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# 《保护臭氧层维也纳公约》及 《关于消耗臭氧层物质的蒙特利尔 议定书》履约

## Implementation of The Vienna Convention for the Protection of the Ozone Layer and The Montreal Protocol on Substances that Deplete the Ozone Layer

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## 1 基本情况

### Introduction

#### ■ 1.1 公约和议定书简介

#### Introduction to the Convention and the Protocol

《保护臭氧层维也纳公约》缔结于1985年，公约针对人为活动对臭氧层产生的影响进行系统的监测、研究和信息交流，为《关于消耗臭氧层物质的蒙特利尔议定书》缔结奠定了基础。中国于1989年加入公约。

The Vienna Convention for the Protection of the Ozone Layer was signed in 1985. The Convention establishes systematic observations, research and information exchange on the impact of human activities on the ozone layer, laying foundation for the conclusion of the Montreal Protocol on Substances that Deplete the Ozone Layer. China acceded to the Convention in 1989.

为保护臭氧层，国际社会于1987年签订了《关于消耗臭氧层物质的蒙特利尔议定书》（以下简称《蒙特利尔议定书》），商定开展保护臭氧层的全球行动，逐步停止生产和使用消耗臭氧层物质（ODS）。中国于1991年加入《蒙特利尔议定书》，目前全球198个国家地区已经全部成为《蒙特利尔议定书》的缔约方，议定书被誉为全球环保合作的典范。

The international community agreed on the Protocol to protect the ozone layer in 1987, deciding to take global action to safeguard the ozone layer by phasing out ozone-depleting substances (ODS) production and consumption. China acceded to the Protocol in 1991. The Protocol, with global ratification of 198 countries and regions, is hailed as a model of global environmental cooperation.



1987年，蒙特利尔议定书首次会议在加拿大蒙特利尔召开  
In 1987, the first conference of Montreal Protocol was held in Montreal, Canada



《蒙特利尔议定书》基加利修正案于2016年10月15日在卢旺达基加利通过将氢氟碳化物（HFCs）纳入管控范围。HFCs是ODS的常用替代品，虽然本身不是ODS，但HFCs是温室气体，具有高全球升温潜能值（GWP）。《基加利修正案》通过后，《蒙特利尔议定书》开启了协同应对臭氧层耗损和气候变化的历史新篇章。习近平总书记高度重视保护臭氧层和应对气候变化工作，多次作出重要指示批示，亲自推动达成并宣布中国接受《基加利修正案》，《基加利修正案》于2021年9月15日对我国生效，将为全球臭氧层保护和应对气候变化做出新贡献。



The Kigali Amendment to the Protocol was adopted on October 15, 2016, in Kigali, Rwanda, bringing hydrofluorocarbons (HFCs) under control. HFCs are commonly used as substitutes for ODS. Although not ODS themselves, HFCs are greenhouse gases with high global warming potentials (GWP). The Kigali Amendment marked a new chapter for the Protocol in tackling both ozone layer depletion and climate change. President Xi Jinping attaches great importance to the protection of the ozone layer and the tackling of climate change, having made multiple important instructions and approvals, and personally promoted the adoption of and announced China's acceptance of the Kigali Amendment. China, with the Kigali Amendment taking effect on September 15, 2021, will make new contributions to global ozone layer protection and climate change mitigation.



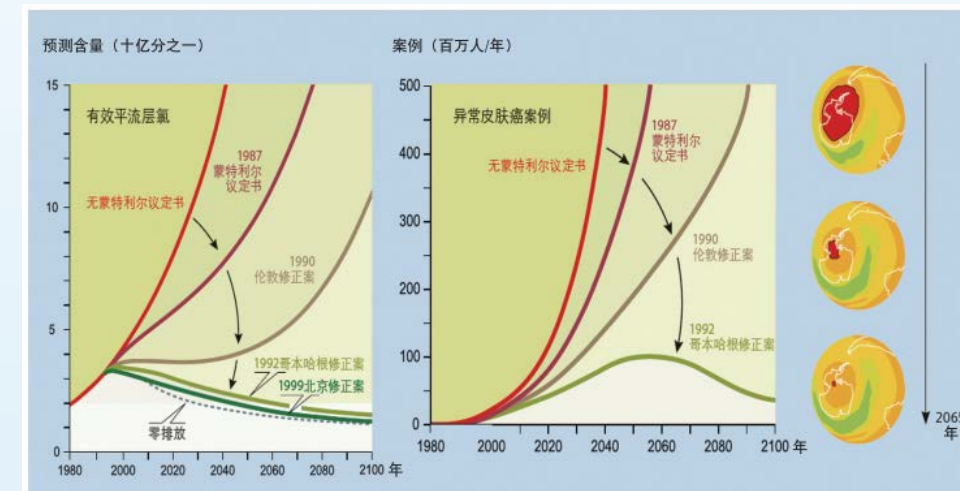
2021年4月16日，国家主席习近平在中法德领导人视频峰会上明确表示中国决定接受《〈蒙特利尔议定书〉基加利修正案》。

On April 16, 2021, President Xi Jinping stated during a video summit with French President and former German Chancellor that China had decided to accept the Kigali Amendment to the Montreal Protocol.

## 1.2 公约和议定书成就 Achievements

《蒙特利尔议定书》被誉为一项巨大的环境成就。迄今为止，全球淘汰了近99%的ODS生产和使用，臭氧层损耗得到了有效遏制，有科学证据表明臭氧层正在自我修复，预计到本世纪中叶将恢复如初。《蒙特利尔议定书》还显著减缓了气候变暖，若没有《蒙特利尔议定书》的管控，目前由ODS造成的气候强迫效应可能会达到当前数值的近2.5倍。

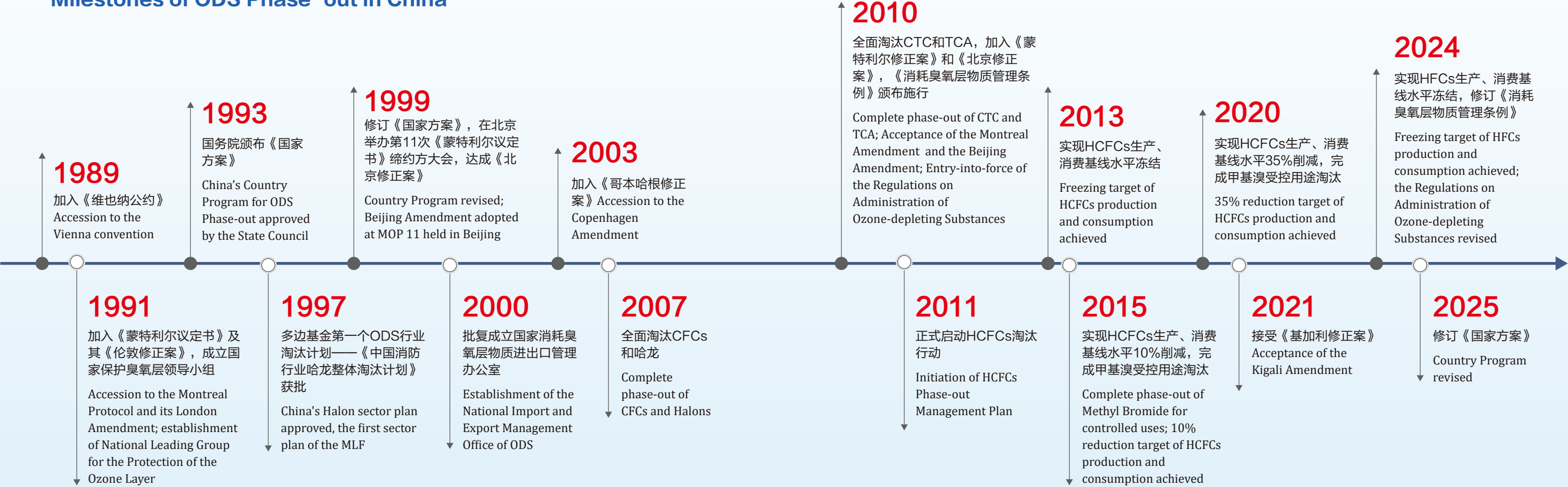
The Montreal Protocol is widely lauded as a huge environmental success. Up to now, almost 99% of ODS production and consumption have been phased out globally, and the depletion of ozone layer is effectively contained. There is scientific evidence that the ozone layer is healing itself and expected to recover by the middle of this century. The Protocol has also made substantial contributions to climate change mitigation. Without its control measures, the climate forcing due to ODS could now achieve nearly two and a half times the present value.



南极地区臭氧层将在本世纪中叶恢复到1980年的水平。

The ozone layer of the Antarctic region is expected to **recover to the 1980s level** by the mid of this century.

■ 1.3 中国消耗臭氧层物质淘汰历程  
Milestones of ODS Phase-out in China





■ 1.4 国家履约机制

National Implementation Mechanism

中国作为发展中国家最大的ODS生产国和使用国，履约任务十分艰巨。为加强履约工作，组建国家保护臭氧层领导小组并制定《国家方案》。

As the largest ODS producer and consumer among developing countries, China faces great challenges in achieving ODS phase-out targets. The State Council approved China's Country Program for ODS Phase-out and established the National Leading Group for the Protection of the Ozone Layer.



2025年5月23日，国家保护臭氧层领导小组会议在京召开

On May 23, 2025, the meeting of the National Leading Group for Ozone Layer Protection was held in Beijing.

2025年4月，经国务院同意，生态环境部、国家发展改革委、工业和信息化部、商务部、海关总署联合印发《中国履行〈关于消耗臭氧层物质的蒙特利尔议定书〉国家方案（2025—2030年）》。《国家方案》明确9类管控物质、确定2大用途分类、提出4项行动举措、11项具体任务，加强保障措施，确保完成履约目标。

In April 2025, with the approval of the State Council, the Ministry of Ecology and Environment, the National Development and Reform Commission, the Ministry of Industry and Information Technology, the Ministry of Commerce, and the General Administration of Customs jointly issued the *China National Plan for Implementing the Montreal Protocol on Substances that Deplete the Ozone Layer (2025-2030)*. The National Plan specifies 9 categories of controlled substances, identifies 2 major use classifications, proposes 4 action initiatives and 11 specific tasks, and strengthens safeguard measures to ensure the achievement of compliance goals.

生态环境部、商务部和海关总署联合成立国家消耗臭氧层物质进出口管理办公室，负责ODS进出口日常管理工 作，对ODS实行进出口许可证管理。2025年3月21日生态环境部、商务部、海关总署联合印发《消耗臭氧层物质进出口管理办法》，5月1日期正式施行。

Jointly established by Ministry of Ecology and Environment, Ministry of Commerce and the General Administration of Customs, the National Import and Export Management Office of ODS is in charge of daily management of ODS import and export, including licensing management. On March 21, 2025, the Ministry of Ecology and Environment, the Ministry of Commerce, and the General Administration of Customs jointly issued the Measures for the Administration of the Import and Export of ODS, which came into effect on May 1.

■ 1.5 行业计划实施

Implementation of Sector Plans

从1996年编制全球第一个ODS行业整体淘汰计划—《中国消防行业哈龙整体淘汰计划》起，先后在化工、制冷、泡沫等十多个行业，实施了32个行业整体淘汰计划，支持数千家企业开展ODS淘汰和替代。

Since the compilation of the Phase-out Plan for Halon in China Fire-fighting Sector, the world's first ODS sector phase-out plan, in 1996, China has implemented 32 sector plans in more than 10 sectors including chemical production, refrigeration and foam, etc., and supported over a thousand enterprises in phase-out and substitution.

## 2 阶段成果 Present Progress

### ■ 2.1 淘汰取得积极进展

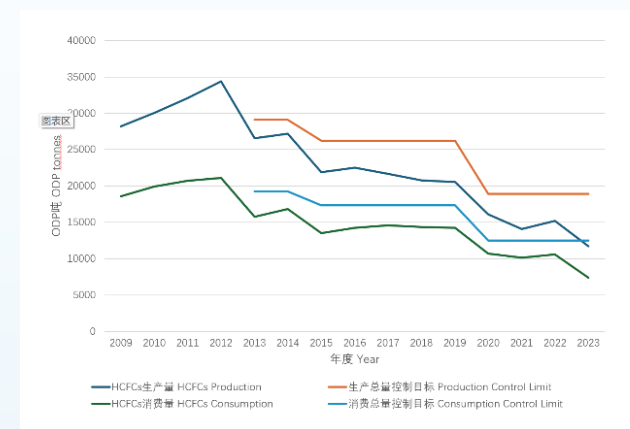
#### Progress achieved in Phasing out Ozone-depleting Substances

淘汰消耗臭氧层物质约62.8万吨

Approximately 628,000 Tons of ODS Phased out

为确保实现议定书规定的各阶段履约目标，中国对受控物质的生产和使用实施总量控制，逐步淘汰受控用途生产和使用，并鼓励减少必要用途和关键用途豁免。中国已全面停止全氯氟烃、哈龙、四氯化碳（CTC）、甲基氯仿和甲基溴五大类物质受控用途生产和使用，正在积极推进含氢氯氟烃（HCFCs）淘汰和氢氟碳化物（HFCs）管控削减。截至目前，中国已累计淘汰ODS约62.8万吨，占发展中国家淘汰量一半以上。1991年至2020年的30年间，中国逐步淘汰ODS的努力累计避免了260亿吨二氧化碳当量的温室气体排放。

To meet the control targets of the Protocol, China conducts total amount control on the production and use of controlled substances, gradually phases out the production and consumption for controlled uses, and encourages the reduction of essential use and critical use exemption. China has stopped the production and use of five major categories of ODS for controlled purposes, namely CFCs, Halons, CTC, TCA and MBr, and it is actively carrying out the HCFCs phase-out as well as hydrofluorocarbons (HFCs) control and phase-down. Till now, China has phased out about 628,000 tons of ODS, accounting for more than half of the ODS phased out by developing nations. China's efforts to phase out ODS from 1991 to 2020 avoided the emissions of greenhouse gases equivalent to 26 billion tons of carbon dioxide.



中国HCFCs生产和消费数据  
HCFCs Production and Consumption in China



美的集团R290空调生产线  
Midea Group R290 air conditioner manufacture line

FECO、行业企业和科研机构等广泛合作，共同推动绿色低碳替代技术研究、应用示范和推广，助力产业转型升级，以高水平履约促进行业高质量发展。

FECO collaborates extensively with industries and research institutions to jointly advance the research, demonstration, and adoption of green and low-carbon alternative technologies. This supports industrial transformation and upgrading, and promotes the high-quality development of the sector through comprehensive implementation of the Montreal Protocol.

具有我国自有知识产权且绿色环保的R290、R717和R744等自然工质的应用，推动家用空调器、热泵等行业实现弯道超车，引领全球绿色低碳发展趋势。

The application of natural refrigerants such as R290, R717, and R744—eco-friendly substances backed by China's independent intellectual property rights—has empowered the room air conditioner and heat pump industries to achieve leapfrog development, pioneering a global shift toward green and low-carbon practices.



类别 Classification	政策 Policy
新改扩建管理政策 Management on new construction, reconstruction and expansion projects	关于严格控制氢氟碳化物化工生产建设项目的通知（环办大气〔2024〕22号） Circular on Strictly Controlling the Construction Projects of Hydrofluorocarbon Chemical Production
生产、消费和排放管理 Production and consumption quota management	关于加强含氢氯氟烃生产、销售和使用管理的通知（环函〔2013〕179号） Circular on Strengthening Management of HCFC Production, Sales and Consumption
	关于控制副产三氟甲烷排放的通知（环办大气函〔2021〕432号） Circular on Controlling the Emission of By-product Trifluoromethane
进出口管理 Import and export management	消耗臭氧层物质进出口管理办法(部令第38号) Management Measures of ODS Import and Export
	关于发布《中国进出口受控消耗臭氧层物质名录》的公告(2021年第50号) Announcement on the Release of the "List of Controlled Ozone-Depleting Substances for China's Imports and Exports"
管理规定 Management regulations	关于加强地方环保部门在保护臭氧层工作中监督管理职能的通知（环控〔1997〕115号） Circular on Strengthening the Supervision and Management of Local Environmental Protection Bureaus in the Protection of the Ozone Layer
	关于进一步加大查处非法生产销售消耗臭氧层物质的通知（环办〔2004〕108号） Circular on Further Strengthening the Investigation and Punishment of Illegal Production and Sales of Ozone-Depleting Substances
	关于加强消耗臭氧层物质淘汰管理工作的通知（环发〔2007〕40号） Circular on Strengthening the Management of the Elimination of Ozone-Depleting Substances
	关于印发《消耗臭氧层物质监管指南（试行）》的通知（环办执法函〔2019〕949号） Circular on Issuing the Guidelines for the Supervision of Ozone Depleting Substances (Trial)
	关于进一步做好消耗臭氧层物质日常监管工作的函（环办执法函〔2021〕254号） Letter on Further Improving the Daily Supervision of Ozone-Depleting Substances

■ 2.2 政策法规不断完善

Continuous Improvement of Policies and Regulations

中国政府先后颁布和实施《消耗臭氧层物质管理条例》及其配套管理规章等100多项政策法规，为《蒙特利尔议定书》履约建立了较完善的法律法规体系。

The Government of China has successively promulgated and implemented the *Regulations on Administration of Ozone-depleting Substances* along with over 100 supporting regulations and rules, establishing a relatively comprehensive legal framework for compliance of the Montreal Protocol.

自2021年《基加利修正案》对我国正式生效以来，进一步完善履约政策法规体系。2023年修订发布《消耗臭氧层物质管理条例》，将HFCs纳入管控，完善全链条管理，强化违法处罚措施，形成对违法行为的有效震慑。2025年发布《中国履行〈关于消耗臭氧层物质的蒙特利尔议定书〉国家方案（2025–2030年）》，明确我国2030年前履约路线图和时间表，着力加强受控物质全生命周期管理体系建设。

Since the Kigali Amendment entered into force for China in 2021, efforts to enhance the compliance policy and regulatory framework have continued. In 2023, *the Regulations on Administration of Ozone-depleting Substances* was revised and issued, bringing HFCs under the regulation, improving life cycle management, and strengthening penalties for violations, thereby establishing a more effective deterrent against illegal activities. In 2025, *the China National Plan for Implementing the Montreal Protocol on Substances that Deplete the Ozone Layer (2025-2030)* was released, which defines the roadmap and timetable for China's compliance of the Protocol before 2030, with a focus on strengthening the full life-cycle management system for controlled substances.



新修订《消耗臭氧层物质管理条例》自2024年3月1日起正式施行  
The revised Regulation has come into force since March 1<sup>st</sup>, 2024.



类别 Classification	政策 Policy
监管文件 Supervision and Management	关于禁止生产和使用消耗臭氧层物质三氟三氯乙烷的公告（2005年第60号） Announcement on the Ban of Production and Use of Trifluorotrichloroethane
	国家粮食局、国家环境保护总局关于粮食仓储行业全面停止使用甲基溴的公告（2006年第4号） Announcement of the State Grain Administration and the State Environment Protection Administration on the Complete Cessation of the Use of Methyl Bromide in the Grain Storage Industry
	关于加强消耗臭氧层物质淘汰管理工作的通知（环发〔2007〕40号） Circular on Strengthening the Management of Phase-out of Ozone Depleting Substances
	国家环境保护总局关于禁止生产全氯氟烃（CFCs）的公告（2007年第43号） Announcement on the Ban of Production of CFCs
	国家环境保护总局关于禁止使用氯氟烃（CFCs）物质作为发泡剂的公告（2007年第45号） Announcement on the Ban of Use of Chlorofluorocarbons (CFCs) as Foaming Agents
	关于禁止生产、销售、进出口以氯氟烃（CFCs）物质为制冷剂、发泡剂的家用电器产品的公告（环函〔2007〕200号） Announcement on the Ban of the Production, Sale, Import and Export of Household Electrical Appliances with Chlorofluorocarbons (CFCs) as Refrigerants and Foaming Agents
	关于严格限制四氯化碳生产、购买和使用的公告(2009 年第 68 号) Announcement on Strictly Restricting the Production, Purchase and Use of Carbon Tetrachloride
	关于禁止使用全氯氟烃类物质生产药用非吸入气雾剂的公告（2013年第9号） Announcement on the Ban of Use of CFCs in the Production of Non-inhaled Medicinal Aerosols
	关于发布《中国受控消耗臭氧层物质清单》的公告（2021 年第 44 号） Announcement on the Release of the List of Controlled Ozone-Depleting Substances in China
	关于禁止生产以 1,1-二氯-1-氟乙烷（HCFC-141b）为发泡剂的保温管产品、太阳能热水器产品的公告（2023年第28号） Announcement on the Ban of Production of Insulation Pipe Products and Solar Water Heater Products Using 1,1-Dichloro-1-fluoroethane (HCFC-141b) as Foaming Agent
	关于印发《中国消耗臭氧层物质替代品推荐名录》的通知（环办大气函〔2023〕198号） Circular on Issue of Catalogue of Recommended ODS Alternatives in China





## ■ 2.3 监管执法持续强化 Strengthened Supervision and Law Enforcement

“零容忍”态度严厉打击ODS非法行为  
“Zero Tolerance” Attitude toward Illegal ODS Behaviors

中国政府把严格执法作为巩固履约成果的重要保障，始终以“零容忍”态度严厉打击涉 ODS 非法生产、销售、使用行为，不断加强 ODS 监管执法，对违法行为，一经发现，严厉查处。

The Government of China regards strict law enforcement as a crucial safeguard for consolidating the achievements of the Protocol, and consistently cracks down on illegal production, sale and use of ODS with a zero-tolerance stance. Supervision and law enforcement has been strengthened continuously. Violations will be punished to the full extent of the law.



上海市组织企业检查，进行普法宣传  
Law enforcement officer explaining legal provisions to enterprise staff during an inspection in Shanghai



2018年，辽宁省丹东市召开ODS执法行动会议  
ODS law enforcement meeting held in Dandong, Liaoning Province in 2018

持续开展ODS执法检查，确保履约成效  
Continued Enforcement Inspection on ODS to Ensure Compliance Effectiveness

自加入议定书以来，生态环境部就高度重视履约监督执法工作。近年来，生态环境部每年至少组织开展一次由中央和地方执法人员共同参与的履约专项联合执法检查，并自2021年开始将ODS监督检查纳入各地的日常工作。联合海关、商务部门开展打击ODS非法贸易专项行动，并通过非正式出口前预先知情机制（IPIC）核查进出口贸易，有效打击ODS非法贸易。

The Ministry of Ecology and Environment has placed high priority on compliance supervision and law enforcement since ratification of the Protocol. In recent years, MEE has organized special joint compliance inspections involving both central and local enforcement personnel at least once a year; and has put ODS supervision and inspection into routine regulatory work across the nation since 2021. MEE, together with customs and commerce authorities, launch special campaigns combating illegal trade, and inspect import and export through informal Prior Informed Consent (IPIC) mechanism, achieving significant results in cracking down on illegal ODS trade.

通过国家12369执法平台，大力发动全社会参与监督。此外，11家HCFCs生产企业于2019年联合出资成立ODS非法行为有奖举报基金，对提供非法信息的个人或组织，给予5万元至50万元不等的奖励。

China actively mobilizes public oversight through the National 12369 Law Enforcement Platform. Additionally, in 2019, eleven HCFCs production enterprises jointly established a reward fund for reporting illegal ODS activities. This fund offers rewards ranging from CNY 50,000 to CNY 500,000 to individuals or organizations providing credible information on violations.



## 强化源头管控 Intensifying Source Control

自2010年我国全面淘汰四氯化碳受控用途的生产和使用以来，生态环境部对副产四氯化碳的甲烷氯化物企业实行严格管理。2019—2020年，对全部在产的甲烷氯化物企业进行不间断的驻厂监督帮扶，共派驻21轮769人次。

The MEE has implemented strict management on chloromethane enterprises that co-produce CTC since China completely phased out the production and consumption for controlled use of CTC in 2010. During 2019-2020, MEE conducted continuous on-site supervision for all operating chloromethane enterprises, deploying 21 rounds of inspections involving 769 personnel.

按照《消耗臭氧层物质管理条例》要求，2020年建成四氯化碳生产国家监控平台，目前所有在产的甲烷氯化物企业均安装自动监测设备并与平台联网。四氯化碳在线监控为后续开展受控物质可持续监管提供了良好借鉴。

In accordance with the Regulations on the Administration of Ozone-Depleting Substances, National CTC Production Monitoring Platform commenced operation in 2020. Currently, all operational chloromethane enterprises have installed automatic monitoring equipment connected to this platform. The platform provides valuable experience for the sustainable supervision of other controlled substances.



2019年，浙江省开展驻厂监督  
On-site supervision in Zhejiang Province in 2019



四氯化碳生产国家监控平台  
National CTC Production Monitoring Platform

## 3 下一步工作 Future Work Plan

自2024年起，生态环境部对HFCs生产和进口实施配额管理，确保实现HFCs生产和使用冻结的阶段履约目标，并为后续逐步削减奠定基础，正式开启了我国削减HFCs工作。目前，我国面临HCFCs加速淘汰、HFCs管控削减以及已淘汰ODS可持续履约监管等新挑战，将重点做好以下工作：

Since 2024, Ministry of Ecology and Environment has implemented quota management for the production and import of HFCs. This ensures the achievement of the compliance target for freezing HFCs production and consumption, lays the groundwork for subsequent phase-down, and formally marks the commencement of China's HFC reduction efforts. China currently faces challenges in accelerating the phase-out of HCFCs, controlling and phasing down HFCs, and ensuring sustainable compliance monitoring for phased-out ODS. The following priorities will guide our future work:

完善协作机制和政策法规体系，强化履约保障。强化国家保护臭氧层领导小组各部门、中央和地方、政府和企业间的沟通协作机制。推进机制建设，压实地方履约责任，强化企业主体意识。做好《消耗臭氧层物质管理条例》《国家方案》宣贯与实施，提高非法 ODS行为的违法成本。

**To improve coordination mechanisms and the policy and regulatory framework to strengthen compliance safeguards.** We'll enhance collaboration among departments of the National Leading Group for the Protection of the Ozone Layer; between central and local authorities, and across government and industry. Institutional frameworks will be reinforced to solidify local governments' compliance responsibilities and elevate enterprises' awareness of their primary obligations. Furthermore, the implementation of both the Regulations on the Administration of Ozone-Depleting Substances and the China National Plan will be advanced, while increasing penalties for illegal ODS activities to raise the cost of violations.



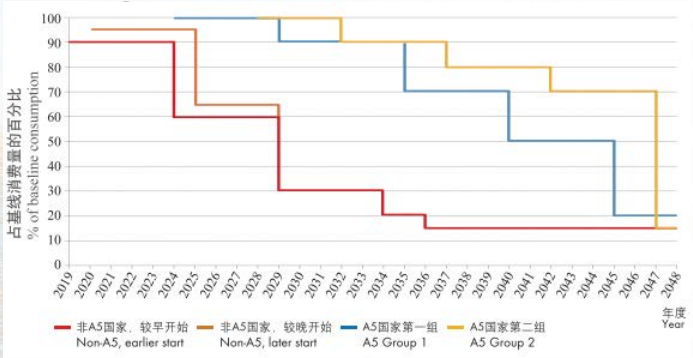
持续推动受控物质替代与削减，确保实现履约目标。推进HCFCs淘汰，确保2025年实现削减67.5%、2030年实现削减97.5%的目标。推动HFCs分行业削减，确保2029年实现削减10%的目标。

**To make continuous efforts to phase out controlled substances to achieve compliance targets. This includes:**

- Advancing HCFC phase-out to achieve 67.5% reduction from baseline by 2025 and 97.5% by 2030.
- Implementing sector-specific HFC phase-down measures to secure a 10% reduction by 2029.

加大监管执法力度，确保履约成效。用好ODS信息管理系统，推进受控物质全生命周期管理，继续定期开展执法检查，强化重点受控物质源头管控，保持对涉ODS非法行为的高压态势。

Supervision and law enforcement to ensure implementation effects will be strengthened. We will make good use of information management system that covers all the ODS categories. We will continue to carry out inspection on a regular basis, strengthen source control on CTC and step up efforts to crack down on ODS illegal trade.



HFCs削减时间表  
Kigali Amendmend HFCs Phase-Down Schedules

强化科技支撑和能力建设，夯实履约基础。加快ODS大气监测网络建设，加强ODS替代品和替代技术研发，加强执法人员培训，配备快速检测设备，进一步推进ODS产品检测实验室建设。

It is planned to intensify scientific and technological support and capacity building to consolidate implementation foundation. We will accelerate the construction of ODS measuring network, enhance R&D of ODS alternatives and alternative technologies, improve training for law enforcement personnel, and equip them with instant identifiers and further advance the construction of ODS product testing laboratories.

深入开展国际合作与交流，形成履约合力。与国际社会共同研究推动形成持续履约的体制和长效机制。助力履约相关行业企业“走出去”，为全球履约治理提供更多的中国技术、中国经验和中国方案，努力讲好中国履约故事。

International cooperation and exchange to create implementation synergy will be deepened. We will work together with the international community and facilitate the implementation of the Protocol. We will continue to support industries and enterprises in 'going global,' contributing more Chinese technologies, experience and solutions to global compliance governance, and effectively sharing China's compliance story.