低碳战略驱动制冷空调行业绿色发展

Low-Carbon Strategy Drives the Green Development of Refrigeration and Air-Conditioning Industry

中国制冷空调工业协会

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1 行业概况Industry Overview

- 中国是当今全球最大的制冷空调设备制造国和消费市场，行业内多项产品产量位居世界第一。 **China is the world's largest manufacturer and consumer for refrigeration and air-conditioning equipment, and the output of many products in the industry ranks first in the world.**

- 据CRAA统计，2023年行业生产总值超8300亿元，较2022年增长超过8%，出口交货值达1600亿元，较2022年增长超过10%。 **According to CRAA statistics, the gross domestic product of the industry in 2023 has exceeded 830 billion yuan, an increase of more than 8% over 2022. The export delivery value has reached 160 billion yuan, an increase of more than 10% over 2022.**

中国制冷剂消费情况

Refrigerant consumption in China

- **HCFCs:**
  - ✓ HCFC-22：< 100,000 吨 tons
  - ✓ HCFC-123: 少量: a small amount
  - ✓ HCFC-142b:少量: a small amount
- **HFCs:**
  - ✓ R410A： >50,000 吨tons
  - ✓ HFC-134a： > 50,000 吨tons
  - ✓ HFC-32： > 100,000 吨tons
  - ✓ R507A, R407C, R404A, R245fa等： >30,000 吨tons
- **天然工质：Natural refrigerants**
  - ✓ NH_3、 CO_2、HC290、HC600a等合计: > 10,000 吨tons

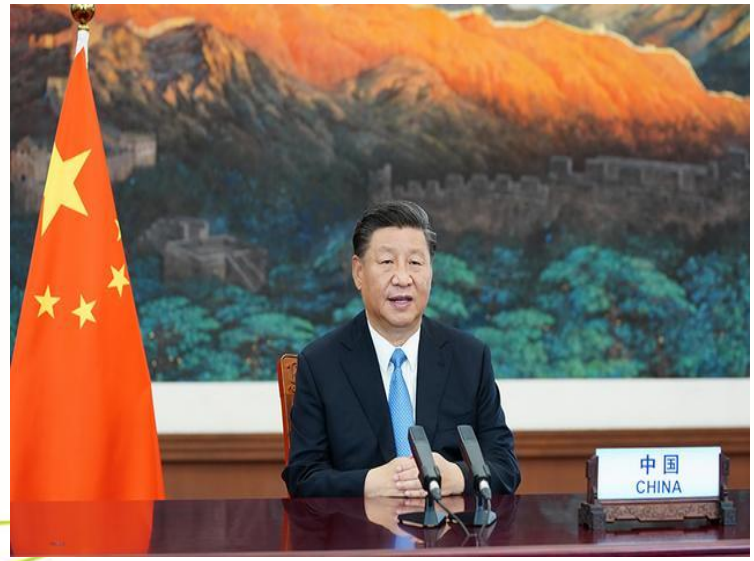
中国生产的各类制冷空调设备中制冷剂年消费量（含HCFCs、HFCs、天然工质等）超过35万吨，约占全球消费量一半。

The annual consumption of refrigerants (including HCFCs, HFCs, natural refrigerants, etc.) in various refrigeration and air-conditioning equipment produced in China exceeds 350,000 tons, accounting for about 50% of global consumption.

2.1 双碳战略和行业目标

Carbon emission peaking and carbon neutrality strategies and industry goals

- 2015年，习近平主席在巴黎气候大会开幕式上表示，中国将在2030年左右二氧化碳排放达到峰值，并争取尽早实现。2020年9月习近平主席在七十五届联合国大会上进一步提出中国要努力争取2060年前实现碳中和。In 2015, President Xi Jinping stated at the opening ceremony of the Paris Climate Conference that China will reach its peak carbon dioxide emissions around 2030 and strive to achieve it as soon as possible. In September 2020, President Xi Jinping further proposed at the 75th Session of the United Nations General Assembly that China will strive to achieve carbon neutrality by 2060.



制冷空调行业“双碳”目标解析

Analysis of the "carbon emission peaking and carbon neutrality" goals of the refrigeration and air-conditioning industry

❖ **2030：**

✓ 实现新生产产品中HCFCs消费的完全淘汰，低GWP值制冷剂获得广泛应用和推广。初步建立起行业碳达峰碳中和标准、规范和认证体系，各类产品能效有效提升。

Complete eliminate HCFCs consumption in new products, and promote the intensive application of low-GWP refrigerants. Initially establish the standards, specifications and certification system on the carbon emission peaking and carbon neutrality for the industry, and effectively improve the energy efficiency of various products.

❖ **2060：**

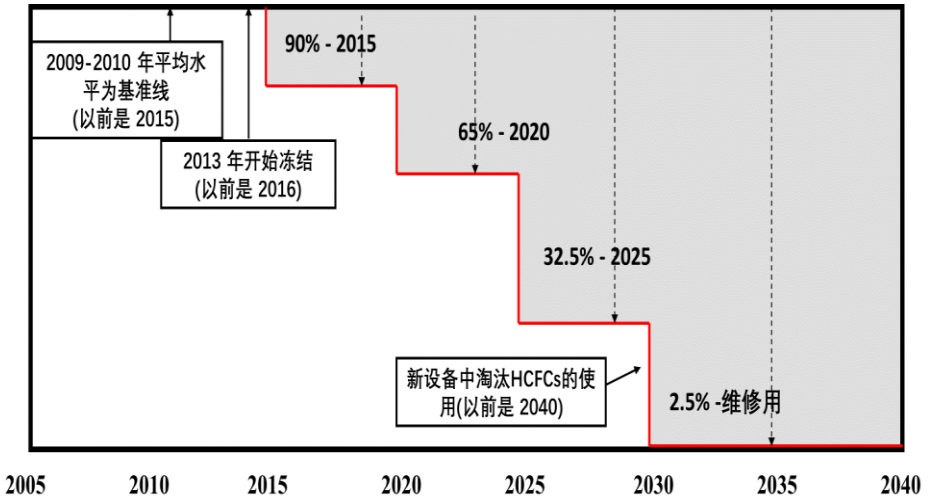
✓ 建立起先进的绿色低碳技术研发和管理体系，制冷空调绿色低碳技术水平达到国际领先水平；重点产品能效标准和能效指标达到国际领先水平，行业全面实现碳中和目标，为国家目标的达成作出更多贡献。**Establish an R&D and management system for advanced green and low-carbon technology, and the green and low-carbon technology level of refrigeration and air conditioning reaches the international leading level. The energy efficiency standards and energy efficiency indicators of key products reach the international leading level, and fully achieves the carbon neutrality goal in the industry, making more contributions to the achievement of national goals.**

行业履约工作任务艰巨

Fulfilling obligations, a tough task for the industry

- 中国制冷空调行业正面临HCFCs加速淘汰和HFCs削减的双重任务目标。
  The Chinese refrigeration and air-conditioning industry is facing the dual tasks of accelerating the elimination of HCFCs and reducing HFCs.

《蒙特利尔议定书》发展中国家
HCFCs加速淘汰时间表
Accelerated HCFCs phase-out schedule for developing countries in The Montreal Protocol



《基加利修正案》发展中国家
HFCs削减时间表
HFCs reduction schedule for developing countries in The Kigali Amendment

国家类别	主要发展中国家(中国等)	少部分发展中国家(印度、沙特、巴基斯坦等)
基线	100%HFCs三年均值（2020-2022）+65%HCFCs基线	100%HFCs三年均值（2024-2026）+65%HCFCs基线
削减进度	2024：冻结 2029：10% 2035：30% 2040：50% 2045：80%	2028：冻结 2032：10% 2037：20% 2042：30% 2047：85%

- 制冷空调是当今我国经济生活中的能源消耗大户，据测算目前中国在用的各类制冷空调设备年耗电量折合约占全社会电力消费总量的20%左右，每年在用设备能源消耗带来的CO_2排放当量折合超过9亿吨。**Refrigeration and air conditioning are major energy consumers in China's economic life currently. It is estimated that the annual energy consumption of various types of refrigeration and air conditioning equipment currently in use in China accounts for about 20% of the total electricity consumption of the whole society, and the CO2 emissions caused by the energy consumption of the equipment in use each year are equivalent to more than 900 million tons.**

- 中国也是当今全球最大的制冷剂消费国（HCFCs、HFCs和天然工质），年消费量超过35万吨，折合CO_2当量超过5亿吨。**China is also the world's largest consumer of refrigerants (HCFCs, HFCs and natural working fluids), with an annual consumption of more than 350,000 tons, equivalent to more than 500 million tons of CO_2.**

- 制冷空调设备的应用市场巨大，并且伴随着中国经济的持续发展，中国制冷空调设备市场需求仍将保持稳定增长。相应的推动包括HFCs在内的各种制冷剂消费不断增长，庞大的产业规模和市场容量意味着要在行业内履行基加利修正案和实现双碳目标，任务艰巨繁重，对全行业而言是一个巨大的挑战。 **Due to the huge application market for refrigeration and air-conditioning equipment and the development of the economy, China's refrigeration and air-conditioning equipment market demand will continue to grow steadily. Correspondingly, the promotion the increasing use of various refrigerants including HFCs, and the huge industrial scale and market capacity mean that it is a difficult and arduous task to implement the Kigali Amendment and achieve the carbon emission peaking and carbon neutrality goals in the industry, which is a huge challenge for the entire industry.**

2.2当前面临的困难和挑战
Current difficulties and challenges

- 全面推进环境气候更加友好的替代品开发应用是国际社会的共识，也是制冷空调行业未来实现绿色可持续发展的必由之路。**It is the consensus of the international community to comprehensively promote the development and application of more environmentally friendly refrigerant alternatives, and it is also the only way for the refrigeration and air-conditioning industry to achieve green and sustainable development in the future.**

- 后HCFCs阶段，基加利修正案要求实施零ODP+低GWP的绿色替代，双重要求给产业发展带来巨大的挑战。**In the post-HCFCs stage, the Kigali Amendment requires the implementation of zero ODP + low GWP green substitution. The dual requirements bring huge challenges to industrial development.**

- 开发环境气候更加友好的新一代替代制冷剂仍是当前摆在全球同行面前的重大课题和挑战，路艰且长。**Developing a new generation of alternative refrigerants that are more environmentally friendly is still a major issue and challenge to the global peers. The way ahead is long and arduous.**

现实困难
Realistic difficulties

- 实现制冷剂绿色替代，不仅要考虑臭氧层破坏和温室效应问题，还应满足高效、安全，经济性好等要求，使得替代产品在生命周期内实现绿色、高效、安全使用。**To achieve green substitution of refrigerants, it is necessary to consider not only the problems of ozone layer depletion and greenhouse effect, but also the requirements of high efficiency, safety, and good economy, so that the alternative products can be green, efficient, and safe during the life cycle.**

- 要完全满足不同国家和地区的政策、法规、标准的要求，只有“完美的”制冷剂才可以做到，而现在已知的所有替代制冷剂均存在这样或那样的“缺陷”，难言“完美”。**Only "perfect" refrigerants can fully meet the requirements of policies, regulations, and standards in different countries and regions. All the known alternative refrigerants have "defect" and are difficult to be "perfect".**

- 天然工质并不“完美”，不能解决所有产品和市场领域的替代需求。**Natural refrigerants are not "perfect" and cannot meet the substitution needs of all products for all market segments.**

- **PFAS**提案和**F-GAS**修正案给全球下一阶段的替代工作带来了新挑战。**The PFAS proposal and the F-GAS amendment have brought new challenges to the next stage of global work on refrigerant substitution.**

中国行业的挑战

Challenges in the Chinese industry

- 中国有大量的中小企业，他们在技术来源、资金、装备、市场推广等方面或多或少都存在一些薄弱环节，要全面推进中小企业实现替代转换，是一个巨大的挑战。**There are a large number of small and medium-sized enterprises in China, and they have some weak links in terms of technology sources, funds, equipment, and market promotion. It is a huge challenge to comprehensively promote small and medium-sized enterprises to achieve refrigerant substitution conversion.**
- 当前多边基金支持力度大幅度削减，意味着企业自身需要提供更多的配套资金，这使得中小企业实施生产转换面临更大压力和更多困难。**The current substantial reduction in the support from the Multilateral Fund means that enterprises themselves have to provide more supporting funds, which makes small and medium-sized enterprises are facing greater pressure and more difficulties in implementing production conversion.**
- 中国中小企业全面实现淘汰转换关乎中国整体履约目标的达成，需要行业各界的国际履约大家庭携手合作，共同推进。**The comprehensive refrigerant elimination and conversion of China's small and medium-sized enterprises is related to the achievement of China's overall compliance goals. It requires the international compliance family from all sectors in the industry to work together to promote it.**

3 行业未来出路和方向

Future Prospects and Directions of the Industry

3.1 全面推进制冷剂绿色替代

Comprehensively promote green substitution of refrigerants

- 履行国际公约是所有缔约方应尽的责任和义务。在《蒙特利尔议定书》框架下，实施制冷剂绿色替代是完成履约目标的必然选择。**It is the responsibility and obligation of all parties to fulfill international conventions. Under the framework of the Montreal Protocol, the implementation of green substitution of refrigerants is an inevitable choice to achieve compliance goals.**
- 开展制冷剂绿色替代不仅是环境保护工作的要求，也是企业实现高质量发展的必由之路。**Carrying out green substitution of refrigerants is not only a requirement for environmental protection, but also the only way for enterprises to achieve high-quality development.**

3.2 大力提升产品和应用系统能效水平

Vigorously improve the energy efficiency level of products and application systems

- 产品能效提升是实现双碳目标的重要途径和基本保障。**Improving product energy efficiency is an important way and basic guarantee to achieve carbon emission peaking and carbon neutrality goals.**
- 在政府主管部门指引下，近年来行业内新修订发布的多联机、房间空调器等产品的能效等级标准中，最高能效指标已达国际领先水平。**With the guidance of the government departments, the highest energy efficiency index in the energy efficiency rating standards for multi-split units, room air conditioners and other products newly revised and released in the industry in recent years has reached the international leading level.**
- 造得好不如用的好，通过高效的系统集成设计，充分提高制冷空调产品实际应用时的系统综合能效水平，将为市场和用户带来最大化的节能环保收益，这也是达成双碳目标的又一重要方向和途径。**It is better to use it well than to make it well. Through efficient system integration design, the comprehensive energy efficiency level of refrigeration and air-conditioning products in actual application can be fully improved, which will bring the maximum energy-saving and environmental protection benefits to the market and users. This is also another important direction and way to achieve the carbon emission peaking and carbon neutrality goals.**

3.3 提升可再生能源利用水平

Increase level of renewable energy utilization

- 可再生能源未来将会成为国家能源供给的主力军，大力开发可再生能源利用方法、提升制冷空调产品对可再生能源的利用效率，是推动实现行业双碳目标的重要抓手，也是新的市场拓展方向。

Renewable energy will become the main force of national energy supply in the future. developing renewable energy utilization methods vigorously and improving the utilization efficiency of renewable energy by refrigeration and air-conditioning products are important means to promote the realization of the industry's carbon emission peaking and carbon neutrality goals and a new market development direction.

- 太阳能 Solar energy
- 自然冷源 Natural cold source
- 空气能 Air energy
- 地热能 Geothermal energy
- …

关注可再生能源设施建设

Focus on the construction of renewable energy facilities

- “双碳”目标将驱动可再生能源生产设施建设高潮。**The "carbon emission peaking and carbon neutrality" goals will drive the construction of renewable energy production facilities to a climax.**
- 可再生能源生产设施建设离不开制冷空调设备的服务保障，将形成新的巨大市场。**The construction of renewable energy production facilities are independent from the service guarantee of refrigeration and air-conditioning equipment, which will form a new huge market.**

关注可再生能源设施建设

Focus on the construction of renewable energy facilities

- 储能技术是可再生能源开发利用不可或缺的伴生品，储能技术配套需求同样为行业带来新的巨大的市场发展空间（机械储能、电化学储能、热化学储能…）**Energy storage technology is an indispensable companion product for the development and utilization of renewable energy. The supporting demand for energy storage technology also brings new huge market development space for the industry (such as mechanical energy storage, electrochemical energy storage, thermochemical energy storage...)**

- 针对不同新能源生产方式的特点和要求，研究开发适用的专有技术和产品，将会赢得更多的节能收益和市场发展空间。**In view of the characteristics and requirements of different renewable energy production methods, research and development of applicable proprietary technologies and products will win more energy-saving benefits and market development space.**

3.4 全面推进资源循环利用技术发展

Comprehensively promote the development of resource recycling technology

- 有效提升废弃制冷空调产品回收处理技术水平，加大对各类制冷剂的回收、再生和循环再利用力度，是未来值得关注的又一个重要的产业发展方向。
  Effectively improving the level of recycling and treatment technology for waste refrigeration and air-conditioning products and increasing the recovery, regeneration and recycling of various refrigerants are another important industrial development direction, which is worthy of attention in the future.

- 在行业内构建产品绿色设计、绿色生产、绿色消费、绿色物流以及绿色回收和处理的全生命周期绿色产业链，建立制冷空调产品对环境影响的评价体系，是实现资源循环利用的重要基础。**Building a green industry chain for the entire life cycle including green product design, green production, green consumption, green logistics, and green recycling and treatment in the industry, and establishing an evaluation system for the environmental impact of refrigeration and air-conditioning products, are important foundations for achieving resource recycling.**

- 政府正在大力推动构造各类设备更新和循环再利用的政策法规和标准体系，这将推动形成新的市场发展空间。**The government is vigorously promoting the construction of policies, regulations and standards for the renewal and recycling of various types of equipment, which will promote the formation of new market development space.**

结束语

Summary

- 实现碳达峰碳中和、履行国际公约是国家的重大战略，也是制冷空调行业必须承担的责任和义务。**Achieving carbon emission peaking and carbon neutrality and fulfilling international conventions are major national strategies, and are also responsibilities and obligations that the refrigeration and air-conditioning industry must bear.**
- 实施“双碳”战略，走绿色发展之路对行业而言是一场革命性的挑战，将带来全产业链的生态革新和重构。**Implementing the "carbon emission peaking and carbon neutrality" strategy and taking the path of green development is a revolutionary challenge for the industry, which will bring about ecological innovation and reconstruction of the entire industry chain.**
- 技术创新将是制冷空调行业实现履约目标、达成碳中和不可或缺的方法和手段。全行业应持续加大技术创新力度，以更加节能环保的技术和产品服务于市场和用户，在推动行业实现绿色可持续发展的同时，也将为全球的环保事业做出更多的贡献。**Technological innovation will be an indispensable method and means for the refrigeration and air-conditioning industry to achieve compliance goals and achieve carbon neutrality. The entire industry should continue to increase its technological innovation efforts, serve the market and users with more energy-saving and environmentally friendly technologies and products. While promoting the industry to achieve green and sustainable development, it will also make more contributions to the global environmental protection cause.**

Thank you!