

China's Good Practices to Address Climate Change

Executive Summary

Chinese Research Academy of Environmental Sciences (CRAES)

Institute of Public and Environmental Affairs (IPE)



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In recent years, climate change has rapidly intensified, with the global average temperature repeatedly breaking historical records. The year 2023 has become the hottest year on record, and 2024 is highly likely to be the first year when the global average temperature rise reaches 1.5°C. Meanwhile, the annual average sea surface temperature globally has repeatedly hit historical highs, with sea temperatures in many areas significantly deviating from normal ranges. Accompanied by the continuous increase in concentrations of greenhouse gases such as carbon dioxide and methane, extreme weather events like high temperatures, heatwaves, wildfires, floods, and droughts occur frequently. Long-term impact events such as glacier melting and sea level rise are accelerating, causing concern.

More worryingly, multiple planetary boundaries, which are crucial for the stability of Earth's ecosystems, are at risk of being breached. Human-induced climate change has led to widespread and rapid changes in the atmosphere, oceans, cryosphere, and biosphere. Once these changes surpass critical thresholds, they may form a vicious cycle, significantly exacerbating climate change and posing a major threat to human and planetary well-being. According to various studies and reports, 9 out of 15 global climate tipping points have already been or are being breached.

The first Global Stocktake released at COP28 identified overall progress under the Paris Agreement in terms of mitigating climate change, adapting to climate impacts, and implementing support measures. However, it also pointed out that there remains a significant gap in achieving the 1.5°C temperature target. Building on the full implementation of both unconditional and conditional Nationally Determined Contributions (NDCs), the addition of further net-zero commitments could limit global warming to below 1.9°C. However, there is currently a lack of confidence among parties in fulfilling these net-zero commitments. The UNEP's *Emissions Gap Report 2024* indicates that, without heightened ambition

in the new round of NDCs and immediate action, global temperatures could rise by 2.6–3.1°C within this century, leading to irreversible and devastating impacts on humanity, the planet, and the economy.

The triple environmental crises, including climate change, ecosystem loss, and pollution, have become critical issues concerning the fate of humanity and the future of our planet. These challenges are presenting themselves with unprecedented urgency, requiring the international community to act together to formulate and implement effective response strategies. As the world's second-largest economy and a responsible major power, China attaches great importance to addressing climate change. Following its commitment in September 2020 to carbon peaking and carbon neutrality, the government, enterprises, and the public have taken swift and determined action, advancing the “dual carbon” goals with tenacity and transforming China from an active participant in global climate governance to an important contributor and leader.

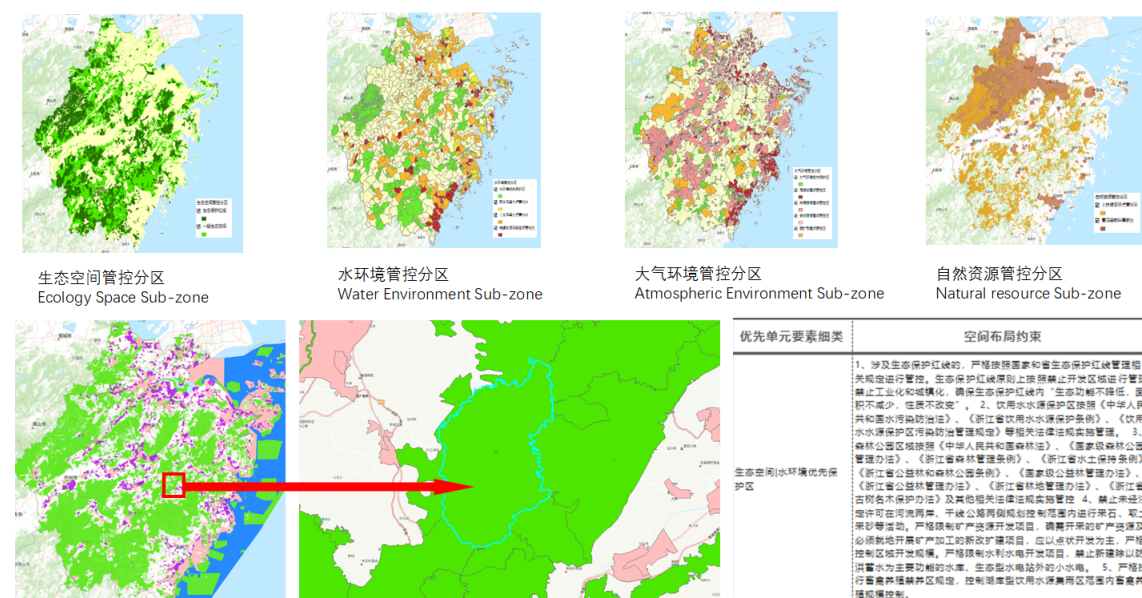
To continuously track China's progress in addressing climate change, following the release of the report *China's Pragmatic Actions to Address Global Climate Change* at the COP28 conference in Dubai, the Chinese Research Academy of Environmental Sciences (CRAES) and the Institute of Public and Environmental Affairs (IPE) have once again joined forces. They have reviewed the important climate policies formulated and released by China in recent years and compiled 57 exemplary practices involving multi-stakeholder participation from the government, enterprises, and the public in addressing climate change. These practices summarize China's experiences in green transformation and achievements in low-carbon technology from ten aspects, supporting the nation's dual carbon actions and high-quality development, while also providing valuable insights and references for other developing countries globally.

In the research and review process, we observed that in 2024, China proposed a series of policies and measures to address climate change, aiming to tackle the growing contradiction between economic growth and resource consumption, ensuring that ecological security and high-quality economic development can proceed in parallel. Among them, the *Guidelines to Ramp up Green Transformation in all areas of Economic and Social Development* and the *Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emissions* are particularly important, further confirming China's development direction of using carbon peaking and carbon neutrality as a guide, and promoting carbon reduction, pollution reduction, greening, and high-quality growth in a coordinated manner.

The first key measure to accelerate a comprehensive green transformation and actively address climate change is to establish a spatial framework for green,

low-carbon, and high-quality development. China took the lead in proposing and implementing the Ecological Conservation Redline (ECR) system, designating over 30% of terrestrial areas and approximately 150,000 square kilometers of marine areas for ecological protection. After a decade of efforts, China had essentially established an ecological zoning control system by 2024, with all provinces, autonomous regions, and municipalities completing the zoning control delineation based on ecological conservation redlines and the “Three Lines and One List” eco zoning management system. According to the *National Ecological Protection and Restoration Bulletin 2024*, China has implemented 52 integrated protection and restoration projects for mountains, rivers, forests, farmlands, lakes, grasslands, and deserts; the area of mangrove forests has increased to 302.7 square kilometers; and the national annual carbon sink from forests and grasslands exceeds 1.2 billion tons.

44,000 Zones for Eco-conservation: digital solutions that help integrate water, natural resource and biodiversity conservation in investment and supply chain management



▲ Provincial "Three Lines and One List" Map

As a major global manufacturing power, China has a significant share of industrial carbon emissions. In response, the Ministry of Ecology and Environment has been continuously promoting the optimization and adjustment of industrial structures, curbing the unchecked launch of high energy consumption, high emission, and low-level projects, and has cumulatively eliminated 1 billion tons of outdated coal capacity, 300 million tons of steel capacity, and 400 million tons

of cement capacity. Efforts are underway to deeply integrate digital and intelligent technologies with green initiatives, promoting the use of AI, big data, cloud computing, and industrial internet in fields such as power systems, industrial and agricultural production, transportation, and building construction and operation, to enable green and low-carbon transformation through digital technology.



▲ CHINT 132kV Natural Ester Oil-immersed Transformer Project in Australia

Since 2023, the pace of green transformation in the energy sector has significantly accelerated. China continues to rank first globally in wind, solar, hydro, and biomass power installations. As of the end of 2024, the installed capacity of renewable energy power generation reached 1.73 billion kilowatts, accounting for 54.7% of the total installed capacity.¹ The installed capacity of renewable energy power generation nationwide

continues to grow at an extraordinary rate, with solar and wind power capacity achieving the 1.2 billion kilowatt target for 2030 six years ahead of schedule. China contributed over 50% of the global increase in newly installed renewable energy capacity.² At this rate, China is on track to triple its renewable energy capacity by 2030, making a significant contribution to the global energy transition.³

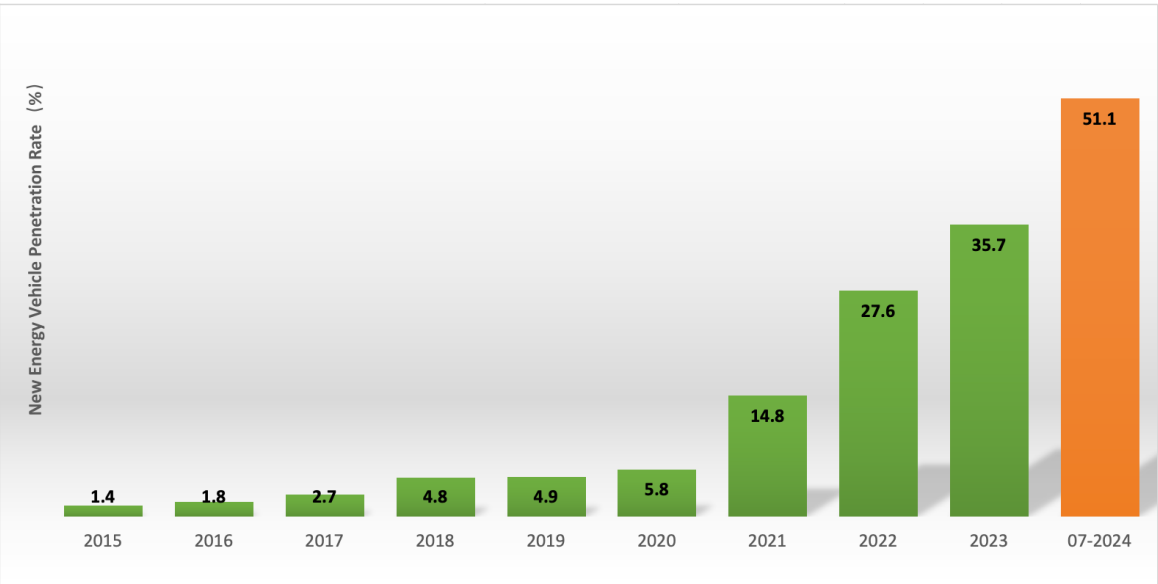


▲ Regional Photovoltaic Development Status

Source: Blue Map

The green transformation of transportation is most notably marked by the electrification of vehicles. In 2023, the annual sales of new energy vehicles nationwide totaled 7.736 million units, with a market penetration rate of 35.7%. By the end of 2023, Shanghai's penetration rate exceeded 40%, approaching

50%, while in Haikou, it surpassed 50%. In 2024, the national new energy vehicle market penetration rate accelerated significantly, historically surpassing 50% in July and reaching 53.3% in September, an increase of 16.8 percentage points compared to September 2023.⁴



▲ National New Energy Vehicle Penetration Rate (2015-2024)

The proportion of carbon emissions from urban and rural construction in the total emissions of the whole society is gradually increasing. To promote green transformation in the construction sector, China is promoting green building methods in urban and rural construction and optimizing the energy structure of buildings. In 2023, 80% of new public housing projects used prefabricated

construction methods. During the first three years of the “14th Five-Year Plan”, the proportion of green building area in new constructions exceeded 90%, and energy-saving renovations of over 300 million square meters of existing urban buildings were completed. By the end of 2023, the clean heating rate in northern regions reached 76%.



▲ Qionghai Bo'ao Near-Zero Carbon Demonstration Zone Project

Source: China-Up WeChat Official Account

Comprehensive resource conservation and the development of a circular economy are key measures to promote the green transformation of the economy and society and to reduce carbon emissions. In recent years, China has vigorously promoted energy conservation and efficiency, popularized land-saving technologies, developed the resource recycling industry, and advanced recycling and reuse. Promote energy conservation, carbon reduction, and efficiency improvement in enterprises through equipment renovation and

upgrading, low-carbon product design and development, implementation of smart energy management, promotion of recycling and reuse of waste materials, and utilization and transformation of residual heat and energy, effectively reducing environmental pollution while lowering resource consumption. In 2023, China's energy consumption per unit of GDP decreased by 2%⁵ year-on-year, accumulating a decline of approximately 26%⁶ since 2012.



▲ "Blue Cycle" Project

Source: Taizhou WeChat Official Account

With the improvement of people's living standards, the proportion of emissions from the consumption side is expected to rise significantly, necessitating the promotion of green transformation in consumption patterns. Over the past year, China has focused on establishing a carbon footprint management system, advancing green product certification and labeling, with a total of 33,000 national green product certification certificates issued.⁷ Promoting green packaging for express delivery, reducing secondary packaging waste, in

2023, over 1 billion mail and express items nationwide used recyclable packaging, and more than 820 million corrugated boxes were recycled and reused. In 2023, the transaction scale of the second-hand e-commerce market reached RMB 548.65 billion, an increase of 14.25% year-on-year; The number of second-hand e-commerce users reached 580 million, a year-on-year increase of 25.26%, making thrift and recycling the new fashion.⁸

1. https://www.nea.gov.cn/2024-10/31/c_1310787069.htm
2. https://www.gov.cn/lianbo/bumen/202401/content_6928330.htm
3. <https://dialogue.earth/zh/4/116380/>
4. <https://news.qq.com/rain/a/20241012A0578V00>
5. http://zfxgk.nea.gov.cn/2023-04/06/c_1310710616.htm
6. https://www.gov.cn/zhengce/202408/content_6971115.htm

7. https://www.samr.gov.cn/xw/zj/art/2024/art_3b87e091a9944ee2a8f0d9f8de842586.html
8. <https://www.100ec.cn/detail--6638645.html>



▲ Clock in my climate action⁹



Source: Blue Map app

Technological innovation is essential for accelerating a comprehensive green transformation of the economy and society. In recent years, China has been vigorously developing low-carbon technologies, with rapid advancements in photovoltaic technology and leading-edge capabilities in wind, hydro, and nuclear power. On the carbon capture and storage front, China is actively conducting research and deployment of CCUS technology. By the end of 2023, there were 107 CCUS demonstration projects in operation or planned nationwide, with a CO₂ capture capacity of approximately 7.3 million tons per year.¹⁰ At the same time, China actively participates in international scientific and technological cooperation, sharing scientific and technological resources and research outcomes and conducting joint R&D initiatives. In addition to collaborations with developed countries and regions, China also actively advocates for South-South cooperation, providing training on climate change response and ecological environmental protection to over 120 developing countries.

The green transition cannot be achieved without fiscal and tax policies and financial support. In recent years, China has initially established a multi-level green financial product system that includes green loans, green bonds, green insurance, green funds, green trusts, and carbon financial products. By the end of the first quarter of 2024, the balance of green loans exceeded RMB 30 trillion, a year-on-year increase of 35.1%, which is 25.9 percentage points higher than the growth rate of all loans. In terms of usage, the year-on-year growth rate of loan balances for infrastructure green upgrading industries, clean energy industries, and energy-saving and environmental protection industries all exceeded 30%.¹¹ On this basis, a series of fiscal and tax policies promoting green and low-carbon development have further expanded to ecological compensation, energy and water conservation, and comprehensive resource utilization.

9. Developed by Blue Map and Wild Aid and in collaboration with Haidian and Chaoyang District Ecological Environment Bureaus under the guidance of China Environmental Journalists Association.

10. China Carbon Capture, Utilization, and Storage (CCUS) Annual Report 2023.

11. https://www.gov.cn/jianbo/bumen/202405/content_6952284.htm

As a responsible major developing country, China adheres to multilateralism in climate governance and actively participates in international climate governance. The “Africa Solar Belt” project is a key initiative under China’s implementation of the China-Africa Cooperation Declaration on Climate Change. It aims to provide electricity for lighting to at least 50,000 impoverished households in Africa without electricity, supporting African countries in addressing climate change and achieving multiple Sustainable Development Goals (SDGs), such as energy self-sufficiency. To date, China

has promoted cooperation agreements for the “Africa Solar Belt” project with five African countries, including Burundi and Chad, with an estimated benefit to nearly 20,000 African households. Since 2024, the China-U. S. Working Group on Enhancing Climate Action in the 2020s has convened twice to discuss the implementation of the Sunnylands Statement on Enhancing Cooperation to Address the Climate Crisis, the fulfillment of their respective 2030 NDCs, and the preparation of their respective 2035 NDCs.



In 2024, as the dust settles on the new U.S. presidential election, local media report that the newly elected U.S. president is preparing to withdraw the United States from the Paris Agreement once again. Global climate action will face another setback, and the international climate governance system will encounter a new round of turbulence. However, in the face of a planet battered by storms, there is no time for waiting and lamenting. The only way forward for countries around the world is to join hands, learn from each other, draw on each other's experiences, and work together to respond to the challenge.

As the world's largest developing country, China faces an enormous challenge in achieving carbon peaking and carbon neutrality while simultaneously advancing economic development, improving livelihoods, eradicating poverty, and controlling pollution. China has traversed an extraordinary path of trial and error, awakening, vigorous action, and persistent commitment in green development. It is striving towards a comprehensive green transformation of economic and social development, promoting carbon reduction, pollution reduction, greening, and growth in a coordinated manner. We sincerely hope that the good practice cases outlined in the 2024 annual report will provide inspiration and valuable insights for the global response to climate change and comprehensive green transformation.

Research Group on China's Good Practices to Address Climate Change
November 10, 2024

- Case 1: Ecological environment zoning control serves green finance and green supply chain
- Case 2: Guangdong–Hong Kong–Macao Greater Bay Area Creating a Green Low–Carbon Industrial Cluster
- Case 3: Baowu Steel Built the First Domestic Million–Level Hydrogen–Based Shaft Furnace
- Case 4: “CHINT 10kV~750kV Natural Ester Oil–immersed Transformer” Helps to Address Climate Change
- Case 5: Hainan Climate Change Smart Management Platform
- Case 6: Danone Mizone Wuhan Factory’s Digital Transformation to Address Climate Change
- Case 7: Jiangsu Province’s Largest Fishery–Solar Complementary New Energy Project Connected to the Grid in Changzhou
- Case 8: Ordos Coal Mining Subsidence Area 3 Million Kilowatt Photovoltaic Base Project
- Case 9: Guangdong Shenzhen Virtual Power Plant Smart Dispatch Operation Management Cloud Platform
- Case 10: Shandong Haiyang Nuclear Power Plant Nuclear Energy Heating Project
- Case 11: Shenzhen New Energy Vehicle Grid Interaction Application Implementation
- Case 12: Three Gorges Ulanqab "Source–Grid–Load–Storage" Integrated Demonstration Project
- Case 13: Sichuan Deyang Dongfang Electric Hydrogen Energy Full Industry Chain Technology Innovation Application
- Case 14: Shandong Shengli Oilfield Million–Ton CCUS Project
- Case 15: Zhejiang Promotes "Four–Port Linkage" to Optimize and Adjust Transportation Structure
- Case 16: Shanghai’s Personal Electric Vehicle Charging Piles Exceed 500,000
- Case 17: Shenzhen Establishes a Global Benchmark for Electrification in the Public Sector
- Case 18: Distributed Photovoltaic Power Generation Project in the Western Service Area of Hohhot
- Case 19: The quality of the slow traffic system in Beijing is gradually improving, with the green travel rate reaching 74.7%
- Case 20: Shenzhen North Station has been built as a zero–carbon hub building, injecting new momentum into the green and low–carbon transition
- Case 21: Qionghai Boao Near Zero Carbon Demonstration Zone Project—Integrating Advanced Technologies to Implement Intelligent Zero Carbon Transformation
- Case 22: Wujin District launches a green building evaluation and monitoring system to empower the low–carbon development of the green building industry
- Case 23: Anji Yucun creates zero–carbon buildings, illuminating the low–carbon profile of rural areas
- Case 24: The China–Singapore Tianjin Eco–City has completed its first "zero–carbon building", injecting green momentum into high–quality development
- Case 25: The integrated dual–carbon management enhancement at Shanghai Hongqiao Airport
- Case 26: Geely Automobile Industry’s "Green Factory"
- Case 27: Land Resource Conservation and Intensive Utilization Practices in Changfeng County, Anhui Province
- Case 28: The implementation of rooftop photovoltaic projects by Alxa Power Supply Company of Inner Mongolia Power Group

- Case 29: Sinopec vigorously promotes the comprehensive conservation, intensive, and efficient use of energy resources
- Case 30: Pu’er City creates a national circular economy demonstration city
- Case 31: Multi–stakeholder Collaboration for Plastic Recycling
- Case 32: Traceable Ocean Plastics
- Case 33: Xianyu Promotes Green Development through the Recycling of Idle Resources
- Case 34: Cainiao’s Full–Chain Green Logistics Solutions Aid in Packaging Reduction
- Case 35: Yili Group Promotes Green Carbon Reduction Across the Entire Industry Chain with "Dual Footprints"
- Case 36: The 2023 CITI Index Shows More Companies in China are Building Green Supply Chains
- Case 37: "Double 11" Shopping Platform Discounts Combined with Home Appliance Trade–in Subsidies Boost Sales of Key Consumer Goods
- Case 38: The country’s first green consumption platform "Forest Market" officially launched
- Case 39: Shanghai establishes a pilot for "Product Carbon Footprint Certification"
- Case 40: Jiangsu’s first real–time management platform for enterprise product carbon footprints goes online
- Case 41: The first carbon source and sink monitoring and verification support system completed, aiding the achievement of "dual carbon" goals
- Case 42: The world’s first fourth–generation nuclear power plant begins commercial operation
- Case 43: A 2 million kilowatt photovoltaic desertification control project is connected to the grid, strengthening the regional ecological security barrier
- Case 44: China’s Ultra High Voltage: Bravely climbing the world’s "high" peaks
- Case 45: China Achieves Major Breakthroughs in Cutting–edge Carbon Capture Technology Innovation
- Case 46: The Effects of China’s Green Taxation Become Evident
- Case 47: State Grid Jibei Company’s Green Procurement Practices
- Case 48: The "Toolbox" of Green Finance Continues to Enrich
- Case 49: Rapid Growth in the Scale of Green Credit
- Case 50: The System of Green Financial Products Continues to Improve
- Case 51: Shandong Green Development Fund—China’s First Project Supported by the United Nations Green Climate Fund (GCF)
- Case 52: Encouraging Various Types of Capital to Increase Investment Proportions in the Green and Low–carbon Sectors
- Case 53: Trial Operation of Full–scale Electricity Spot Settlement in Five Southern Provinces
- Case 54: Pilot Reform of Water Resource Tax to be Implemented Soon
- Case 55: National Voluntary Greenhouse Gas Emission Reduction Trading (CCER) Market Officially Restarted
- Case 56: Hubei Province Initiates Coordinated Trading in "Electricity–Carbon–Finance" Markets
- Case 57: Digital Tools Assist Postal Savings Bank in Conducting Corporate Client Carbon Accounting

Author Organizations

The Chinese Research Academy of Environmental Sciences (CRAES) is a state-level non-profit scientific research institution founded on December 31, 1978. As a national research institute and the leading force in the field of ecological and environmental research, CRAES has long focused on the national sustainable development strategy, conducted innovative and fundamental scientific research on environmental protection, and is committed to providing strategic and forward-looking scientific support for China's economic and social high quality development and environmental decision-making, as well as meeting the engineering and technology needs of major environmental issues in economic and social development.

The Institute of Public & Environmental Affairs (IPE) is a non-profit environmental research organization registered and based in Beijing, China. Since its establishment in June 2006, IPE has dedicated itself to collecting, collating and analyzing government and corporate environmental information to build a database of environmental information. IPE's two platforms – the Blue Map website and the Blue Map app – integrate environmental data to serve green procurement, green finance and government environmental policymaking, using cooperation between companies, government, NGOs, research organizations and other stakeholders and leveraging the power of a wide range of enterprises to achieve environmental transformation, promote environmental information disclosure and improve environmental governance mechanisms.

Authors

CRAES: Yang Pingjian, Chang Hongwang, Wang Tao, Tang Yue, Peng Shuan, Wu Xuefang, Tang Zhongshi

IPE: Ma Jun, Ma Yingying, Ruan Qingyuan, Guo Huaxin, Zhu Li, Xu Xin, Wang Jingjing, Liu Yijun

Design: Chen Shuangli, Shi Huan

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