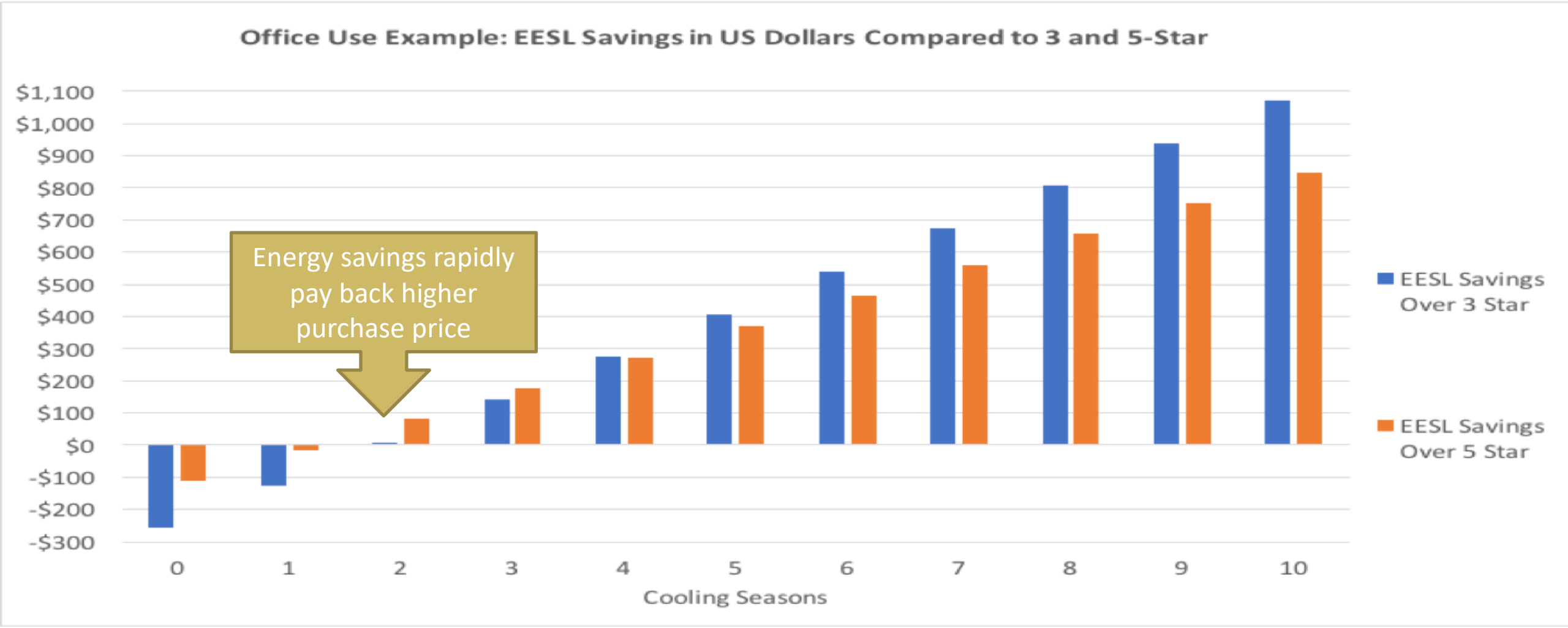
Fast Payback if 5-day running of about 10 hours for 7 months, Avg. tariff: US$ 0.126 per kWh

	3-Star 2016 BEE table	5-Star 2016 BEE table	EESL First Procurement
ISEER	3.1	3.5	5.2
Estimated AC purchase price (US$)	$441	$552	$699
Annual energy use (kWh)	2618	2319	1561
Additional energy expense incurred by you if non-ESEAP used (US$)	$133 per cooling season $19 per month for 7 months	$96 per cooling season $13.71 per month for 7 months	$0
Simple payback of the higher cost 5.2 ISEER RAC from EESL	13.6 months of operation < 2 cooling seasons	10.7 months of operation < 2 cooling seasons	Saves $96 to $133 per cooling season compared to 5- or 3-Star, respectively
Avoided GHG emission reductions (kg CO_2)	899 kg CO_2	644 kg CO_2	0 kg CO_2

Source: Karan Mangotra edited by Team

Room ACs using HC-290 have additional climate benefits compared to equally efficient room ACs using HFC-410A

Office Case Study – ~$825 to ~$1075 Saved in 10 Years!



Note: Cumulative savings depend on product life expectancy

Source Karan Mangotra edited by TEAM

2030 Peak Load Reduction and Avoided Power Plants From Superior-Efficiency Room ACs

	Peak Load Reduction (GW) from 30% Efficiency Improvement and Refrigerant transition	Number of Avoided 500- MW Peak Power Plants
Brazil	15-36	31-72
China	132-310	264-620
Egypt	3-7	6-14
India	28-66	56-130
Indonesia	20-46	40-92
Mexico	2-5	4-10
Pakistan	1-3	2-6
Thailand	6-14	12-28
GLOBAL	**338-788**	**676-1576**

Source: Nihar Shah, Max Wei, Virginie E. Letschert, and Amol A. Phadke; 2015

Fast Start with Bank ATM Rooms?

- Banks in most countries put ATMs in small air-conditioned rooms
- Most ATM ACs are old, inefficient, expensive to operate and unreliable
- Replacement super-efficient ACs rapidly pay back cost in hot and humid climates, particularly if purchased through a Buyers Club
- Banks can finance procurement, make ACs available to others at the bid price, and can finance customer purchase and installation
- Electric utilities could be the loan collection agency with pay back such that the monthly bill is never higher than with an inefficient AC

The Basic Recipe for a RAC Buyers Club

- ✓ One ambitious “cook” in charge: country decision
- ✓ Meet with energy authorities and plan cooperation on Buyers Club
- ✓ Collect information on ATM rooms, colleges, hospitals, libraries, public housing and other large AC buyers
- ✓ Meet with the potential buyers with strong likelihood of leadership
- ✓ Ask RAC suppliers how large a first order for substantial discount
- ✓ Explore financing mechanisms that will support energy savings
- ✓ Once ready to move forward, contact OzonAction Buyers Club Team
- ✓ OzonAction will involve other experts as needed

Essential to Room AC Buyers-Club Success

- Confirmed demand sufficient to justify price discount
- Payment security to supplier offering discount products
- Supplier confidence in fair bidding based on published criteria
- Competitive bidding for RACs qualifying as super-efficient lower-GWP
- Sustainable balance of affordability, safety, reliability, carbon footprint, GWP, profit, and wages for properly trained installers
- Honest and transparent disclosure of long-term plans for continuous improvement in environmental performance (carbon footprint)

Final Remarks

- HFC-410A discredited worldwide for inferior Life-Cycle Climate Performance (LCCP), particularly at high ambient temperature!
- Super-Efficiency with lower-GWP refrigerants is the new metric for low-carbon footprint!
- All manufacturers can join the Challenge for Affordable Super-Efficient Room ACs (AC Challenge)!
- Power and energy service companies are part of the solution!
- For more details see: Leap Frogging to Super Efficiency http://www.igsd.org/publications/government-ngo/

Thank You Very Much

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Backup Slides

Recap: EESL & NGO Partner Strategy

- Step 1: The Clean Energy Ministerial Advanced Cooling Challenge invites corporate leadership in affordable energy efficiency
- Step 2: Daikin India offers affordable super-efficient room AC locally produced with HFC-32 technology available to any manufacturer
- Step 3: TERI & IGSD help set the stage and motivate the actors using an impressive network of climate champions
- Step 4: EESL issues first tender for 100,000 5.2 ISEER room ACs
- Step 5: EESL plans for procurement of 400,000 more increasingly efficient room ACs with lowest feasible carbon footprint

Step 1: The Clean Energy Ministerial (CEM)

- The CEM is a Global Forum to Promote Policies and Share Best Practices to Accelerate the Global Transition to Clean Energy
- Members Are:
  - Australia, Brazil, Canada, Chile, China, Denmark, the European Union, Finland, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Norway, Russia, Saudi Arabia, South Africa, Spain, Sweden, the United Arab Emirates, the United Kingdom, and the United States
- The CEM Advanced Cooling Challenge (AC Challenge) Inspires:
  - "[G]overnments, companies, and other stakeholders to develop and deploy at scale super-efficient, smart, climate-friendly, and affordable cooling technologies that are critical for prosperous and healthy societies"

Step 2: Daikin Response to CEM AC Challenge!

- Daikin Air-Conditioning India (Daikin India) offered an affordable super-efficient room AC using lower-GWP refrigerant HFC-32, available as soon as public and private energy efficiency programs were aligned in India
- The Daikin India ambition is to market a 5.2 ISEER* inverter room AC with HFC-32 refrigerant with a price that is 12% to 15% lower than the current retail price of premium 4.5 ISEER** variable speed ACs
  - * A 5.2 ISEER room AC would earn 7-Stars (if the scale went that high)
  - ** A 4.5 ISEER room AC is the lowest efficiency now qualifying for 5-Stars
- Daikin International had already granted free access to patented HFC-32 technology

Step 3: TERI-IGSD Response to AC Challenge!

- Ajay Mathur (Director General, TERI) and Stephen O. Andersen (Director of Research, IGSD) co-chaired a committee of Indian and global experts -- including Suely Carvalho, Marco Gonzalez, Karan Mangotra, and Rajendra Shende -- and partnered organizations to align public and private policy
- The committee collaborated with experts from the Bureau of Energy Efficiency (BEE), Collaborative Labelling and Appliance Standard Program (CLASP), Energy Efficiency Services Limited (EESL), Natural Resources Defense Council (NRDC), Super-Efficient Appliance Deployment (SEAD), TERRE, and other notable organizations
- The policy alignment helped make super-efficient room ACs both cost effective for owners and profitable to companies who respond to the AC Challenge
- The plan focused on smart specifications, effective partnerships, innovative business models and effective outreach to achieve the collective goal of raising energy efficiency and lowering GWP of new equipment

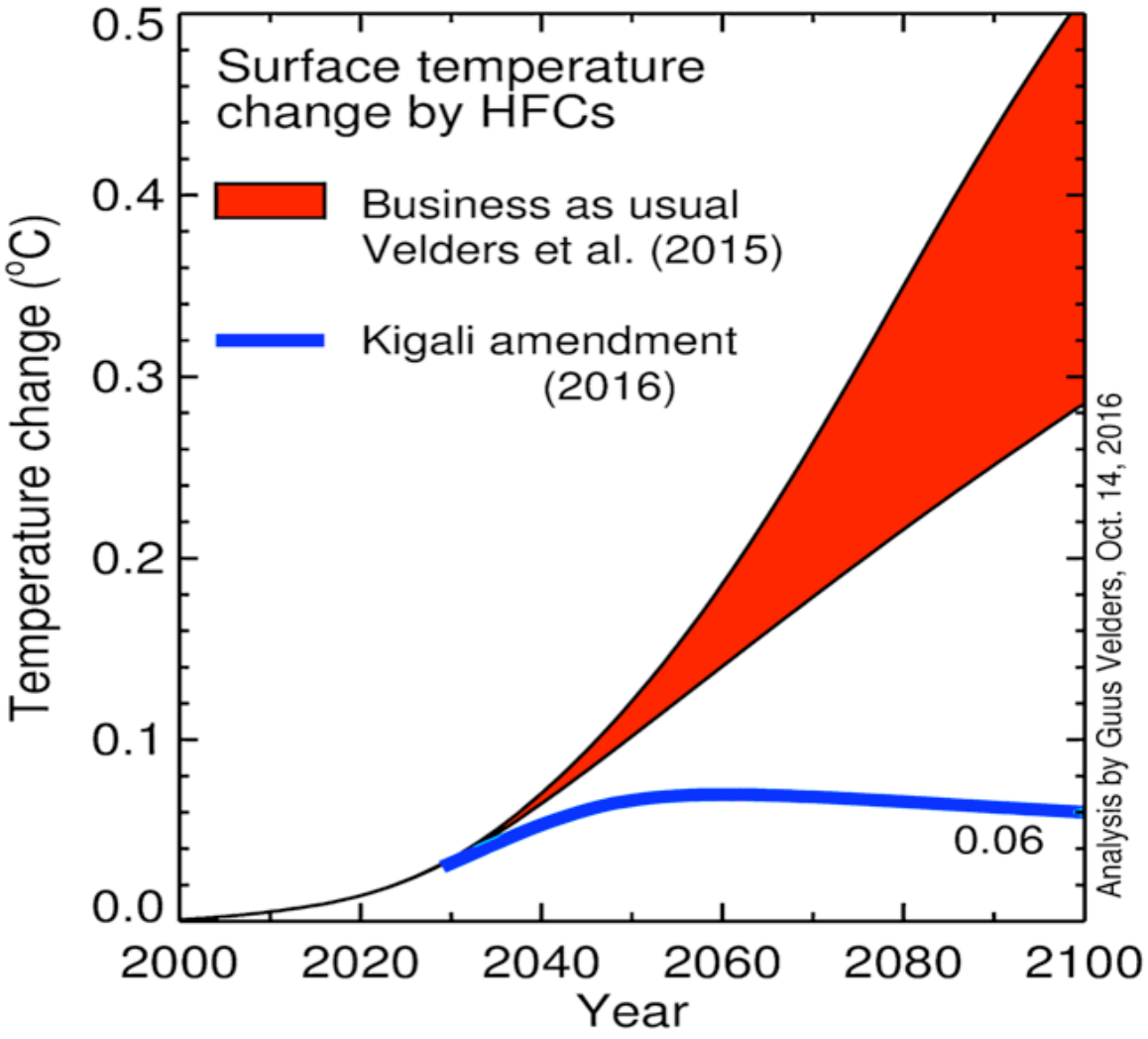
Step 4: EESL Super-Efficient Procurement Success!

- First Procurement of 100,000 Super-Efficient Room ACs:
  - "Design, manufacture, supply, installation, and provision for after-sales warranty and customer support for 5.28 kW (1.5 TR) room air- conditioners with ISEER of 5.2 (or higher) including three year comprehensive warranty"
- EESL achieved a 30% discount on 100,000 5.2 ISEER room ACs; 40% of the procurement features natural refrigerant HC-290 (propane)

Step 5: Affordable Room ACs in all A5 Markets!

- OzonAction & Buyers-Club Partners Next Steps:
  - Capacity build on energy efficiency and buyers clubs
  - Jump-start buyers clubs and learn by doing
  - Use Regional Networks and NOUs to cultivate and report success
- EESL Next Steps
  - Generate demand in Indian export markets for super-efficient products available from existing and new EESL procurements and thereby widen and deepen the supply chain of affordable room ACs
    - » India currently primarily exports to Bangladesh, Nepal, and Sri Lanka

Avoided warming from the Kigali Amendment compared to Business-As-Usual (BAU)

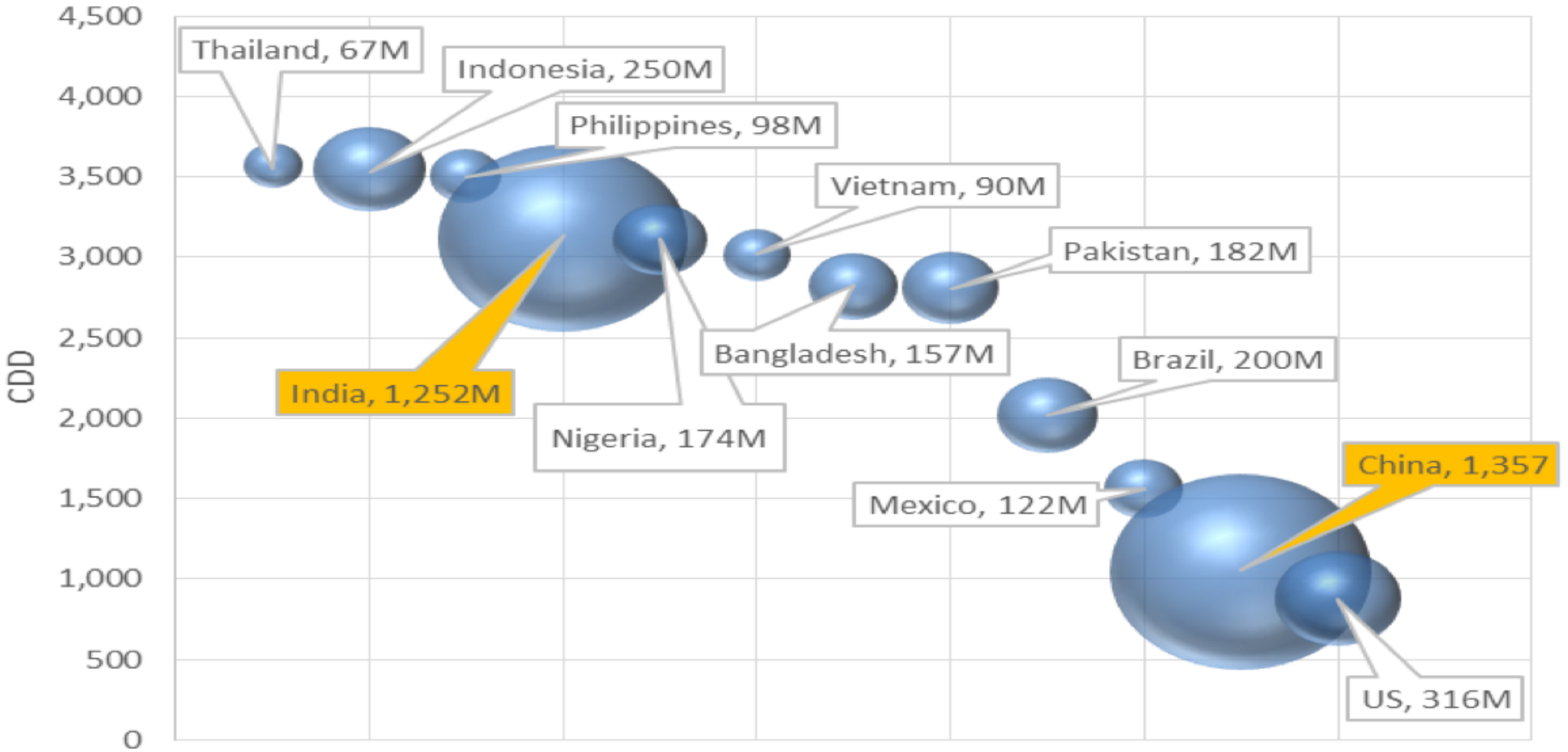


Mitigation from F-gas cuts since 1974 = size of CO_2 warming today

MP agreed to cut HFCs in 2016

Kigali Amendment will avoid 80 Gt CO2-e by 2050, up to 0.5C warming by 2100

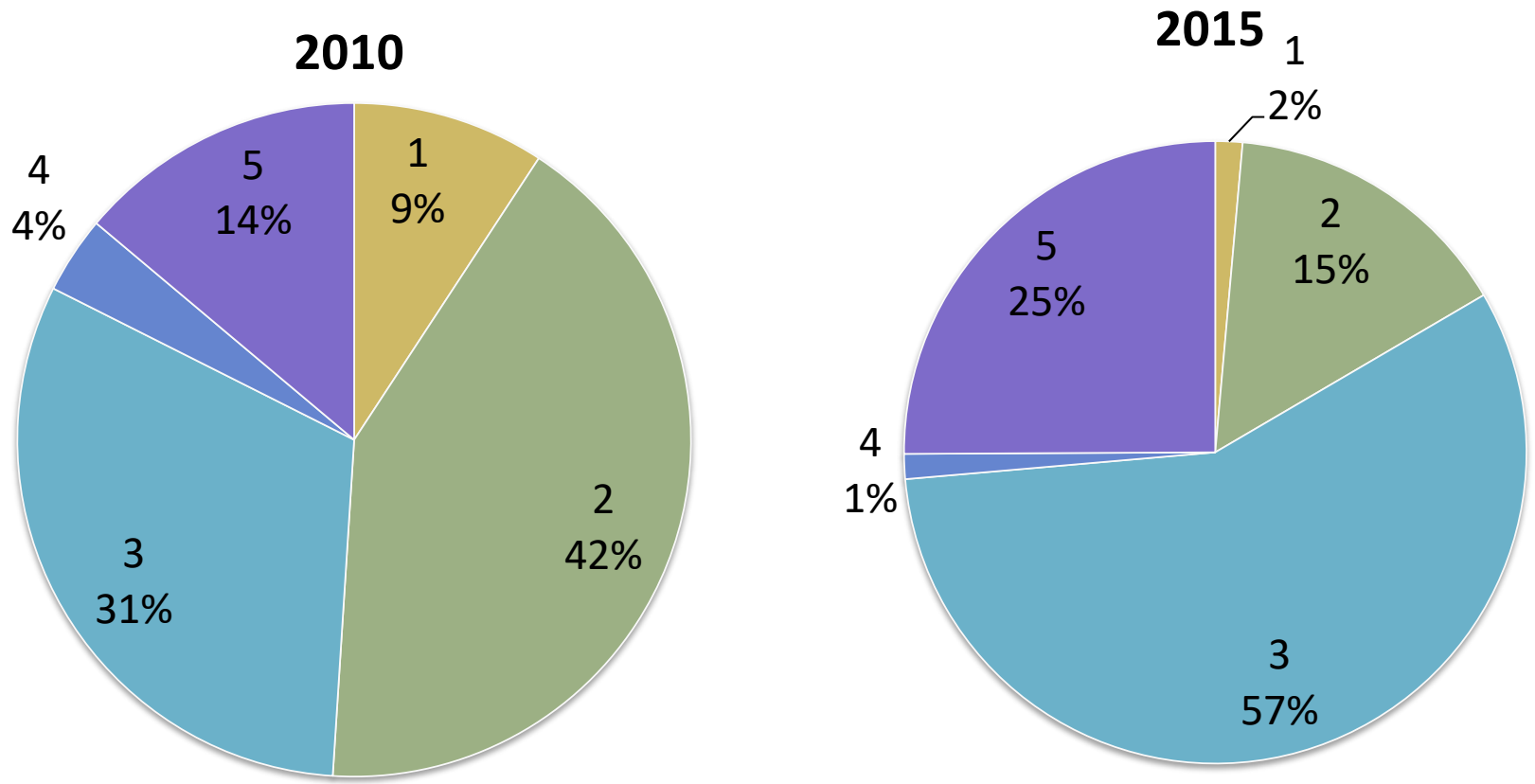
Cooling Degree Days & Population



Source: Davis et al, Proceedings of the National Academy of Sciences, 2015

Star Labeling Impact in India

Air Conditioners Market



Super Energy-Efficiency Imperative

- The Montreal Protocol transition to Super-Efficiency and a Lower-GWP Pathway can reap high climate protection benefits
- Low-GWP, Super-Efficient room AC lowers ownership cost, avoids new power plants, cleans air, lowers health-care costs, and protects agricultural and natural ecosystems
- The business opportunity is huge from the replacement of high-GWP HCFC and HFCs with HC-290, HFC-32 and new HFC/HFO blend, avoiding wasted infrastructure from obsolete HFC-410A!
- The Clean Energy Ministerial calls on stakeholders to commercialize affordable super-efficient cooling technology