

# Buyers Clubs Support Affordable Access to Super-Efficient Low-GWP ACs

**WORKSHOP ON  
ENERGY EFFICIENCY**

NAIROBI, KENYA  
22 OCT 2023

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The Montreal Protocol  
Has the Power to Stop  
Inefficient Cooling Equipment and Obsolete Refrigerants  
From Forcing Earth Past Climate Tipping Points  
That Threaten Life on Earth

# What is a Buyers Club?

- Buyers Clubs lower the purchase price and increase the environmental performance by bulk purchase and streamline distribution and installation according to best practices
- Air Conditioner (AC) Buyers Clubs can purchase the ACs take delivery, and install the product for members -- or can negotiate a lower price for members who buy from dealers that deliver and install the ACs
- Optional agreements can be made for supervised installation and improved service to maintain energy efficiency and savings
- Yes, every Multilateral Fund Implementing Agency should aggregate demand for replacements and bargain for discounts

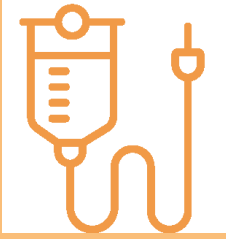
# 2017 India EESL Path-Breaking Bulk Procurement

- Ajay Mathur and Stephen O. Andersen co-chaired the alignment of Indian government policy in support of the first bulk procurement to make super-efficient room AC price competitive
- Energy Efficiency Services Limited (EESL) Bulk procurement stimulated price competition, achieved economy-of-scale in domestic manufacturing, saved buyers millions of dollars, and helped clean the air and protect the climate
- Others can proceed confidently to procure higher-efficiency and lower-GWP ACs at affordable prices
- Each procurement raises the bar on what A5 Parties can demand

# Indicative Buyers Club Opportunity in Brazil

- Over 2 are already responsible for 15% of Brazilian residential sector electricity consumption driving peak loads, increasing power generation 200 million inhabitants with increasing income living in a hot and humid climate that is rapidly warming from climate change
- ACs costs, polluting air, and contributing to higher electricity tariffs

# Brazil Cooling Sector Opportunities



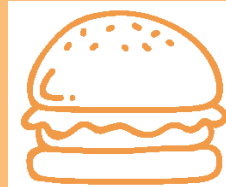
- > 2900 public and > 4300 private **health institutions**
- > 445000 patient rooms, with split and refrigerators installed + central cooling systems
- Major refrigerants: R22, R410A, R134a



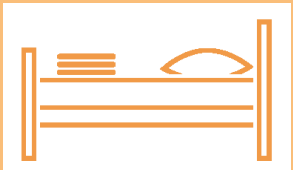
- >6300 **convenience stores**
- Sector is expanding in Brazil
- Each one demands at least 2 splits and 6 beverage and food exposer in average
- Major refrigerants: R22, R134a, R404a



- > 21000 bank agencies across Brazil
- Most part adopts central cooling systems
- COVID-19 accelerated the shift to smaller agencies, prompting the demand for splits
- Major refrigerants: R22, R410A, R134a



- > 9000 **fast-food restaurants**
- Market dominated by few major companies
- Buildings usually demands splits, post-mix, ice-cream machines, freezers, etc.
- Major refrigerants: R22, R134a, R404a, R410A



- > 31000 hotel buildings, > 960000 **hotel rooms**
- High demand for splits and central cooling systems
- High demand for small refrigerators
- Major refrigerants: R22, R134a, R404a



- > 63000 **bakery stores** around the country
- Local players
- Buildings usually demands splits, post-mix, freezers, beverage expositors, etc.
- Major refrigerants: R22, R410A, R134a

# Sample AC Replacement Programme in 33 Hospitals Sample in Brazil

## Potential for Refrigerant Collection and Disposal ( metric tonnes)

| Year * | Potential for Collection and Proper Disposal of HCFC-22 (metric tonnes) |
|--------|---|
| 2022   | 2523  |
| 2024   | 5065  |
| 2028   | 5886  |

\*10 year lifetime for R-22

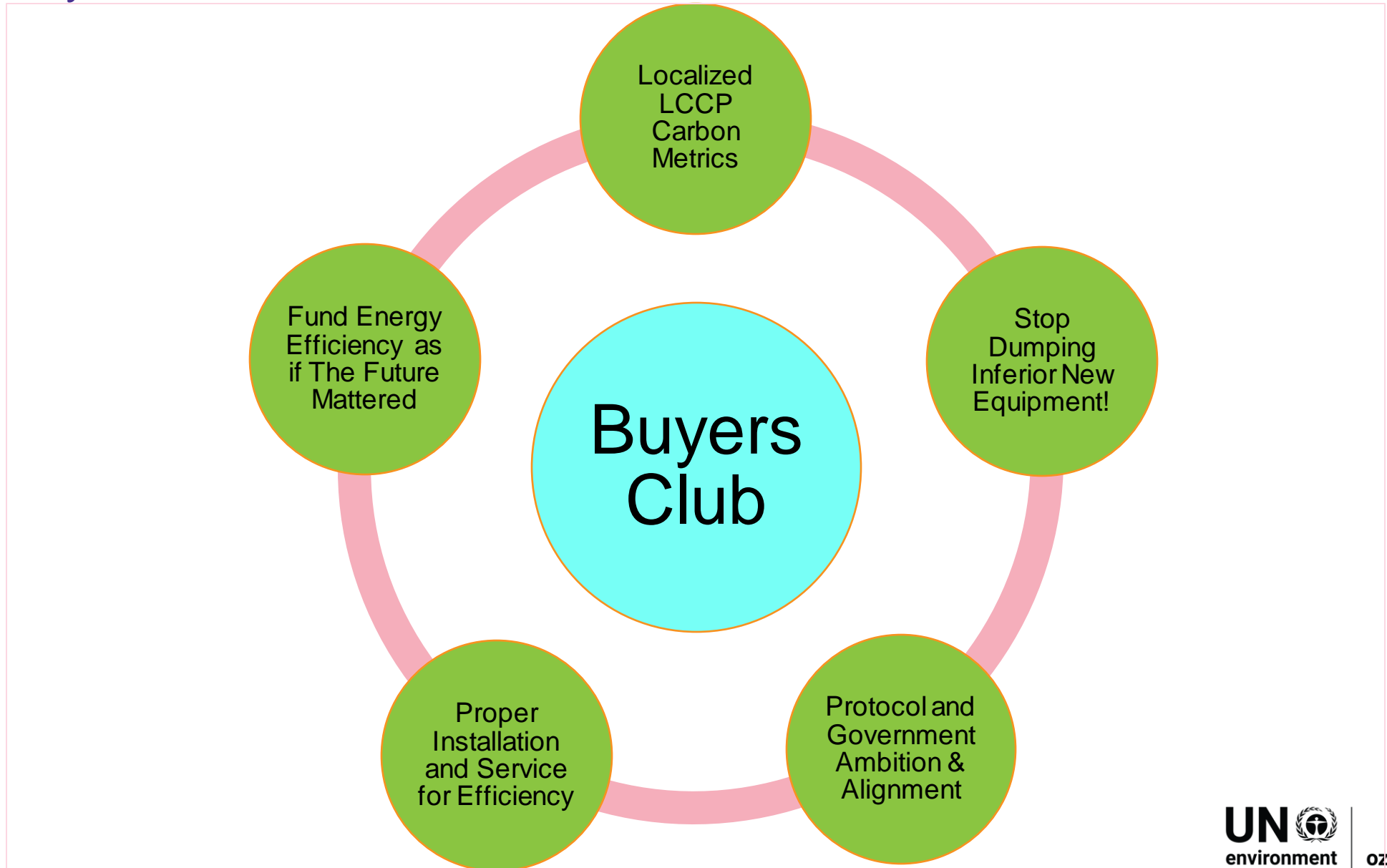
| Year ** | Potential for Collection and Proper Disposal of HFC-410A (metric tonnes) |
|---------|--|
| 2024    | 876  |
| 2027    | 876  |
| 2029    | 3517   |
| 2033    | 4087   |

\*\*15 year lifetime for R-410A

**Opportunity for replacement of inefficient/ high GWP refrigerant AC and training for procurement authorities for proper selection of alternative technologies that are ozone and climate friendly**

[Ref: Suely Carvalho, Kamyla Borges, ICS, Vital Ribeiro, PHS. Stephen O. Andersen, IGSD. 2021. "Towards Economically Sustainable EOL Schemes Case Studies in Brazil and Morocco". OEWG43 side event.](#)

# Buyers Club Synchronization



# Take Fast Action With Buyers Clubs

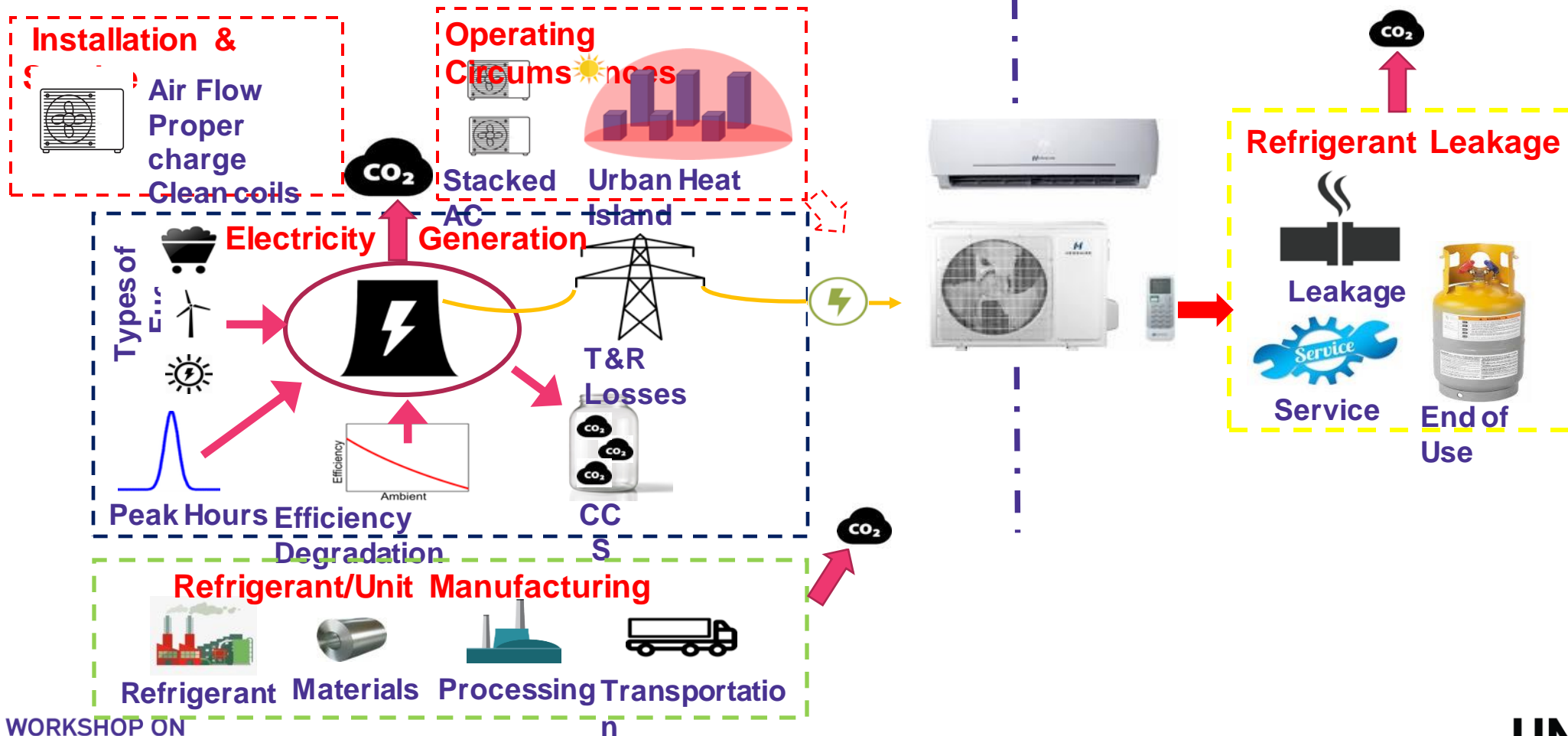
- Learn from the Notes and Backup Slides in this Presentation
- Study the Referenced Publications for the Devil in the Detail
- Network with Buyers Club Experts
- Replenish the MLF for Energy Efficiency Beyond Compliance
- Join Forces with Ministries of Energy and Implementing Agencies to Gain Access to the Most Energy Efficient Cooling Equipment with Lower GWP Refrigerants at Favourable Prices

# Backup Slides

# Localized Life-Cycle Climate Performance (LCCP)

## Indirect Emission

## Direct Emission



# Status Quo Temperature Bins Ignore:

Heat Islands, Stacking, Clustering, Long Hoses, Poor Airflow, ...

|            |                       | Marrakech | Tangier   | Casablanca |
|------------|-----------------------|-----------|-----------|------------|
| Bin Number | Temperature Bins (°C) | Bin Hours | Bin Hours | Bin Hours  |
| 1          | 18.3-21.1             | 1,213     | 1,388     | 1,862      |
| 2          | 21.1-23.8             | 811       | 953       | 1,645      |
| 3          | 23.9–26.6             | 887       | 867       | 688        |
| 4          | 26.7-29.3             | 650       | 366       | 116        |
| 5          | 29.4–32.1             | 501       | 150       | 16         |
| 6          | 32.2-34.9             | 298       | 43        | 0          |
| 7          | 35–37.7               | 207       | 14        | 0          |
| 8          | 37.8-40               | 161       | 1         | 0          |

# Improper Installation Increases Energy Use

Buyers Clubs can include best practices and inspection

Overhang Obstructs Airflow



Improper Spacing for Air Intake



Air Intake Blocked by Roof Beam



# Proper Installation for Maximum Efficiency



Unobstructed Heat  
Discharge

# Global RAC Anti-Dumping Campaign

- Obsolete and Inefficient HCFC-22 and HFC-410A Room ACs are Dumped in A5 Markets Worldwide
- This dumping Harms AC Owners, Local Communities, Nations, and Climate
  - Money spent on electricity is wasted on imported fuel and power plants
  - Money saved on electricity is spent locally
  - Local spending recirculates, creating local jobs and prosperity

# Profitable Lower Cost Supply

- Sustainable procurement requires continuously profitable supply chains to motivate research, development and commercialization, to achieve economy of scale, and to enter all A5 markets
- The Buyers Club strategy is to reduce the cost of supply by rewarding companies competing for quality and low-carbon performance and to reduce the cost of marketing, distribution, installation, inspection, service, and recover/recycle at end of product life
- Green is the new Gold

# Why Equatorial A5 Parties?

- Long, hot cooling seasons made worse by climate change with expensive and stressed fossil fuel electric supply
- Low AC market penetration and high expected growth rate
- Champions of Montreal Protocol HFC Kigali Amendment, Leadership in leapfrogging high-GWP HFCs in HCFC phaseout, and Ambition to integrate energy efficiency in refrigerant transition

# Why Private Banks in Buyers Clubs?

- Bankers are the masters of rate-of-return and pay-back and know that energy savings can accumulate into fortunes
- Bankers are concerned and involved in their communities and are trusted advisors in sustainable investment
- Bankers have access to money for investment and set an example for others wanting to do their part for sustainable prosperity
- Local Banks are often owned by national or international organizations, allowing success in one location to be quickly replicated

# History of AC Buyers Clubs (1)

- 2006:
  - Atul Bagai and Saurabh Kumar (OzonAction), Sitaram Joshi (Nepal Ozone Officer), Stephen O. Andersen (US EPA & TEAP), and the Hotel Association of Nepal (HAN) plan AC buyers club for green tourism
- 2013:
  - Saurabh Kumar moves from OzonAction to India's Energy Efficiency Services Limited (ESSL) as Managing Director
- 2015
  - Ajay Mathur (India Bureau of Energy Efficiency-BEE) and Stephen O. Andersen begin collaboration with Suely Carvalho (UNDP, retired) and Marco Gonzalez (Ozone Secretariat, retired) on 'government alignment' strategy for energy efficiency

# History of AC Buyers Club Leadership (2)

- 2016

- Daikin responds to the Clean Energy Ministerial Advanced Cooling Challenge (ACC) with a pledge to offer a super-efficient ACs using a lower-GWP refrigerant at a favorable price if a government procurement can buy enough to achieve economy of scale
- Ajay Mathur became Director General of The Energy & Resources Institute (TERI)
- Ajay, Stephen, Suely, Marco, and a dozen partners complete government and industry alignment
- Kigali Amendment agreed to phase down hydrofluorocarbons (HFCs)
- Kigali Decision (by Morocco and Rhonda) for energy

# History of AC Buyers Club Leadership (3)

- 2017
  - Saurabh Kumar and EESL tender for 100,000 room ACs at ISEER of 5.2 or higher, which is awarded to Panasonic and Godrej
- 2018
  - IGSD and Partners pursue Private Buyers Clubs in Morocco and Brazil with government, banking, and industry partners
  - ASHRAE publishes Enhanced and Localized Life Cycle Climate Performance Metric (EL-LCCP)
- 2023
  - Buyers Club Strategy Gaining Traction for Affordable Ownership and Cost-Effective Finance of New High Efficiency Cooling Equipment with Lower-GWP Refrigerants

# History of Stop Dumping Leadership (1)

- 1993-1995
  - Mauritius and Morocco warn that deliberate dumping of obsolete cooling products could increase ODS consumption and affect compliance with the Montreal Protocol
- 2016
  - Immediately after passing the Kigali Amendment, Parties agree the Energy Efficiency Decision put forward by Rwanda and Morocco aiming to combat dumping of inefficient cooling equipment and thermal insulating foam
- 2018
  - Scholars define environmental dumping and craft legal tools and strategy aimed at protecting the tools from international trade challenges: See “Defining the Legal and Policy Framework to Stop the Dumping of Environmentally Harmful Products”  
<https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1356&context=delpf>

# History of Stop Dumping Leadership (2)

- 2019
  - Commitments to prevent environmentally harmful dumping of cooling appliances are included in the Biarritz Pledge for Fast Action on Efficient Cooling
- 2020
  - TEAP warns environmentally harmful dumping impacts ozone and climate and blocks access to superior technology to replace ODSs
- 2021
  - The Intergovernmental Panel on Climate Change (IPCC) warns that environmentally dumping of cooling equipment undermines efforts to prevent and adapt to climate change

# History of Stop Dumping Leadership (3)

- 2021 (continued)
  - Ghana, on behalf of Africa, submits draft decision to “Stop the Harmful Dumping of New and Used, Inefficient Refrigeration and Air Conditioning Appliances Using Obsolete ODS and HFC Refrigerants”
  - Investigative reporters in Cameroon document illegal dumping of refrigerators despite best efforts of government
- 2022
  - Authorities report that even the most aggressive enforcement by importing Article 5 Parties is no match for the power of unethical multinational corporations determined to dump cooling products in Africa. See “The Importance of Stopping Environmental Dumping in Ghana

# History of Stop Dumping Leadership (4)

- 2022 (continued)
- Union of Associations of African Actors in Refrigeration and Air-Conditioning (U-3ARC) asks industry leaders and government officials to join forces in stopping cooling equipment dumping in Africa
- Sharm el-Sheikh Communique adopted at the 2nd Climate and Clean Air Coalition (CCAC) Ministerial at COP commitment “to the accessibility of the best available climate technologies in the cooling sector and support discussions under the Montreal Protocol to prevent market penetration of obsolete technologies”

# History of Stop Dumping Leadership (4)

- 2023
  - CCAC Paris Workshop of Stopping the Unwanted Dumping in Africa of Inefficient Cooling Appliances With Obsolete Refrigerants
  - CLASP documents widespread dumping in Southeast Asia of inefficient high-GWP RACs
  - OEWG Moves Stop Dumping CRP forward toward Shared Responsibility

# Buyers Club Handbook

- 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

# A5 RAC Market Drivers

- AC demand is driven by low rate of AC market penetration; long, hot, and humid air conditioning seasons and increasingly frequent heat waves; and increasing population, urbanization, wealth, and electrification
- Expensive electricity generated from fuel imported from foreign countries makes energy efficiency more economic than elsewhere
- The Kigali Amendment to the Montreal Protocol will phase-down hydrofluorocarbon (HFC) refrigerants and increase energy efficiency
- The challenge is to gain access to the best next-generation technology while avoiding obsolete technology
- A Bankers Buyers Club can jump start investment in super-efficiency with climate and clean air benefits

# Cultivate Super-Efficient RAC Supply

- R-22 and R-410A are Obsolete, High GWP, Scarce, and Costly
- R-32
  - Most A5 Parties are leapfrogging to R-32
  - 40 manufacturers have sold more than 160 million in more than 90 countries; Japan has completed the transition from R-410A to R-32
- HC-290
  - HC-290 market penetration worldwide is low, but progress on approval in Germany is considered a breakthrough
  - R-290 ACs can achieve the lowest carbon footprint in small occupied spaces where the safe maximum refrigerant charge allows energy efficiency

# Kigali Success With Help From Friends of Earth

- Locally-Appropriate Carbon Footprint Metrics Guide Choice
- Participation of Global Suppliers of Super-Efficient Lower-GWP ACs
- Respect National Choice of Affordable GWP and Energy Efficiency
- Good Faith Efforts to Stop Dumping Products Widely Prohibited
- Backup with Stronger MEPS Justified by Lower Buyers Club Price From Economy-of-Scale and Competition

# Selected Bibliography (1)

- Agyarko, Kofi A., Stephen O. Andersen, Richard “Tad” Ferris, Gabrielle “Gabby” B. Dreyfus, Mohamed Rida Derder, Leslie Olonyi Bosire, Laura Bloomer, and Xiaopu Sun. 2022. The Importance of Stopping Environmental Dumping in Ghana: The Case of Inefficient New and Used Cooling Appliances with Obsolete Refrigerants. *32 Duke Environmental Law & Policy Forum* 51-106  
<https://scholarship.law.duke.edu/delpf/vol32/iss1/2>.
- Agyarko, Kofi A. (Editor). 2023. Report of the Climate and Clean Air Coalition (CCAC) Stop Dumping Workshop. Paris 24-25 August.
- Andersen, Stephen O., James Wolf, Yunho Hwang, and Jiazhen Ling. 2018. *Life-Cycle Climate Performance Metrics and Room AC Carbon Footprint*. ASHRAE Journal, November. <https://enme.umd.edu/news/story/lifecycle-climate-performance-metrics-and-ac-carbon-footprint>.

## Selected Bibliography (2)

- Andersen, Stephen O., Richard Ferris, Romina Picolotti, Durwood Zaelke, Suely Carvalho, and Marco Gonzalez. 2018. *Defining the Legal and Policy Framework to Stop the Dumping of Environmentally Harmful Products*. 29 Duke Environmental Law & Policy Forum 1-48. <https://scholarship.law.duke.edu/delpf/vol29/iss1/1>.
- Carvalho, Suely, Kamyla Borges, Vital Ribeiro, and Stephen O. Andersen. 2021. “Towards Economically Sustainable EOL Schemes Case Studies in Brazil and Morocco”. OEWG43 Side Event.
- CCAC (Climate and Clean Air Coalition). 2022. Resource Book for Life Cycle Management of Fluorocarbons: Good practice portfolio for policy makers. <https://www.ccacoalition.org/sites/default/files/resources/Resource%20Book%20Life%20Cycle%20Management%20of%20Fluorocarbons%20-%20FINAL.pdf>.

## Selected Bibliography (3)

- CLASP. 2018. *Africa Air Conditioner Market Scoping Study: Final Report*. 15 August. <https://www.clasp.ngo/research/all/scoping-study-of-african-air-conditioner-markets/>.
- CLASP. 2023. *Dumping in Southeast Asia of Inefficient Room Air Conditioners with Hazardous Obsolete Refrigerants. Final Report*. 16 September.
- Ezzedine Khalfallah, Rafik Missaoui, Samira El Khamlichi and Hassen Ben Hassine. 2016. *Energy-Efficient Air Conditioning: A Case Study of the Maghreb Opportunities for a More Efficient Market*. The World Bank Group. April. <https://openknowledge.worldbank.org/entities/publication/149590a0-feac-5299-aa0b-cf98f339bc17>.

## Selected Bibliography (4)

- IGSD. 2018. *Primer on HFCs*: Fast action under the Montreal Protocol can limit growth of hydrofluorocarbons (HFCs), prevent 100 to 200 billion tonnes of CO<sub>2</sub>-eq by 2050, and avoid up to 0.5°C of warming by 2100. Lead Authors: Durwood Zaelke, Nathan Borgford-Parnell, and Stephen O. Andersen and Contributing Authors: Kristin Campbell, Xiaopu Sun, Dennis Clare, Claire Phillips, Stela Herschmann, Yuzhe Peng Ling, Alex Milgroom, and Nancy J. Sherman. <http://www.igsd.org/wp-content/uploads/2018/01/HFC-Primer-v11Jan18.pdf>.
- Theodoridi, Christina, Alex Hillbrand, Christina Starr, Avipsa Mahapatra, and Kristen Taddonio. 2022. *The 90 Billion Ton Opportunity*. Environmental Investigation Agency (EIA), Institute for Governance & Sustainable Development (IGSD), and the Natural Resources Defense Council (NRDC).

## Selected Bibliography (5)

- Xiaopu Sun, Houfu Yan, Shekun Wang, and Tad Ferris. 2021. *An Opportunity That Should Not Be Missed: Applying Chinese Policy That Promotes Efficient Air Conditioning to Countries That Need It*. Sustainable Development Law & Policy Brief. [https://www.igsd.org/wp-content/uploads/2021/11/China-Same-Line-Policy-Article-20Oct2021\\_8Nov.pdf](https://www.igsd.org/wp-content/uploads/2021/11/China-Same-Line-Policy-Article-20Oct2021_8Nov.pdf).