ENERGY FOUNDATION
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清洁能源繁荣未来

SUSTAINABLE ENERGY, PROSPEROUS FUTURE

Financing Innovation to Enable Large-Scale Multi-Sector Efficient Cooling Deployment in China

Han Wei

December 13, 2019

Energy Foundation China

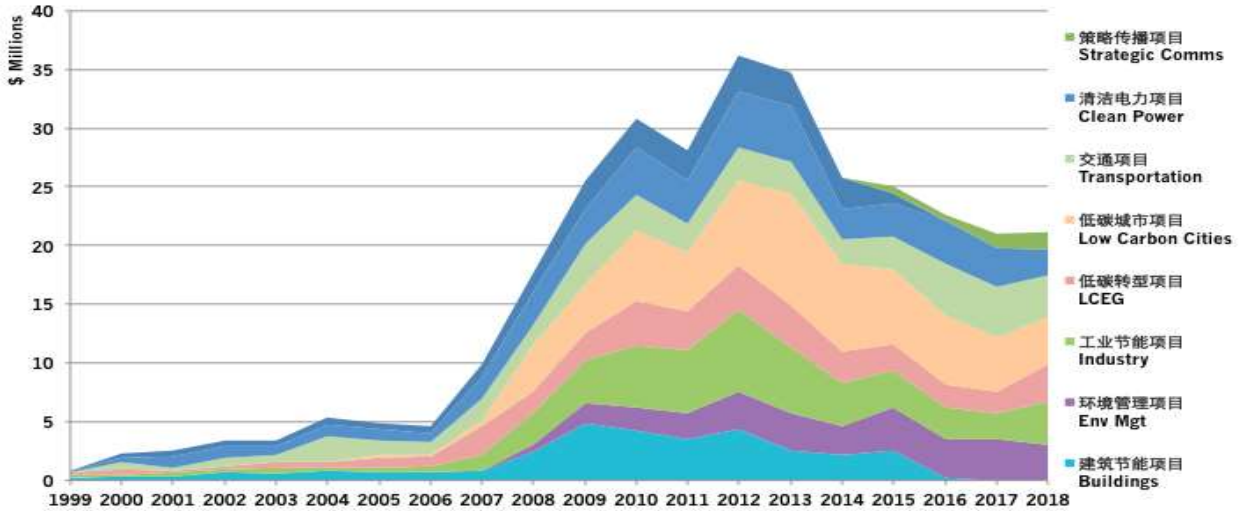


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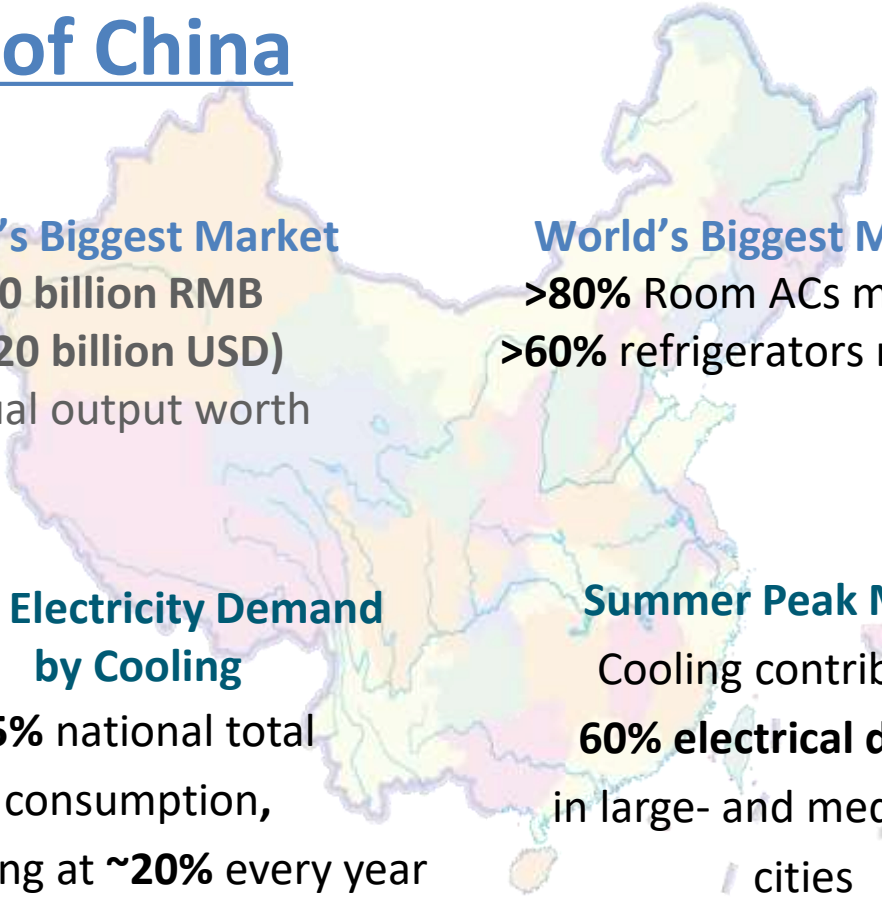
SUSTAINABLE ENERGY, PROSPEROUS FUTURE

Our vision is to achieve prosperity and a safe climate through sustainable energy.



7 Programs: power, industry, transportation, cities, environmental management, low carbon economic growth, and strategic communications
6 Task Forces: Long-term strategy for Decarbonization, Belt and Road Initiative, Track II Cooperation, Electrification, Air Quality, and Urbanization

Role of China



World's Biggest Market

800 billion RMB

(~120 billion USD)

Annual output worth

World's Biggest Manufacturer

>80% Room ACs made by China

>60% refrigerators made by China

Large Electricity Demand by Cooling

15% national total consumption**,** increasing at **~20%** every year

Summer Peak Months

Cooling contribute to **60% electrical demand** in large- and medium-size cities

Demand for Sustainable Cooling

Domestic ACs sales keep growing in China

	2017 Q1+Q2	2018 Q1
Domestic Sales	+31.90%	+22.70%

Source: China Household Electrical Appliances Association (CHEAA)

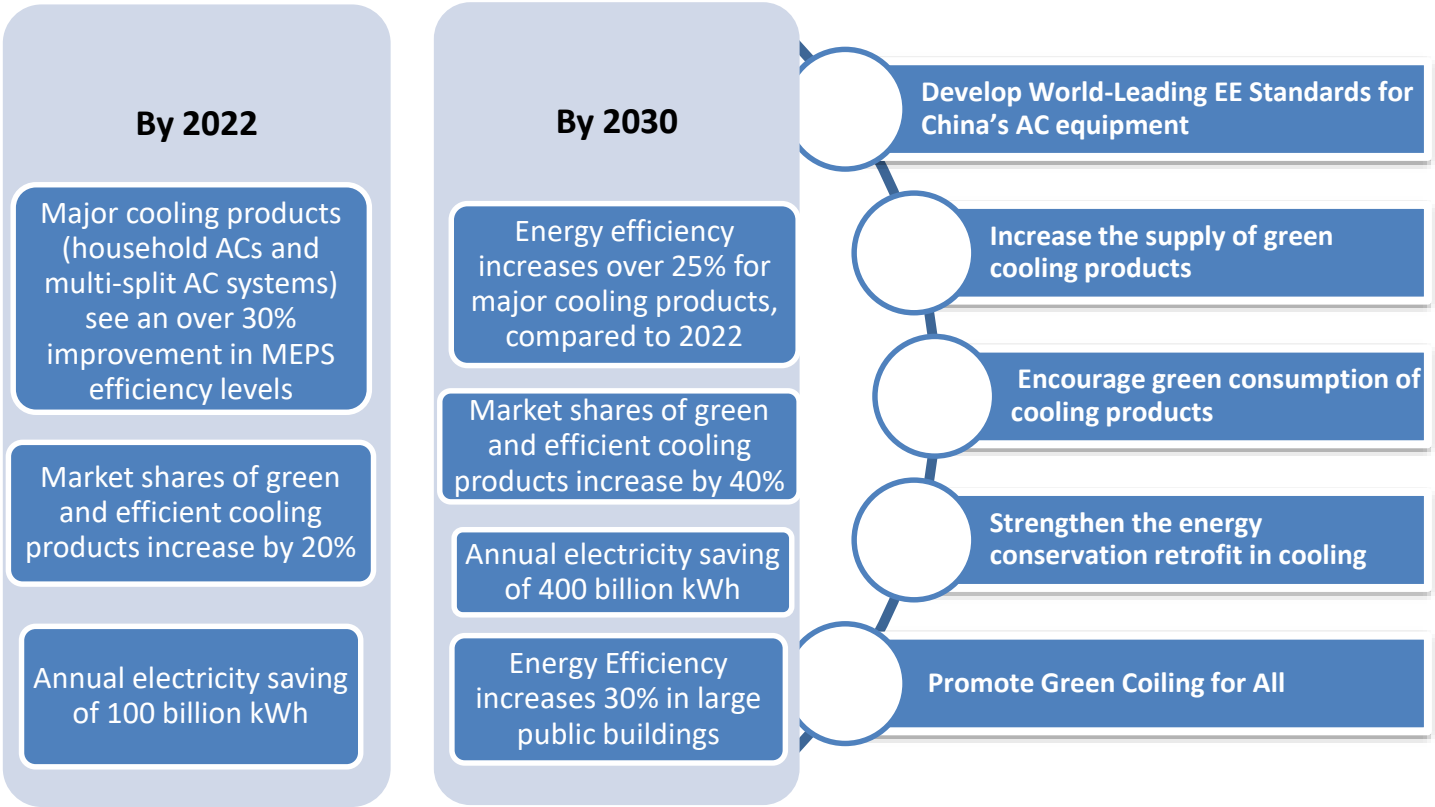
According to research, **improving cooling energy efficiency** & **phasing out high-GWP refrigerants** promise 0.5-1° C less global temperature increase by 2100.

"China has seen by far the biggest – and fastest- increase in energy use for space cooing since 1990, with a surge in sales of ACs."

1990	2016
6.6 TWh	450 TWh

Source: "The Future of Cooling, Opportunities for energy-efficient air conditioning", International Energy Agency, 2018

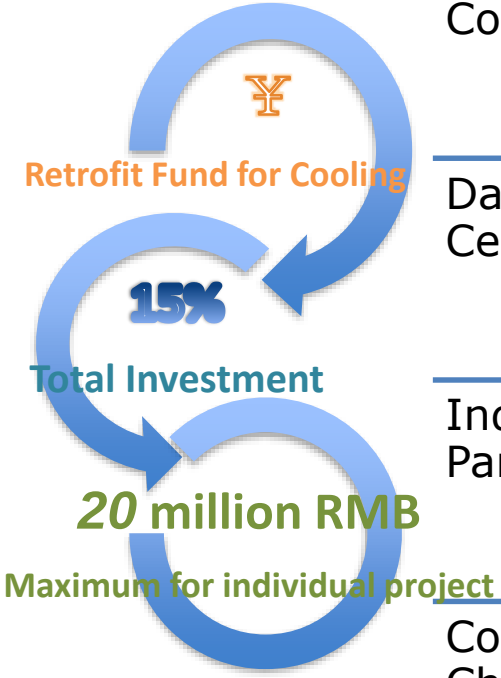
China Green Cooling Action Plan (CGCAP)



Market Incentives needed to stimulate the market transformation towards green cooling

Subsidies and “Old for Green” initiatives for Residential Sector	•Encourage residents to update and replace old and low-efficient cooling products •Implement incentive programs such as "energy conservation subsidies" •Encourage retail enterprises, e-commerce platforms to run "old-for-green" programs for green and efficient products.
Government Procurement	•Improve the government procurement policy for energy-conservation and environment-friendly cooling products and send the signal to manufacturers on the expanded market demand of high efficient ACs and cooling refrigeration products
Buck Procurement and Green Supply Chain	•Encourage the bulk procurement for a market aggregation of green and efficient cooling products through voluntary energy conservation commitments •Promote green procurement by using the purchasing power of green supply chain

Buildings and infrastructures are the major players in cooling retrofits



Space Cooling

To support the replacement of low-efficient equipment using technologies such as intelligent control, pipeline optimization, energy recovery, energy and cold storage, natural cold sources, multi-energy complementation, natural ventilation in key areas including the public institutions, large public buildings, subways, airports, and, in areas where conditions permit, to promote air-conditioning use by time slot and by partial-space。

Data Centers

to strengthen the optimization and upgrading of equipment layout, cooling structure, peripheral structure, etc., and encourage the use of liquid-cooled servers, heat pipe backplane, indirect evaporative cooling, rack-level cooling systems, automatic spraying and other efficient cooling systems, and adopt natural cold sources and other cooling methods according to local conditions

Industrial Parks

where conditions permit, support the overall design of cooling transformation plans, innovate the use of cooling service, charge according to cooling consumption, cooling demand and energy efficiency performance guarantee contract and other business models in selected commercial gathering areas, university parks, centralized administrative centers, leisure resorts and other parks with great cooling demand and concentrated load.

Cold Chain Logistics

to support the leading cold chain logistics enterprises in the agricultural products, food, medicine and other fields to replace with green refrigerators, refrigerated display cabinets, commercial refrigerators, refrigerated vehicles, cold storage and other cooling equipment and facilities; to establish energy consumption control center, and achieve reduction in both cost and damage rate using the Internet of Things, accurate temperature (humidity) control and other technologies.

Innovation in business models and financing mechanisms is the key

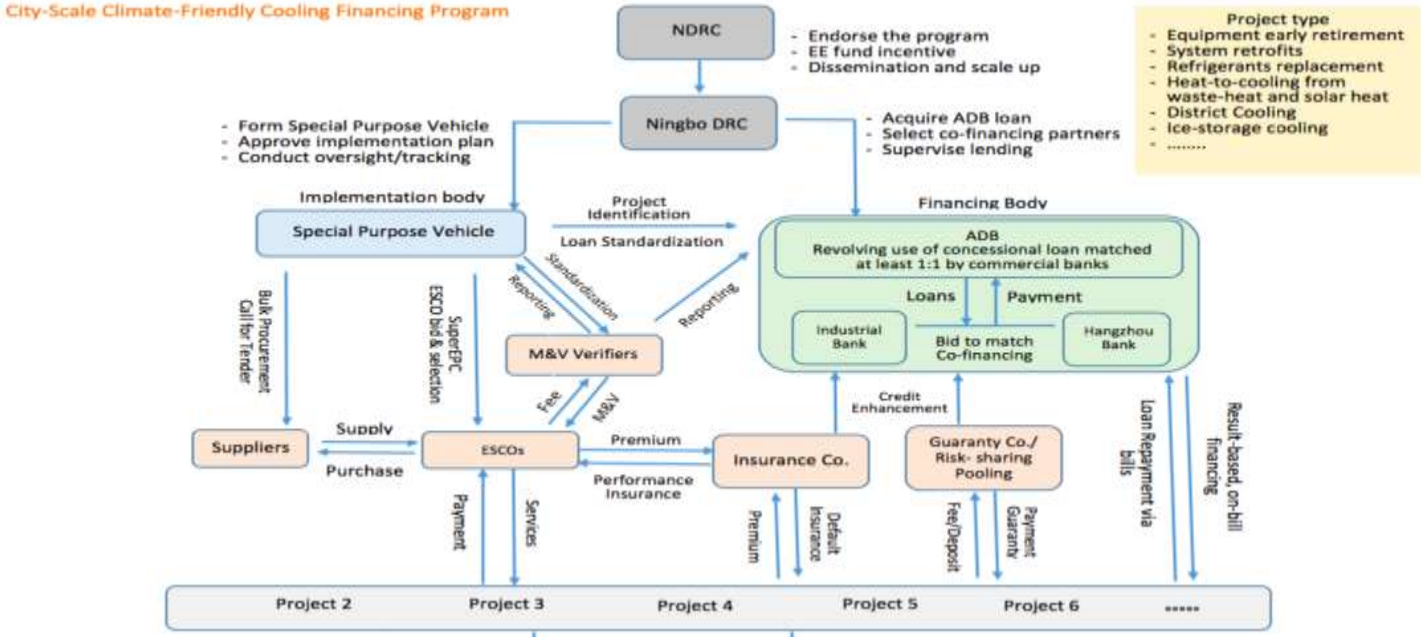
Current Situations	Challenges
High up-front costs and inner budget and operation system hinder the EE retrofits	• High up-front investment of cooling system retrofits • The energy management team in the company doesn't have strong self-motivation on EE retrofit which may bring the budget cut for their next year budget planning due to the saved energy cost • Lack of incentive mechanism to encourage EE improvement
Limited green financing channels for the cooling service industry	• Most of the financing sources for the cooling service industry are internal funds, and the financing channels are narrow • Green financial service policy lacks specific operation plans and measurement standards to provide guarantee for investment and financing of the refrigeration industry
Energy-conservation service companies face tremendous pressure during the financing process	• Most of ESCOs are SME with limited internal funds, making it difficult to carry out large-scale cooling system renovation projects • "Light assets" enterprises have difficulties to provide effective mortgage collateral • The income from cooling system reform is uncertain, and the investment recovery period is long. It is regarded as a "high-risk" industry by banks.
Uncertain returns make users and banks have concerns	• High costs of high-efficient cooling products in the early stage, and the demand for cooling system renovation and upgrading is insufficient. • Uncertainty in the financing returns of the cooling efficiency improvement projects, and the measurement of returns lacks a uniform standardized standard • Lack of effective guarantee mechanism and standardized risk management and control measures

Innovative cooling efficiency financing model

Demonstration Projects:

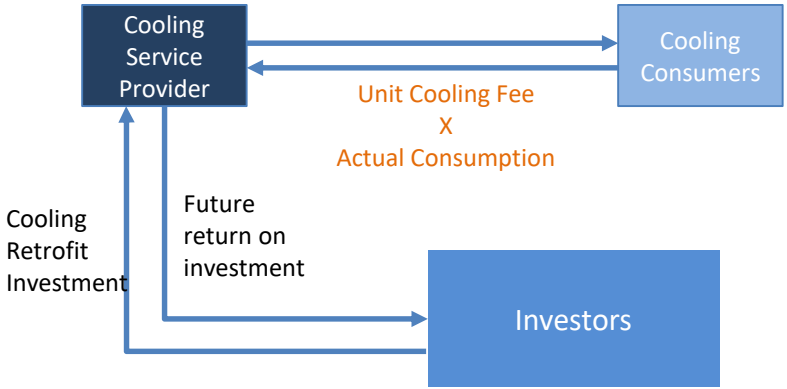
- *Asia Development Bank (ADB) and Ningbo launched the technical assistance project for cooling retrofits*
- *Kigali Cooling Efficiency Project and Industrial Bank of China launched loans program to promote cooling system efficiency*

1. Super EPC
2. Special Purpose Vehicle
3. Result-Oriented Loan



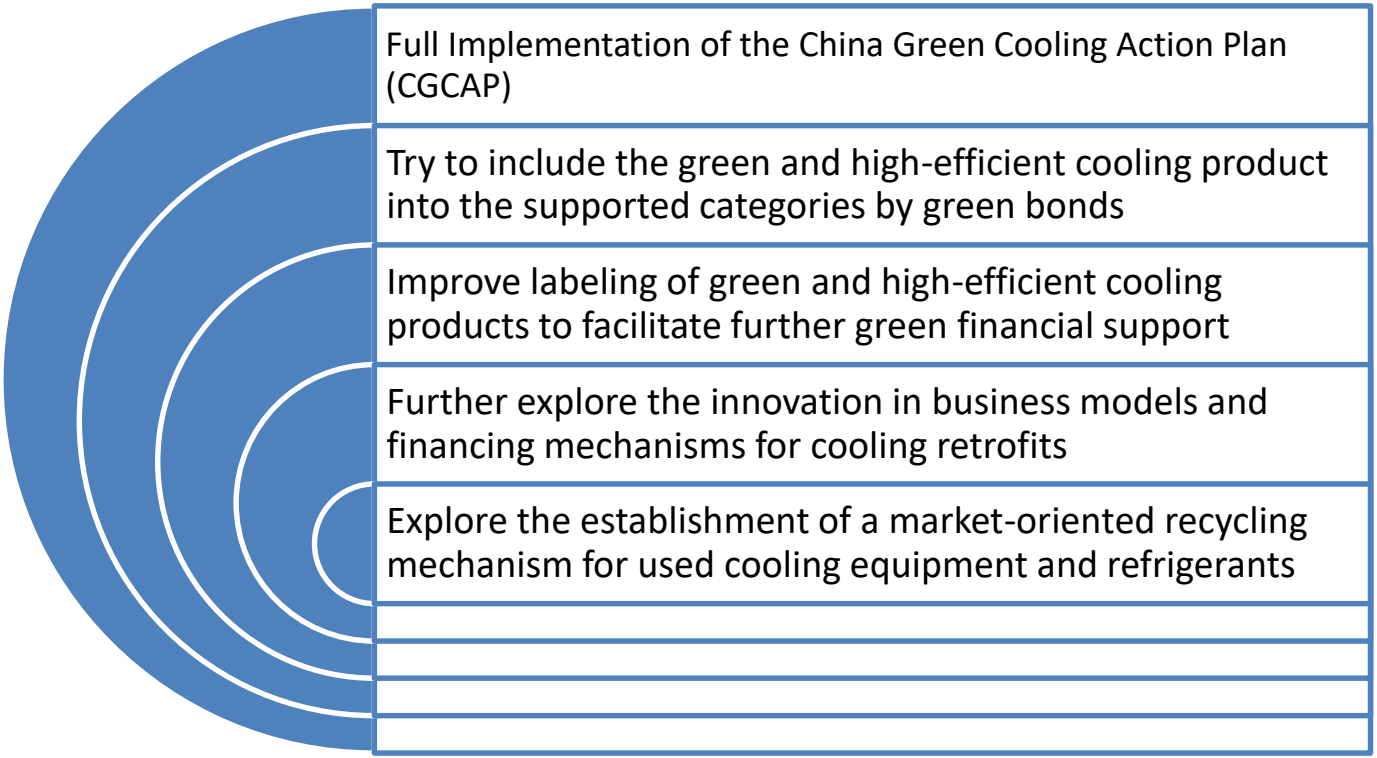
Cooling as a Service(CaaS)

1. Innovative marketing mechanism
    - “Lighting as a service/Cooling as a service”
2. Integrated / Energy Services Hosting
3. Production Services / Service Manufacturing
    - Pay-per-service；generate awareness of energy saving
    - Consumer need no dedicated maintenance personnel as the cold service provider is responsible for maintenance
    - Cold service provider will adopts advanced conservation technologies to reduce its operating costs
    - Transfer the technical and financial risks from the users to the professional energy supply companies





Further Actions Required



China Cooling Efficiency Project

EFC has been implementing the China Cooling Efficiency Project since 2017, with goals to improve cooling efficiency levels, support achieving national carbon emission targets, improve air quality, and at the same time contribute to China's high-quality development.

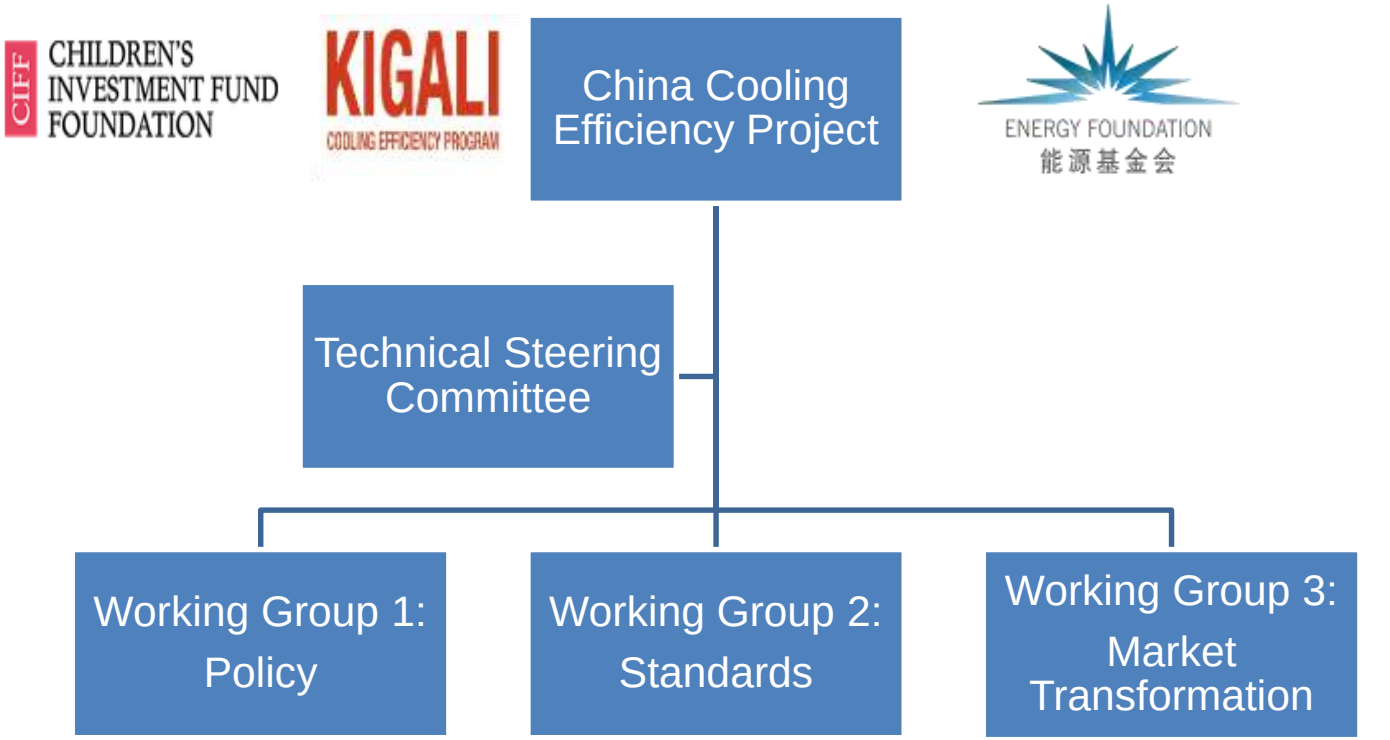
Expected outcomes of the project include:

- Support the research, launch and implementation of the Green Cooling Action Plan in China
- Integrate cooling efficiency into the 14th Five-Year-Plan and China's updated National Determined Contribution
- Upgrade the MEPS of China's major cooling products to be world-class, and enlarge the numbers of MEPS to cover most of the cooling industry
- Dramatically improve market penetration of high-efficient and low-GWP cooling products



Energy Foundation China: China Cooling Efficiency Project

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



Key Activities

	2017-2019	2020-2023
National Policies	1. Green Cooling Action Plan in China 2. scenario analysis of HFCs production and consumption	1. Support Action Plan Implementation 2. Support 14 5YP & NDC update 3. Support F-GAS Phase-down
MEPS	1. Room AC MEPS 2. VRF MEPS	1. Unitary ACs MEPS development 2. MEPS revision for commercial freezers and display cabinets 3. Auto Mobile ACs and refrigerant
Market / Financing	1. Cooling efficiency improvemen by public institutions 2. City-level pilot projects 3. Market Transformation Publicity	1. Cooling retrofits and improvement in Public Institutions 2. Innovative financing and business models
Exported ACs	1. Belt and Road Green Cooling Initiative launched	1. Cooling efficiency info disclosure on export products 2. International/Regional comparison of MEPS 3. bilateral and multilateral dialogues on cooling efficiency (e.g. China-India, China-France)

Thank you!

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- **Scan to keep updated via WeChat:**

