ENERGY FOUNDATION
能源基金会

Challenges, Opportunities and Action on Advancing Cooling Efficiency in China

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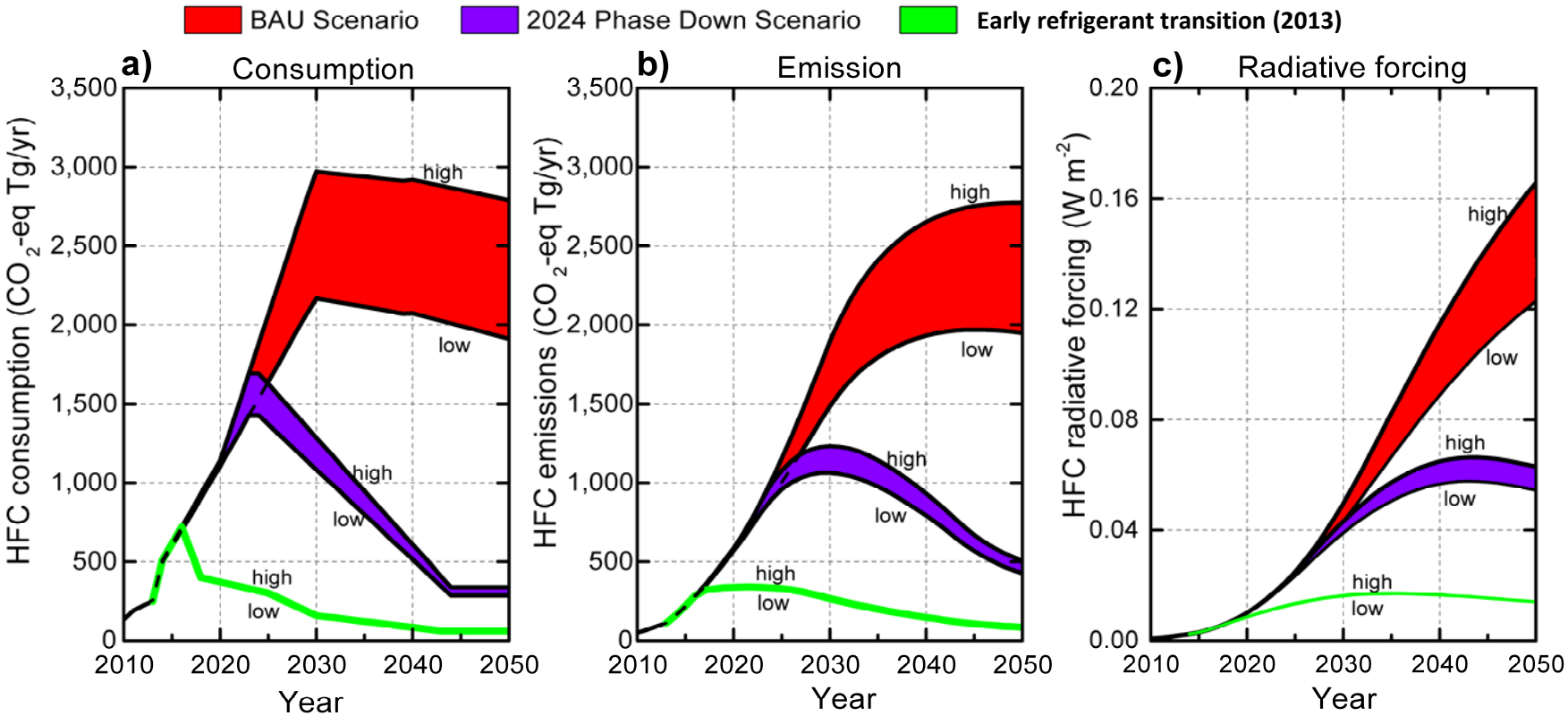
2020-2030 ARE THE MOST CRITICAL TIME-WINDOW FOR COOLING SECTOR.

Kigali Amendment:

Kigali Amendment Requiring Cooling Industry Transit toward Clean and Efficient

Transitioning to low GWP refrigerant would help China raise its climate ambition through reducing non-CO_2 GHG emissions

- HFC Phase Down Timeline [2024 Freeze]

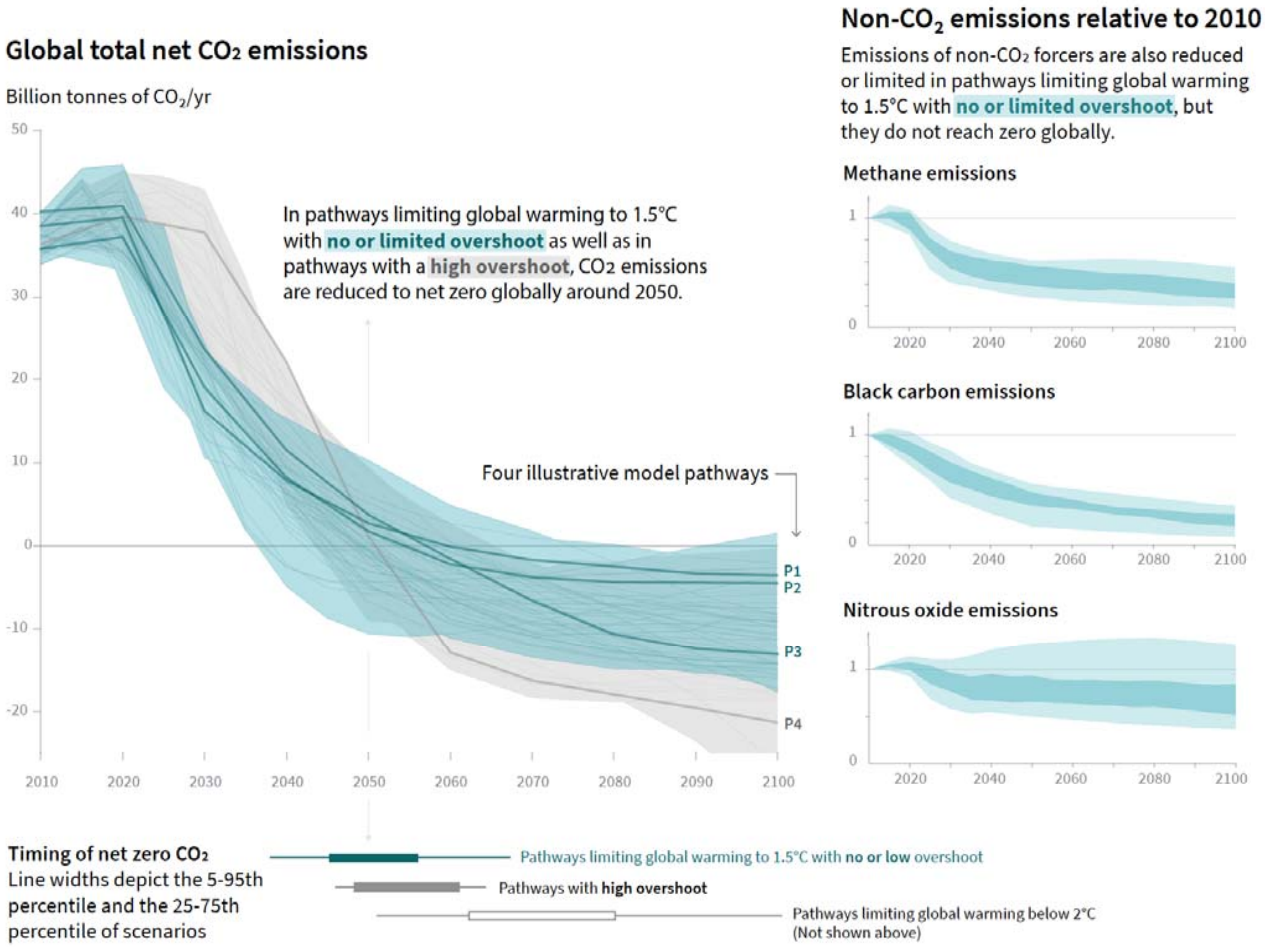


Sources: HU, Peking University, *China's HFCs Emissions Projection of Room AC and Mobile AC*

Paris Agreement:

China’s commitment requires its energy intensity to further decrease between 2020 to 2030 so as to achieve its goal to peak CO_2 emission around 2030

为实现2030年之前达到碳排放达峰的目标，中国的整体能效强度还需要大幅降低

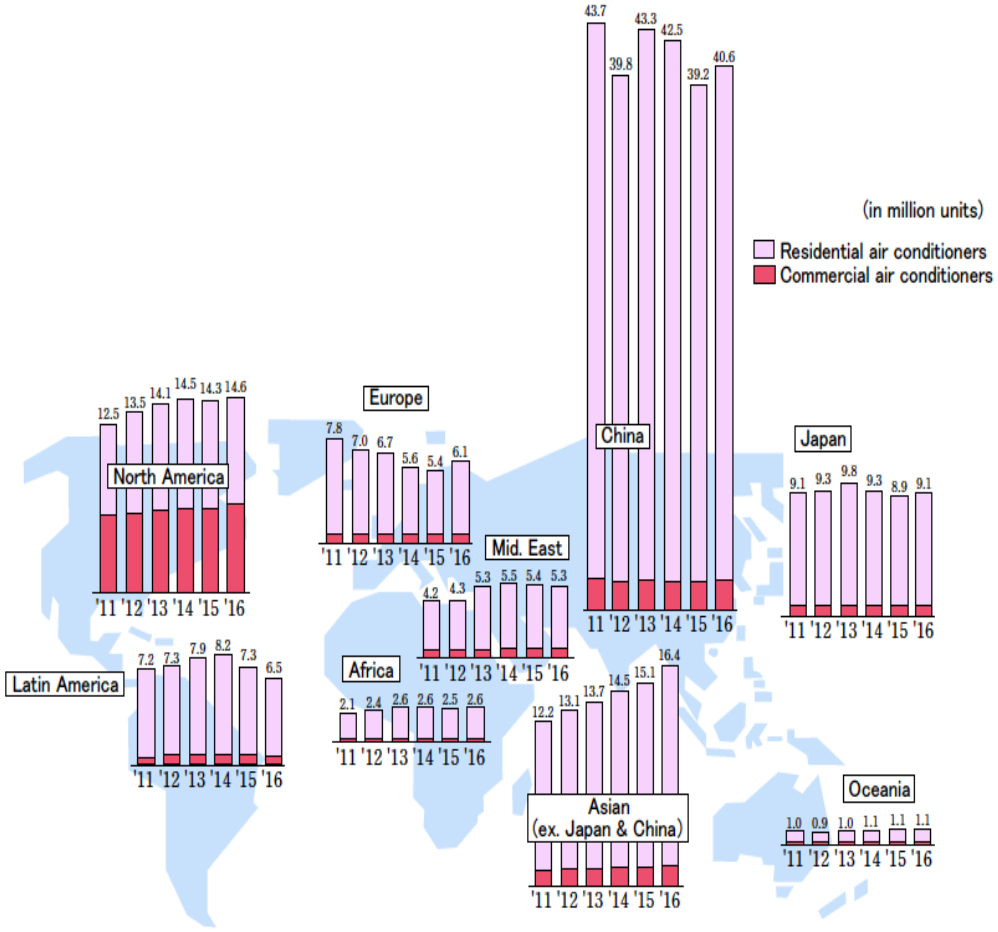


IPCC 1.5 special report: The world’s net CO2 emission needs to decline to zero by mid-late this century to keep temperature rise within 1.5 to 2 degree.

为避免升温超过1.5度，全球温室气体需要在2050年达到零排放。

Opportunities and Challenges

- Over the past two decades, China has put in great efforts to improve building efficiency and develop energy efficiency standards for home appliances. Both are essential for the promotion of cooling efficiency.
- China produces over 130 million room air-conditioners (ACs) per year, accounting for 70% of the global market. Taking advantage of Montreal Protocol-mandated refrigerant replacements to enhance energy efficiency of China-produced equipment will massively transform the global market.
- Dominating the global ACs manufacture and consumption, China, through successful policies and regulations, will help the global market transform towards lower GWP refrigerants and more efficient equipment.



- World AC Demand (2011-2016)

Source: JRAIA, "World AC Demand By Region," April 2017

60% of the daily peak load in summer is related to Cooling

China per capita space cooling energy use is less than 1/5 of US and 2/5 of Japan

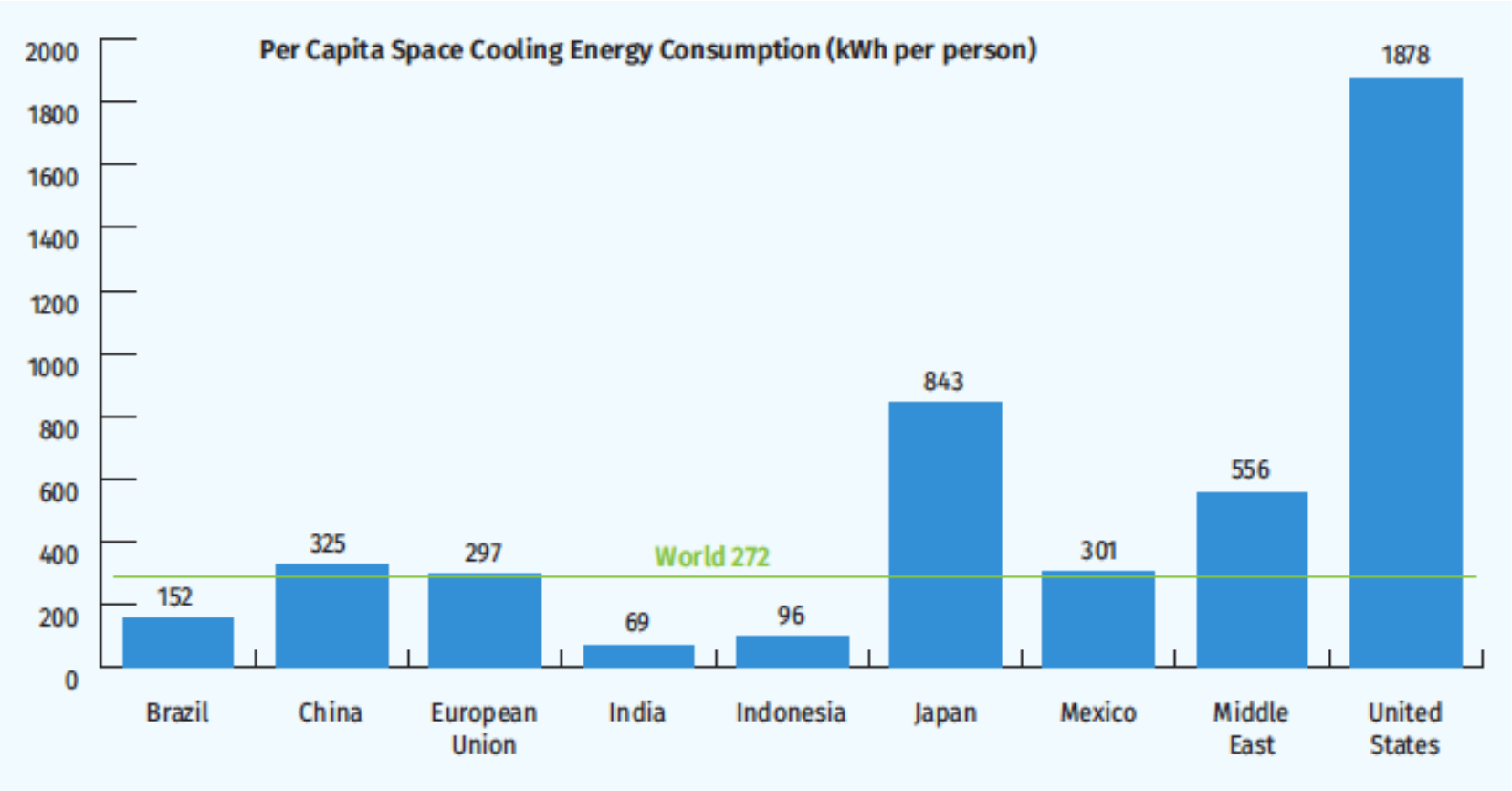
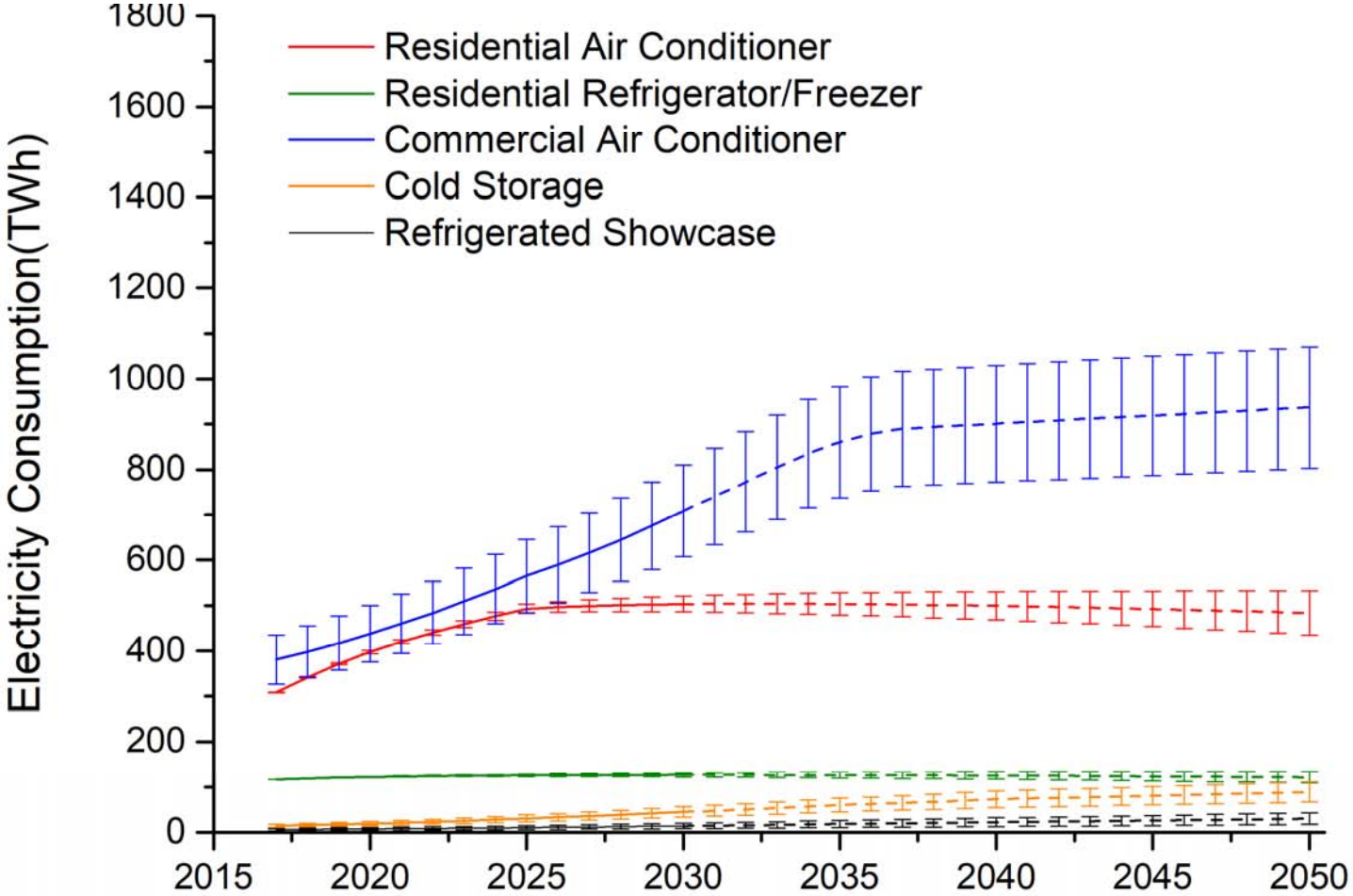


Figure A: Per Capita Space Cooling Energy Consumption (IEA (2018). The Future of Cooling.)

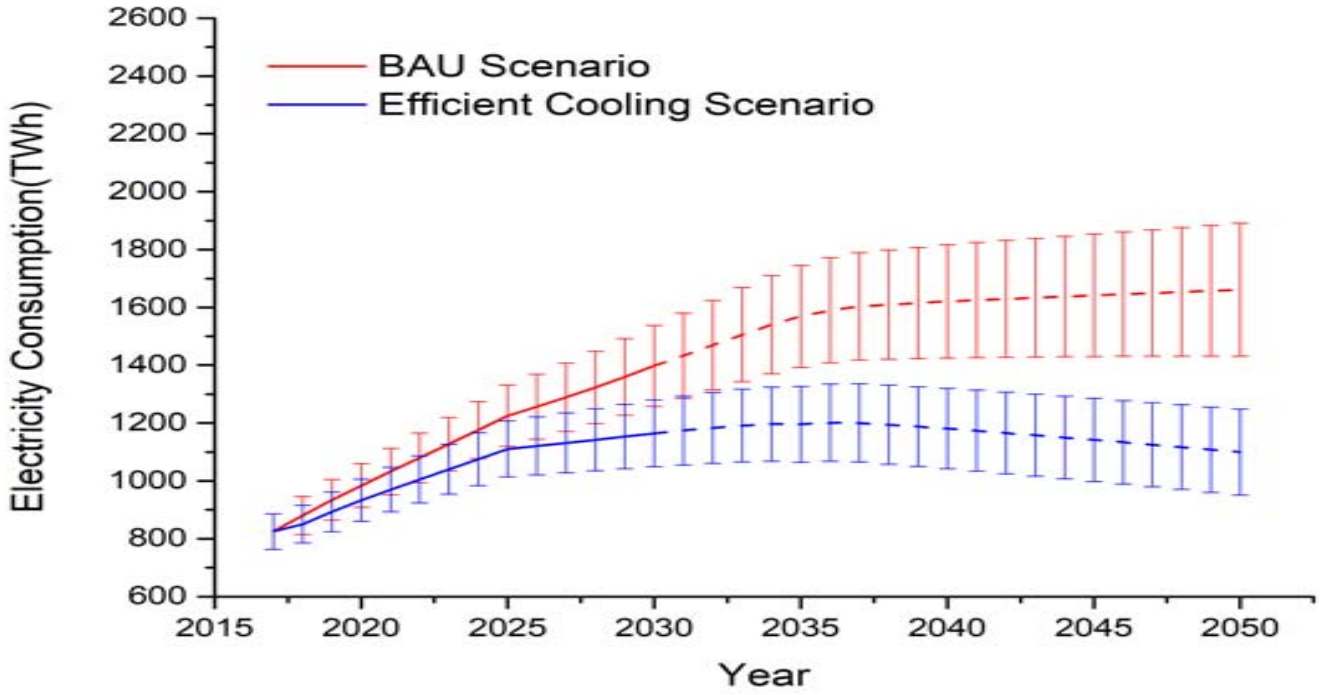
Commercial AC keep momentum for the electricity use



Cooling-related electricity consumption by category in the BAU Scenario

Vision

- *Provide strategic, targeted assistance to support China's cooling sector to peak its energy use by 2035 or earlier with maximum benefit for the economy.*
- *Ensure that after peaking, cooling energy use declines (does not plateau) and that by 2050, cooling energy use is at the same level or lower than 2025.*



Cooling-related electricity consumption in the BAU vs Efficient Cooling Scenario

Opportunities

- Given the rapid growth of urbanization, there are huge emission mitigation opportunities in the next 5-10 years in Space Cooling, Industrial Cooling, Cold-Chain, Refrigeration, Transport Air-Conditioning, Maintenance and Service, etc.
- Macro policy opportunities:
  - Integrate ambitious cooling goals into national 14th Five-Year Plan (2021-2025)
  - Support China to ratify the Kigali Amendment this year and strengthen implementing capacity for early and over achieve the HFCs frozen and deduction target

China Cooling Efficiency Project

Project Goal: Maximizing GHG Emissions Reduction through Significant Efficiency Improvement in Residential and Commercial Air-Conditioning in China

Project Duration: 2018-2020

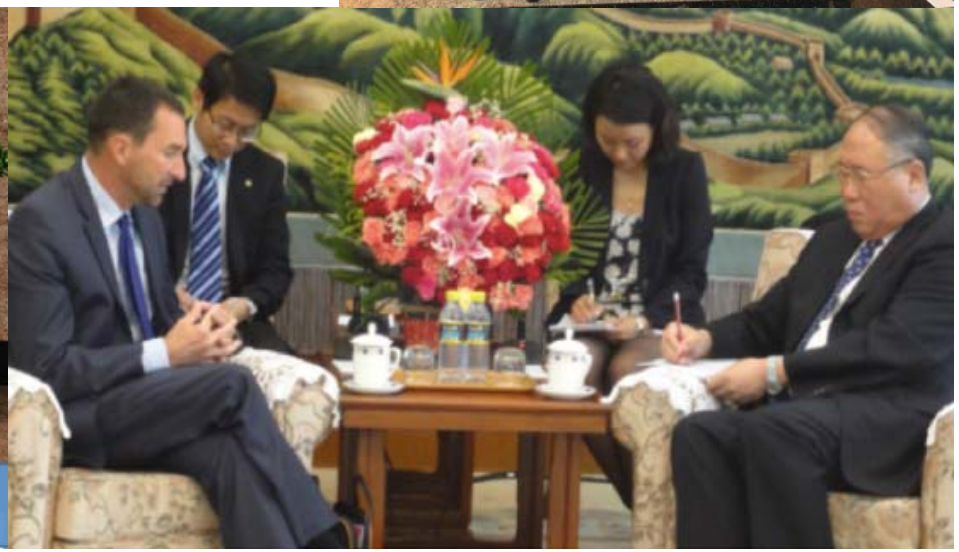
Project Strategy

Part 1: Policy and Strategy
Part 2: MEPS and Labeling
Part 3: Market Transformation

Policy and Strategy

Develop National Cooling Efficiency Strategy and Roadmap

- Scenario analysis of HFCs production and consumption to 2030, 2050
- Analysis and evaluation of alternatives to HFCs considering energy efficiency and other environmental factors
- Evaluation of related policy and measures for HFCs and energy efficiency
- Technical and economic analysis on cooling system solutions
- **China National Clean Cooling Action Plan**



China National Clean Cooling Action Plan

- As a direct result of our support and technical engagement, NDRC has begun integrating cooling efficiency promotion into its overall policy agenda.
- Earlier this year, NDRC announced that it intends to develop a new “National Clean Cooling Action Plan”.
- The Action Plan will guide and implement growing penetration of highest efficiency cooling systems/devices in China.
- It will serve as a master national long-term plan for promoting clean cooling and enhancing cooling efficiency across multiple sectors: space cooling in buildings, cooling for industrial production, cold-chain logistics, and servicing sector.

Overall Objectives

- Enhance the overall energy efficiency levels of cooling products
- Decrease cooling energy consumption
- Increase market penetration and production value of high efficiency cooling products
- Facilitate the market transition to green and low-GWP cooling products

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- Annual electricity savings of 208.2-259 TWh by 2030
- Thermal comfort and life quality improvement
- Green consumption
- High quality development: technology innovation & industry upgrading
- Service-orientated manufacturing industry
- Reduce the HFC frozen baseline by accelerating the application of low GWP refrigerants and early achieve the HFC deduction target

Enforcement and Compliance

- Enhancing the MEPS and Labeling system to cover more cooling products and systems and increase the ambition level
- Innovative Labeling Design, enforce the disclosure of GWP values
- Enhancing enforcement by integrating enforcing the standards into China's political and environmental inspection system
- Facilitating the green public procurement plans and Buy Clean Program
- Developing MRV (Monitoring, Reporting and Verification) targeting cooling energy use data

Mechanism Innovation and Business Engagement

- Mobilizing significant private capital to co-finance a climate-friendly, energy-efficient cooling initiative
- Innovating business models to accelerate the market transformation toward advanced cooling technology and operation
- Facilitate the market for champion enterprises with a healthy condition/environment of market competition and/or sound market structure policies (e.g., information transparency, antimonopoly, benchmark permit to access to market, economic incentives, etc.)

Capacity Building

- Strengthening capacity of financial institutions and project implementers/project hosts in cooling-related financing and implementation
- Enhancing capacity for refrigeration and air-conditioning servicing sector
- Building and strengthening the collecting and recycling system for retired cooling products

Public Communication

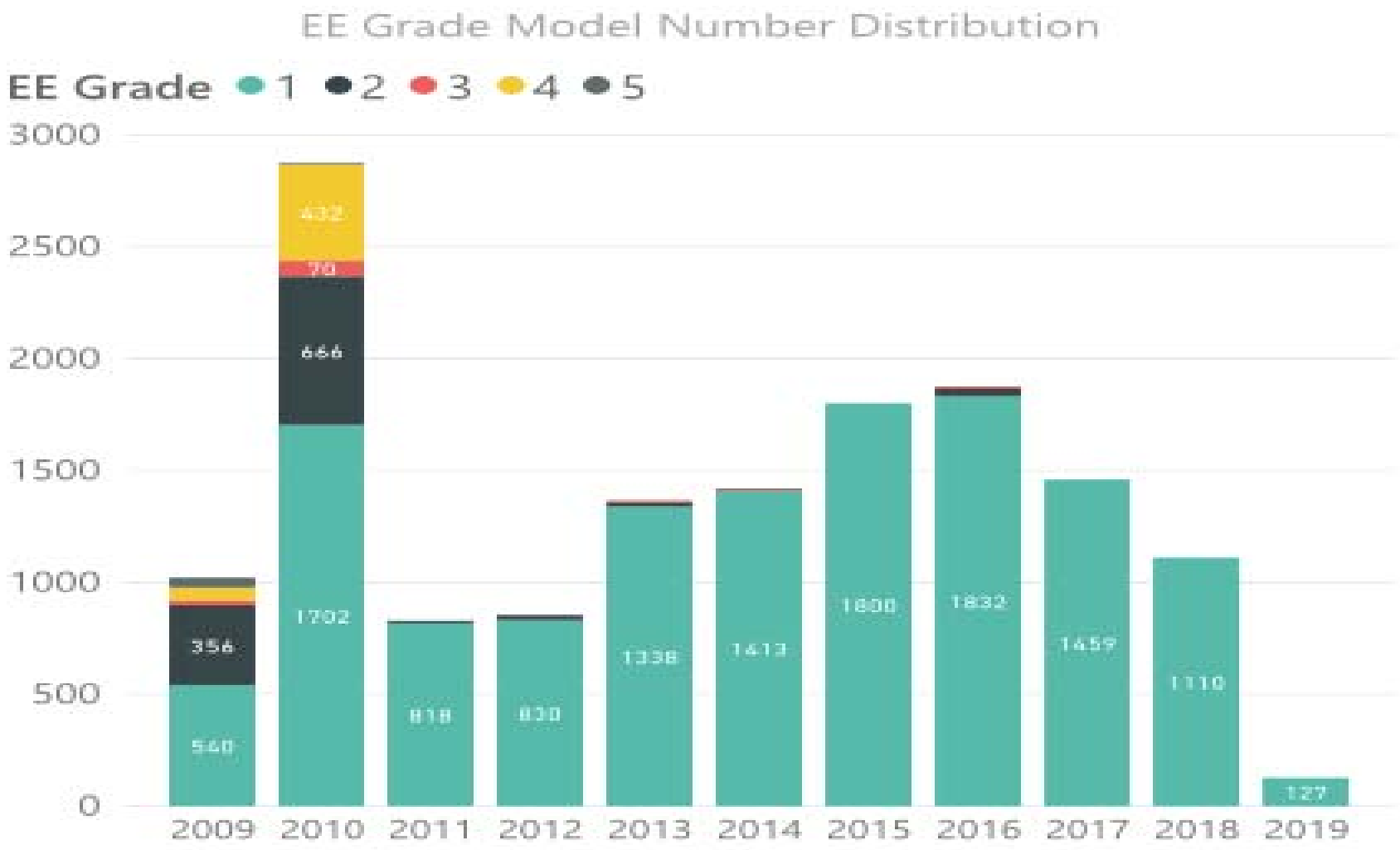
- Develop and implement public communication strategies and campaigns
- Develop and initiate China's Clean Cooling Campaign by partnering with NDRC, MOHURD, MEE, SMAR, MOF, MOST, MIIT, industry associations, think tanks, NGOs and manufactures, etc. to align the public interests in clean cooling
- Encourage manufacturers and retailers to develop ACs trade-in program to incentivize consumers replace outdated and low efficient ACs

Standards and Labeling

To improve the average energy efficiency of the VRF ACs.

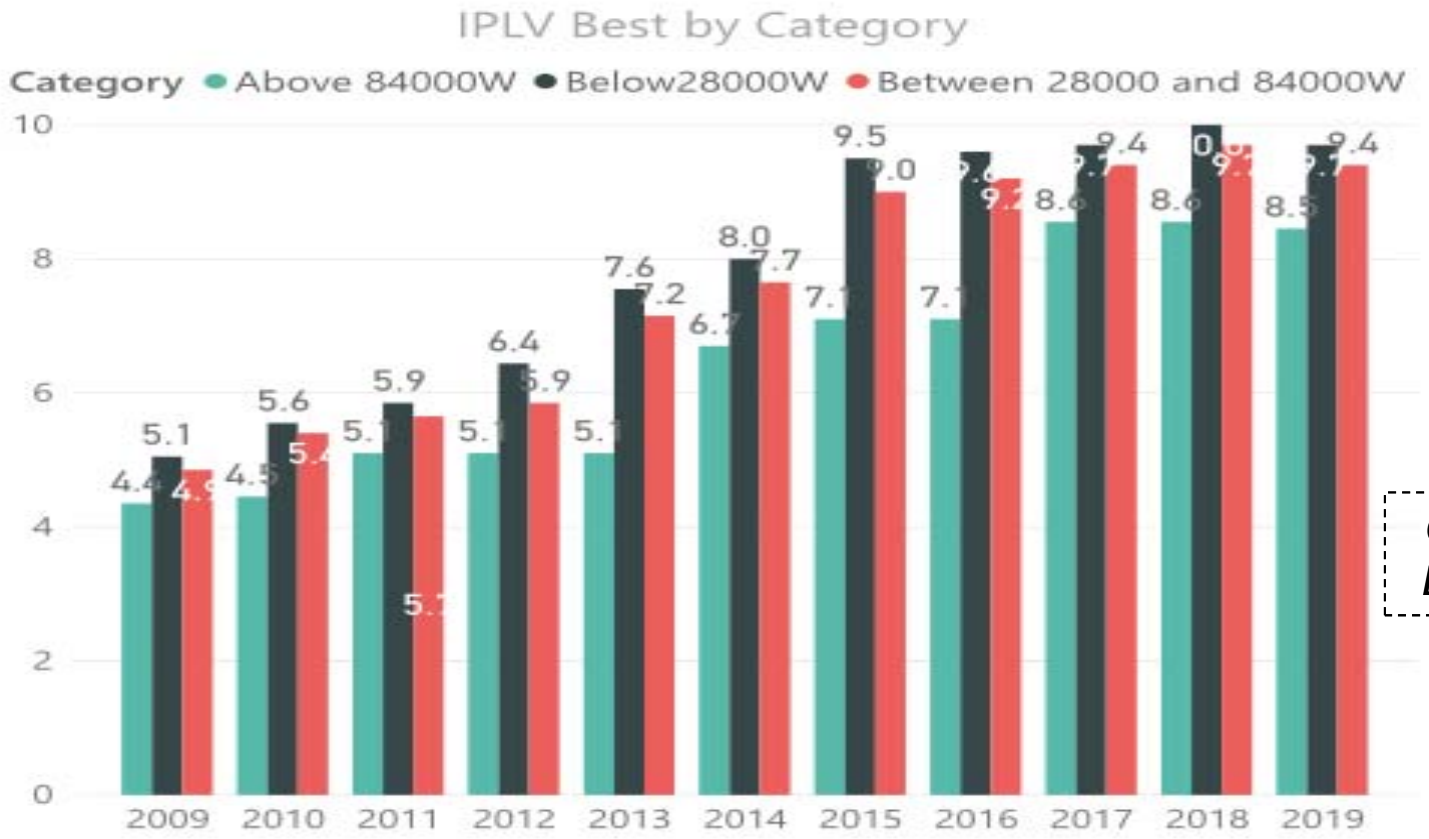
- VRF market assessment report (Energy efficiency, refrigerant, price)
- Baseline establishment for Chinese market of VRF (efficiency, refrigerant type, price)
- Technical analysis reports on cooling efficiency improvement pathway for VRF developed
- VRF MEPS draft developed and submitted
- Update the testing standards related to the new MEPS
- Recommendation on MEPS enforcement and market monitoring

Currently, all VRF products on the market meet EE Grade 1



Data Source: labeling dataset (confidential)

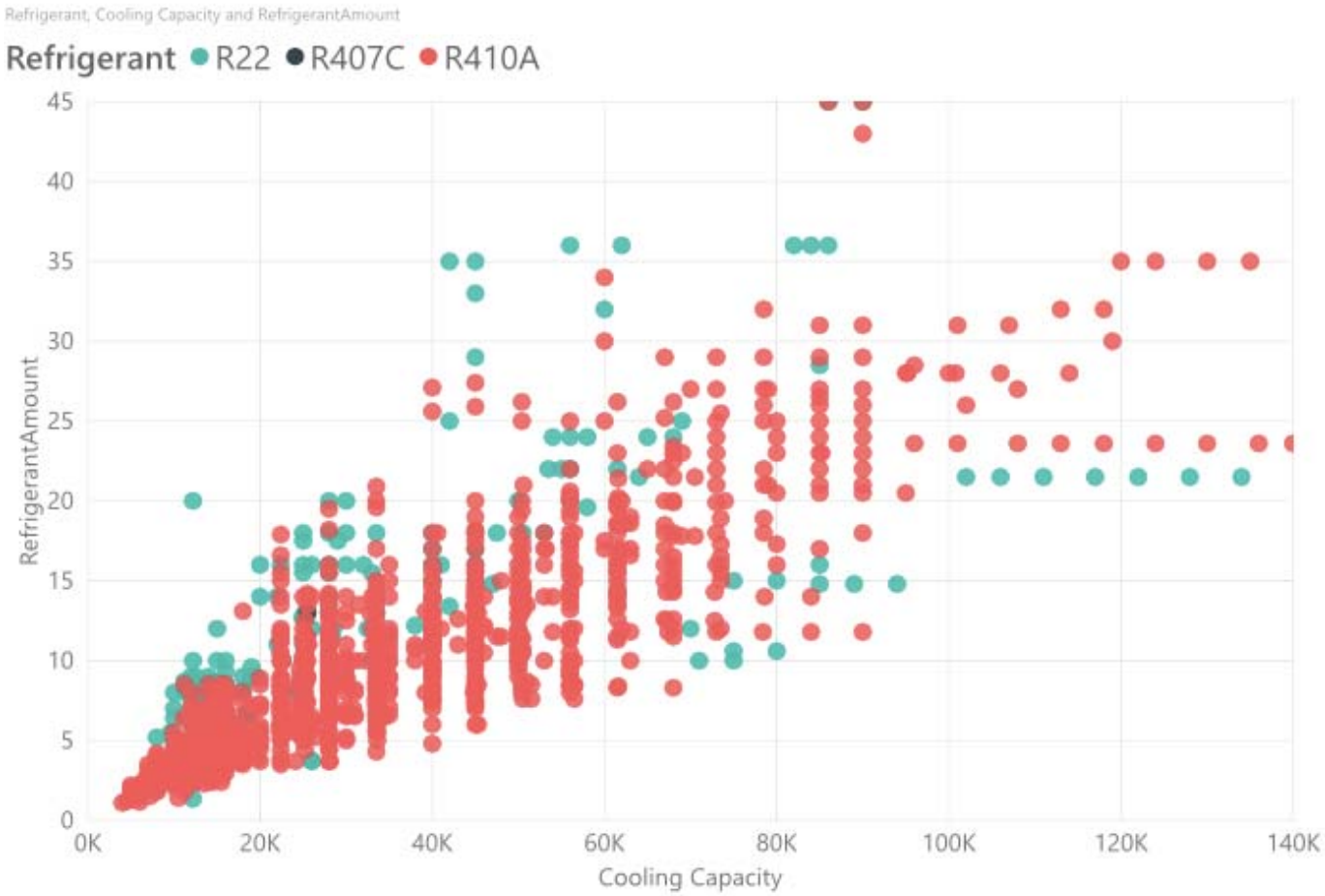
The best technologies on the market are far beyond the existing MEPS



Current MEPS
Level 1 3.5-3.6

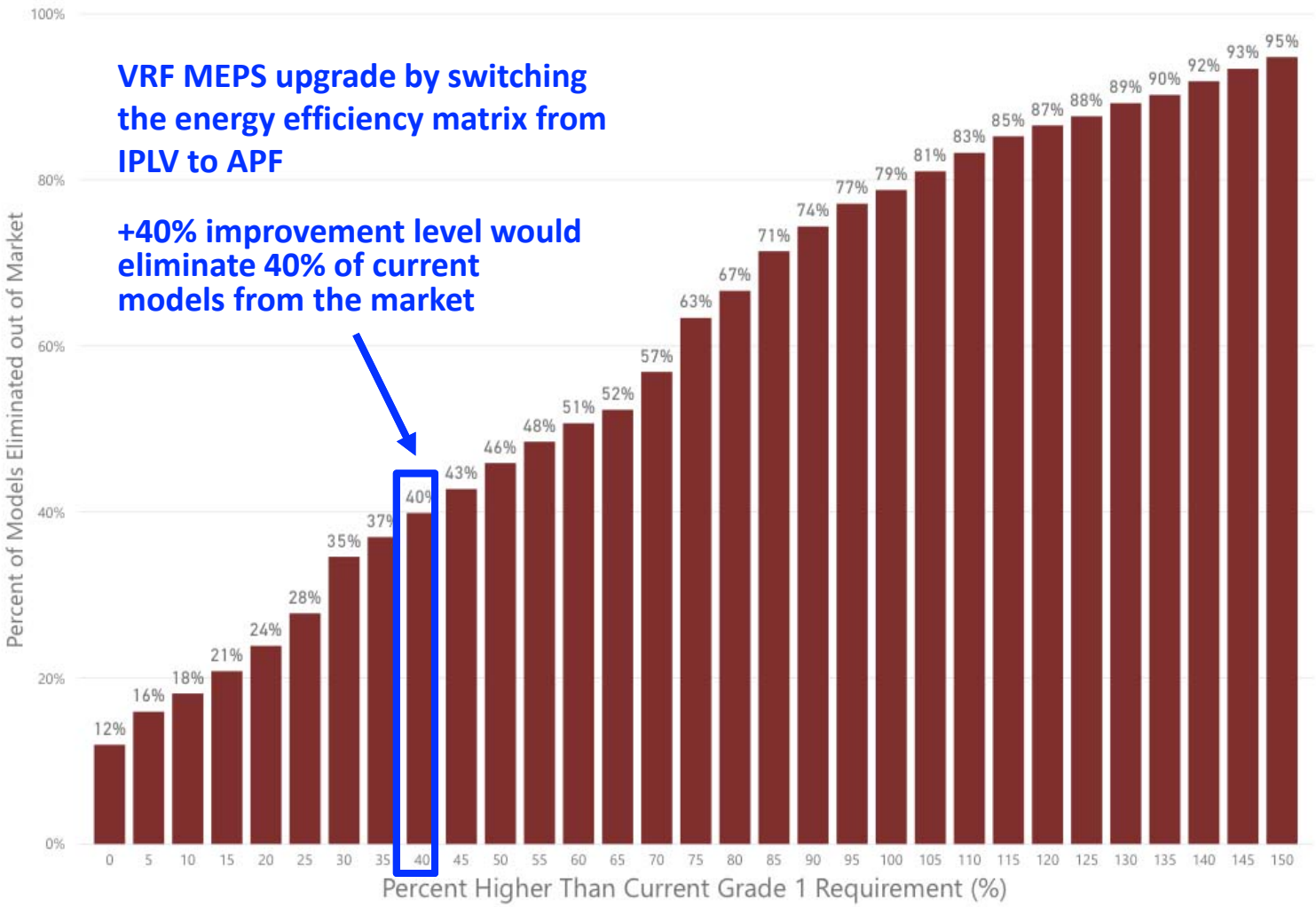
Data Source: labeling dataset (confidential)

Distribution of current models on the market (by refrigerant)



Source: labeling dataset (confidential)

The market needs stricter MEPS and testing procedures for boosting VRF efficiency



Data Source: labeling dataset (confidential)

Market Transformation

Improve the market share of high efficient and low-GWP

- City pilots selected for developing sub-national cooling efficiency strategy (Ningbo, Wuhan)
- Promote public institute and government clean cooling procurement
- Market activities for promoting clean cooling products with retailers
- Campaign initiated for the Awards Program of Retailers, Technology Innovation and Manufacturers (strategies, selection and evaluation criteria development)

2019
International Cooling Efficiency Conference
(ICEC 2019)

International Cooling Efficiency Conference 2019

Date: June 13-14, 2019

Location: Beijing

Hosts:
Kigali Cooling Efficiency Program (K-CEP)
Energy Foundation China (EFC)

Supporting Organizations:
National Development and Reform Commission of the People's Republic of China (NDRC)
China National Institute of Standardization
China Refrigeration and Air-conditioning Industry Association

International Cooling Efficiency Conference 2019

Government	International Organizations	Cooling Industry
Rwanda Brazil India Malaysia Bangladesh Philippines Egypt Thailand Indonesia Vietnam Mongolia Mexico Nigeria Ghana Argentina Kenya Japan Korea EU United States …	K-ECO ADB WB UNESCAP UNEP UNDP GIZ IEA …	Japan Refrigeration and Air Conditioning Industry Association (JRAIA) Korea Refrigeration and Air-Conditioning Industry Association (KRAIA) Air-Conditioning, Heating, and Refrigeration Institute (AHRI) European Partnership for Energy and the Environment (EPEE) Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies (EUROVEN) Refrigeration and Air- Conditioning Manufacturers Association of India (RAMA) Brazilian Association for HVAC-R (ABRAVA) Manufactures…

International Cooling Efficiency Conference 2019

Topics proposed :

- Policy dialogue and information sharing for cooling efficiency
- National Cooling Plans
- MEPS for ACs
- Energy efficiency technologies and climate-friendly refrigerant alternatives
- Public awareness of high-efficient and low-GWP cooling products

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