



臭氧气候友好的替代技术 在中国工商制冷空调行业应用与推广

Application and Promotion of Ozone2Climate Alternative Technologies in China ICR Sector

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2018.4.12

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1 行业现状

Industry Situation

- ❖ 中国是全球制冷空调设备的生产大国。根据CRAA统计，中国工商制冷空调行业2017年工业总产值约3100亿元人民币，较2016年有超过10%的增长。

China is a major refrigeration and air conditioning equipment manufacturing country in the world. According to CRAA statistics, the total industrial output value of ICR sector in 2017 was around CNY310 billion with a over 10% increase from 2016.

- ❖ 人民生活水平的提高，日益增长的美好生活的需求，对制冷空调设备的数量和品质的要求越来越高。环保、高能效的制冷空调产品面临重要的发展机遇。

As the development of people's living standard and the increasing demand for a better life, which requires larger quantity and higher quality of R/AC equipment, the development opportunity is emerged from environment friendly and energy efficient R/AC products.

2 臭氧气候友好替代技术的应用



Application of Ozone2Climate Alternative Technologies

- ❖ 基加利修正案规定全球各国最终实现HFCs基线水平80%—85%的削减，意味着目前制冷空调行业普遍使用的R410A、R134a、R404A等常用的高GWP的HFCs制冷剂最终将被替代和淘汰。

The *Kigali Amendment* stipulates to phase-down HFCs by 80% -85% of baseline in all countries, which means that the current commonly used high-GWP HFCs refrigerants such as R410A, R134a, R404A, etc. in the R/AC industry will eventually be replaced and phase-out.

- ❖ 中国工商制冷空调行业在HPMP的实施过程中，大力推动臭氧气候友好替代技术在行业中的应用与推广，体现了中国工商制冷空调行业企业负责任的态度。

China ICR sector vigorously promotes the ozone2climate alternative technology in the HPMP implementation, which reflects its responsible attitude.

2 臭氧气候友好替代技术的应用



Application of Ozone2Climate Alternative Technologies

- ❖ 工商制冷空调领域第一阶段总共签署了超过8000吨的HCFCs产品生产线的转换改造合同，通过政府、行业和企业各界的共同努力，其中大部分已经采用了NH₃/CO₂、R32等更加环保的替代技术；只有较少部分选用了R410A和R134a等高GWP值的制冷剂作为替代品，这部分约有2500吨，只占第一阶段行业总淘汰量的30%；远远低于第一阶段行业计划中4,033吨的设定目标值。

In stage I, ICR sector has signed HCFCs production line conversion transformation contracts with a total amount of more than 8,000 MT. With efforts from government, industry and enterprises, most of them adopted more environmentally friendly alternatives such as NH₃/CO₂, R32 and etc. Only a few projects selected high GWP refrigerants such as R410A and R134a as alternatives, which approximate 2,500 MT. It is about 30% of stage I phase-out volume, much lower than the upper limit of 4,033 MT.

2 臭氧气候友好替代技术的应用



Application of Ozone2Climate Alternative Technologies

- ❖ 考虑到基加利修正案的达成，中国工商制冷行业第二阶段行业计划中将不再资助采用高GWP的R410A和R134a作为替代技术的项目。

Taking into account the agreed *Kigali amendment*, China industrial and commercial refrigeration industry will no longer give financial support to the projects adopting high GWP refrigerants R410A and R134a in the HPMP stage-II.

- ❖ 采用CO₂、NH₃、HC、HFOs等低GWP的替代技术超过第二阶段总淘汰目标的50%。

Low GWP alternative technology such as CO₂, NH₃, HC and HFOs, exceeds half of the overall phase-out target in stage II.

第二阶段替代技术的选择计划

HPMP Stage-II — Alternative Technology Selection



替代制冷剂 Alternative refrigerants	R32	NH ₃ /CO ₂ 复叠/载冷 NH ₃ /CO ₂ cascade; CO ₂ as secondary refrigerant	NH ₃	CO ₂	HC	HFOs	合计/吨 Total/ton
小计/吨 Sub-total/ ton	3,150	1,700	150	270	780	450	6,500

臭氧气候友好替代技术的研发与示范应用

Development and Demonstration of Ozone2Climate Alternative Technologies



❖ 低GWP值替代技术研发

Research & development of low GWP alternative technology

❖ 环保低碳热泵技术采暖示范项目

Demonstration project of low-carbon heat pump technology

❖ 二氧化碳制冷技术在超市的应用示范项目 **Demonstration project of CO₂ refrigeration technology**



宣传活动

Promotional Activity



- ❖ 为推动臭氧气候友好替代技术的应用，CRAA与FECO、UN Environment和UNDP等相关国际执行机构密切合作，在行业内组织开展各种活动，广泛宣传淘汰管理计划和臭氧层保护的政策法规。

Cooperating closely with FECO, UN Environment, UNDP and other international agencies to promote application of Ozone2Climate friendly alternative technology, CRAA have carried out various activities and disseminate HPMP as well as ozone protection policies and regulations.



- ❖ 烟台冰轮集团承担的“冷冻冷藏NH₃/CO₂复叠制冷系统替代R22”示范项目于2013年7月通过国家验收，先进的NH₃/CO₂复叠技术代替R22成为企业的主流技术并广泛应用于其产品生产和市场推广，新技术的应用同时为广大用户带来了明显的节能收益。目前中国在这个领域的主要企业均把这一环保技术确定为未来的选择方向，这一示范项目的成功真正在行业中树起了环保技术应用的典范。

A demonstration project "NH₃/CO₂ cascade refrigeration and cold storage system" undertaken by Yantai Moon Co., Ltd. passed national acceptance in July 2013. The advanced NH₃/CO₂ cascade technology, which replaced R22, become the mainstream technology and widely used in refrigeration and cold storage products production and markets. the new technologies brought obvious energy savings. At present, China's major enterprises in this field have identified this environmental technology as their direction of future choice. The success of this demonstration project has built up a model of environmental-friendly technology applications in the industry.





Technologies

- ❖ 下一步需要重点开展的工作是提高产品能效、加强替代产品的市场推广，同时还需要开展的多种活动包括政策法规完善、标准制修订、替代技术研发、新技术示范应用、宣传和培训等，以扫除环保替代技术和产品市场应用的障碍。

In addition to promoting product energy efficiency and alternative product marketization in the next key steps, we also need to carry out a variety of activities including policies and regulations improvement, standards development and amendment, alternative technology research and development, new technology demonstration and application, publicity and training, in order to remove the barriers to the marketization of environmental alternative technology and product .



- ❖ 基加利修正案要求执委会制定费用指南时考虑维持或提高被替代的设备的能效，同时注意其他机制解决能效问题的作用。

The *Kigali Amendment* requires the Executive Committee to consider preserving or improving energy efficiency of the equipment replaced when formulating cost guidelines, and to take into account the role of other mechanisms in addressing energy efficiency issues.

Improving Energy Efficiency

- ❖ 2011年，国际空调制冷和供热制造商协会联合会（ICARHMA）正式发布了制冷剂负责任使用声明，从全球制造业同行的角度出发，明确提出在选择未来的替代制冷剂时，除满足零ODP、尽可能低的GWP外，还应综合考虑制冷剂的整个寿命期气候性能(LCCP)，选择对全球气候变化影响更低的替代物，这样才能实现环境效益的最大化。

The International Council of Air-Conditioning, Refrigeration, and Heating Manufacturers Associations (ICARHMA) officially issued the "*Statement on Responsible Use of Refrigerants*" in 2011. From the perspective of global manufacturing counterparts, it is clear that in the selection of future alternative refrigerants, not only to satisfy zero ODP, lower GWP, but also to consider its overall life-cycle climate performance (LCCP), choosing alternatives with lower impact on global climate change in order to maximize environmental benefits.

- ❖ ICARHMA的制冷剂负责任使用声明与基加利修正案的要求是一致的，这为我们未来的选择和行动指明了方向。

ICARHMA's *Statement on Responsible Use of Refrigerants* is consistent with requirements of *Kigali Amendment*. This points out direction for our future choices and actions.



- ❖ 基础、安全和产品等标准的制修订，为环保型替代产品的市场化应用和推广奠定了基础。

The development and amendment of fundamental, safety and product standards lay the foundation for market application and promotion of environmental alternatives.

- ✓ GB/T 9237-2017，修改采用ISO 5149:2014，2017年12月29日发布，2018年7月1日正式实施，规定了可燃性制冷剂的使用门槛。

GB/T 9237-2017 Refrigerating System and Heat Pumps—Safety and Environmental Requirements (ISO 5149:2014 MOD, released on Dec. 29th, 2017, to be in effect on Jul. 1st, 2018)

- ✓ GB/T 7778-2017，修改采用ISO 817:2014，2017年5月12日发布，2017年12月1日正式实施。

GB/T 7778-2017 Number Designation and Safety Classification of Refrigerants (ISO 817:2014 MOD, released May 12th, 2017, in effect Dec. 1st, 2017)

- ❖ 希望广大的行业企业密切关注新标准的颁布和实施，积极投入到替代产品的市场化应用和推广中来，推动环保型替代产品的批量化销售。

We expect vast enterprises in the industry follow closely the release and implementation of up-to-date standards, join actively into market application and promotion of environmental alternatives and put forward their mass sales.

序号	标准名称
1	GB/T 9237—2017 制冷系统及热泵 安全与环境要求 Refrigerating system and heat pumps—safety and environmental requirements
2	GB/T 7778-2017 制冷剂编号方法和安全性分类 Number designation and safety classification of refrigerants
3	GB/T 18836-2017 风管送风式空调（热泵）机组 Ducted air-conditioning (heat pump) units
4	GB/T 18430.2-2017 蒸汽压缩循环冷水（热泵）机组 第2部分户用和类似用途的冷水（热泵）机组 Water chilling (heat pump) packages using the vapor compression cycle- Part 2: Water chilling (heat pump) packages for household and similar application
5	JB/T 12319-2015 制冷剂回收机 Refrigerant recover machine
6	JB/T 12844-2016 制冷剂回收循环处理设备 Refrigerant recovery and recycling equipment
7	T/CRAA 1010-2017 工商业用或类似用途的制冷空调设备维修保养技术规范 Technical specification for service and maintenance of refrigeration and air-conditioning equipment for industrial & commercial and similar application

结束语

Conclusion



- ❖ 保护臭氧层、减缓气候变暖是全人类共同的责任与义务。
Protecting ozone layer and mitigating global warming are the common responsibilities for all human beings.
- ❖ 随着《蒙特利尔议定书》基加利修正案的达成，推进采用零ODP、更低GWP且具有更加友好的寿命期气候性能（LCCP）的环保制冷剂做为未来的替代物将是全球制冷空调行业共同且唯一的选择。
Promoting to adapt environmental friendly refrigerants with zero ODP, lower GWP and better LCCP will be the common and only choice for the global R/AC industry.
- ❖ 我们希望与国际社会一道，以负责任的态度开展合作，为全球的ODS淘汰以及减缓全球变暖的目标早日实现做出更多的行动和贡献！
We expect to cooperate with international societies, take more actions and contributes to our early achievements of global ODS phase-out and global warming mitigation!



Thank you!