



# Green Development

China Mobile firmly believes that "lucid waters and lush mountains are invaluable assets". We therefore prioritize the harmonious co-existence between human and nature in our development plans, which guide us to make significant strides in cutting energy consumption and carbon emissions. We also actively drive the establishment of green standards along our industry chain and empower society to save energy and reduce carbon footprints with information technology. By doing so, we aim to increase our ecosystem's diversity, stability and sustainability, and make a contribution to the "Beautiful China" initiative.



Conducting Green and Low-Carbon Operations



Supporting Social Initiatives in Energy Conservation and Environmental Protection

## SUSTAINABLE DEVELOPMENT GOALS

Responding to SDGs

**6** CLEAN WATER AND SANITATION

**7** AFFORDABLE AND CLEAN ENERGY

**11** SUSTAINABLE CITIES AND COMMUNITIES

**12** RESPONSIBLE CONSUMPTION AND PRODUCTION

**13** CLIMATE ACTION

**14** LIFE BELOW WATER



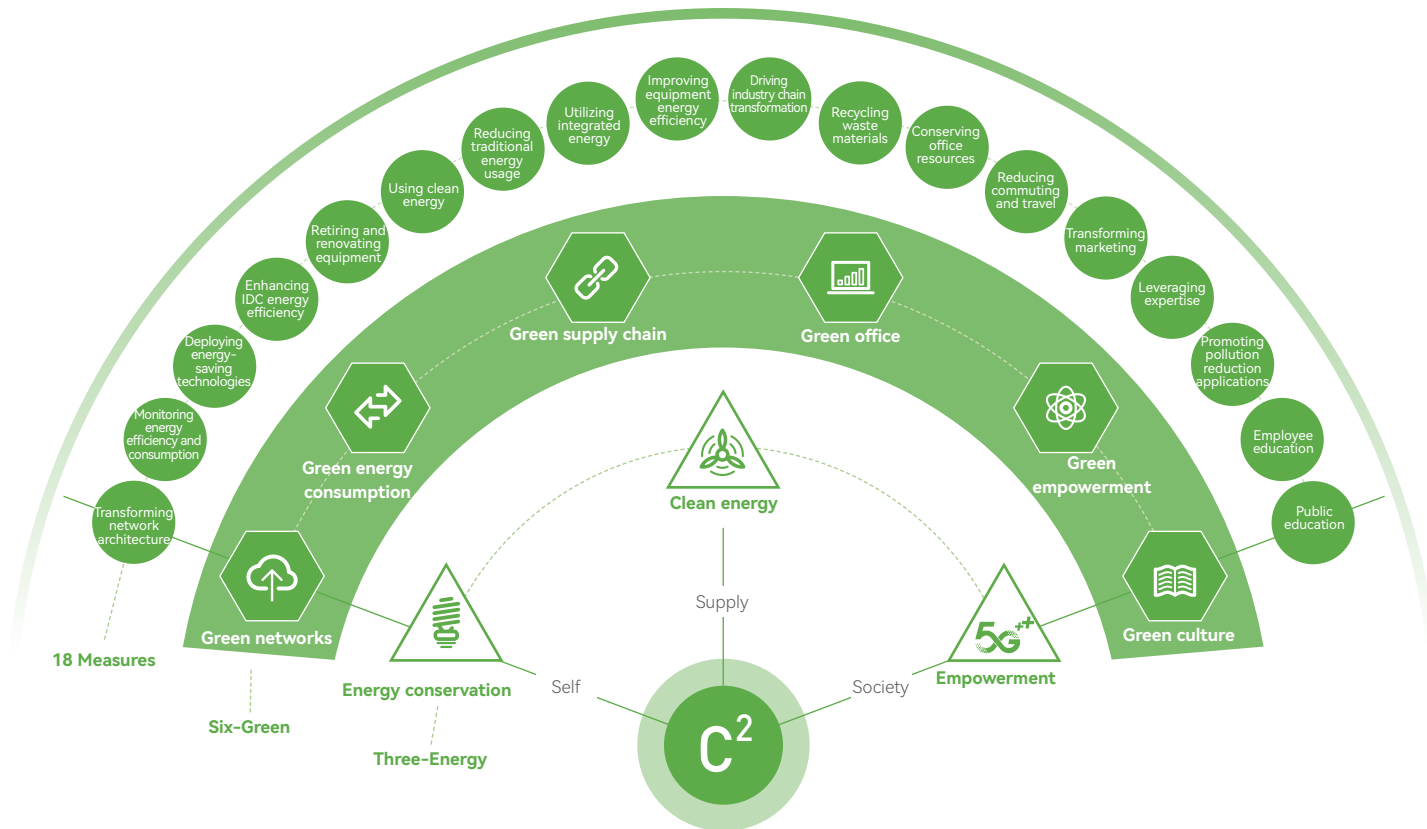
# Conducting Green and Low-Carbon Operations

China Mobile incorporated carbon peaking and carbon neutrality goals (the “30-60 Decarbonization Goals”) into its overall development plan. While meeting the needs of society in information services with high quality and continuously promoting 5G and data center construction, we placed a heightened focus on the management of the 30-60 Decarbonization Goals, continued to advance all energy conservation and carbon reduction efforts, and worked to make our carbon emission stable and controllable, thereby supporting the country in achieving the 30-60 Decarbonization Goals on schedule.

## Advancing Towards the 30-60 Decarbonization Goals

Guided by the 30-60 Decarbonization Goals, China Mobile keeps pushing forward the “C<sup>2</sup> Three Energy - China Mobile Carbon Peaking and Carbon Neutrality Action Plan”. With “energy conservation, clean energy, and empowerment” as the main course of action and green networks, green energy consumption, green supply chain, green office, green empowerment, and green culture as the paths of implementation, the Company continuously embeds green and low-carbon development into all aspects of its production and operating activities.

### C<sup>2</sup> Three Energy China Mobile Carbon Peaking and Carbon Neutrality Action Plan



### ► Specifying governance measures

The chairman of the Company’s Board of Directors is responsible for our environmental policies and performance, leads our efforts in energy conservation, emission reduction, and climate change, and evaluates the performance in climate change. The Board of Directors is responsible for supervising and reviewing the annual performance and goal setting, and reviewing and approving the strategies and key action plans combined with climate issues as well as the budgets for energy conservation and emission reduction relating to climate change. The Company has put in place a three-level governance structure comprising decision-making, management, and execution. It has standardized the organizational structure and assignment of responsibility relating to energy conservation by releasing the *China Mobile Energy Conservation Management Measures*.

## China Mobile Climate Change Governance Structure

Level of governance	Responsible organization(s)	Composition and primary responsibilities
Decision-Making Level	<b>China Mobile Leading Group for Carbon Peaking and Carbon Neutrality (Energy Conservation and Emission Reduction)</b>	The group is led by the chairman of China Mobile. The leading group implements national guidelines and policies concerning carbon peaking, carbon neutrality, energy conservation and emission reduction, assumes the primary responsibility for relevant tasks, researches and formulates overall strategies and deployments for environmental protection, energy conservation and climate action, coordinates the Company's relevant resources to create synergy, deliberates to solve major issues in the work, and ensures the steady progress of carbon peaking, carbon neutrality, energy conservation and emission reduction.
Management Level	<b>Working Group for Pollution Prevention and Control and Energy Conservation</b>	The working group was set up under the leadership group and is led by China Mobile's Vice General Managers. The working group is responsible for executing decisions made by the leadership group, and reviewing and approving investments in actions for energy conservation, emission reduction and climate change mitigation. Group members primarily include the heads of headquarters departments and relevant units. They are mainly responsible for implementing the overall strategies and deployment plans on pollution prevention and control and energy conservation, completing specific tasks, and giving instructions to implement our actions in response to climate change and promoting pollution prevention and control and energy conservation.
Execution Level	<b>Departments responsible for energy conservation and emission reduction and related business departments at the headquarters / subordinate units</b>	We have established working groups for energy conservation and emission reduction at the headquarters and our subsidiaries, which are responsible for coordinating and managing climate-related work from three perspectives of business, network and office. The working groups hold regular meetings to assess whether key activities and projects align with our strategies concerning climate change and energy, and make recommendations to the management.
	<b>Planning and Construction Department</b>	<p>The department is fully responsible for the planning and implementation of climate-related work. Its main work duties include reviewing the achievement of climate-related goals and indicators on a monthly basis, drawing up initiatives and budgets for energy conservation, emission reduction and climate change mitigation, and reporting regularly to the management level, the decision-making level and the Board of Directors.</p> <p><b>Tasks completed:</b> The Department held the meetings of the China Mobile Leading Group for Carbon Peaking and Carbon Neutrality (Energy Conservation and Emission Reduction), issued the <i>Priorities for the China Mobile C<sup>2</sup> Three Energy Plan in 2022</i> and the <i>Performance Assessment Methods for the China Mobile C<sup>2</sup> Three Energy Plan in 2022</i>, and clarified the annual working principle, major objectives, and key tasks; made steady progress in promoting the 18 "Three-Energy and Six-Green" measures, and the main quantitative objectives were completed on schedule; published the Group's 2021 energy conservation and emission reduction performance assessment results and launched evaluation of green data centers; issued the <i>Technical Suggestions on New Energy-Saving Processes, Materials and Components for China Mobile's 5G Equipment</i> to fully play out its role as the leader of the industry chain and drive low-carbon development along the chain; launched seven special projects; enhanced internal management mechanisms, set up the "C<sup>2</sup> Three Energy Plan" regular reporting mechanism, formulated inspection scheme for energy conservation and environmental protection, and conducted co-inspections; issued the <i>Guiding Opinions for Application of Energy-Saving Technologies in China Mobile's Wireless Networks</i>; and formulated the <i>China Mobile Standards on Energy-Saving Classification of Equipment</i>.</p>

## ► Undertaking risk assessment

The Company actively identified, analyzed, and solved the risks and opportunities brought by climate change, fully integrated the climate-related risk management, and incorporated it throughout the Company's risk management system.



## ► Formulating coping strategies

Based on our identification and assessment of risks and opportunities relating to climate change, we analyzed the impact of each risk on our finances, operations and development over different stages of time, based on which we formulated our mitigation plans.

### Climate-Related Risks Facing China Mobile and Coping Measures (Short-term: 0-1 year(s); Medium-term: 1-3 year(s); Long-term: 3-5 years)

Type of risks/opportunities	Description of risks/opportunities	Primary financial impact	Impact on business and strategies	Term	Degree of impact	Coping measures
New regulatory risks	Some of our subsidiaries were included in Beijing's carbon trading market, and shall conduct trading and perform their obligations in compliance with regulations and rules of the market. Meanwhile, there is a substantial possibility that we will be included in the upcoming national carbon trading market and shall conduct trading and perform our obligations in compliance with regulations and rules of the market. If our certified emissions exceed our carbon credit in carbon audits, we may need to purchase additional carbon credit on the market or set-off with Chinese Certificated Emission Reduction (CCER) and incur additional compliance costs.	Increased indirect (operating) costs	Adaptation and mitigation actions	Long-term	Moderate	Conduct quarterly accounting of carbon emissions, assess the financial impact of compliance costs and the legal risks of failure to comply on time, and issue carbon emissions notifications on a quarterly basis; evaluate consistency between our carbon trading management policies with the management requirements issued by regulatory authorities annually.
Technological risks	The evolution of the fifth generation of communication technology is expected to increase in the density of communications infrastructure. By the end of December 2022, 1.285 million 5G base stations had been established, providing 5G service for all prefecture-level cities, some counties, and critical areas in China. Failure to develop and use more efficient and energy-saving technologies will result in rapid growth in energy usage and costs.	Increased indirect (operating) costs	Investments in R&D	Short-term	Moderate to high	Assess the financial impact of energy costs annually, select appropriate low-carbon technologies, and devise schedules for phasing of working with value chain partners to drive the application of low-carbon technologies.
Severe natural factors	The Company is actively developing 5G business, and the stable operations of base stations, office buildings, and optical cables are of great importance to the Company's rendering of reliable 5G service to the customers. Extreme weather can cause varying degrees of damage to the Company's infrastructure and fixed assets and affect network quality. Increasing severity and frequency of extreme weather events may increase the Company's capital expenditures. An estimated potential financial impact of RMB 340 million may be caused.	Increased capital expenditures	Products and services and business operations	Short-term	High	Assess the potential impact of natural disasters on the damage of fixed assets, production and operations, and the environment based on their frequency and scale. Based on the assessment, plan and set up special funds for post-disaster reconstruction according to the assessment results, draw up plans for post-disaster reconstruction, and deploy emergency response plan in advance.
Long-term natural factors	Keeping the temperature of server rooms within a stable range is an essential prerequisite for the regular operations of base stations, server rooms and data centers. As global warming continues, rising temperature in the future will lead to increases in power consumption and electricity costs for air-conditioning at our base stations and server rooms.	Increased indirect (operating) costs	Business operations	Long-term	Moderate	Regularly assess and monitor the service time of air conditioners (ACs) in server rooms based on the financial impact of increased energy costs resulting from increased AC usage.

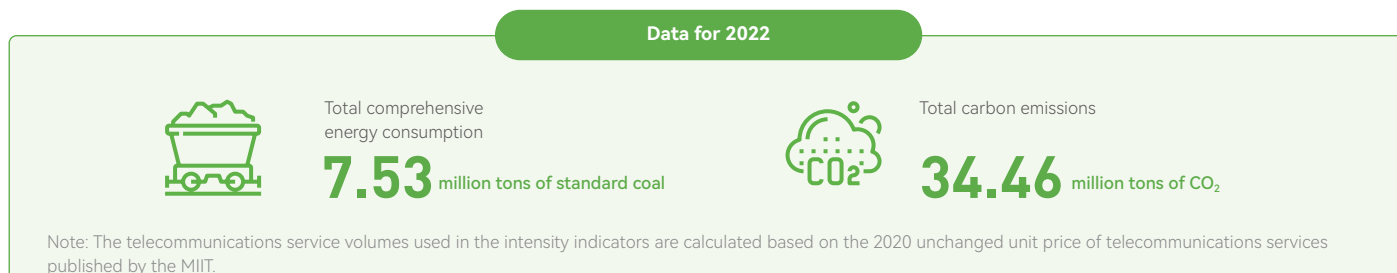
To understand the impact of significant climate-related risks on the Company's business strategies and decisions over different time stages, we also explored the application and analysis with industrial energy efficiency scenarios and models.

	<p><b>Industrial energy-saving scenarios</b></p>	<p><b>Scenario 1:</b> By 2025, the comprehensive energy consumption per unit of telecom service shall decrease by 15% compared with 2020 (MIIT's requirement).</p> <p><b>Scenario 2:</b> By 2025, the comprehensive energy consumption per unit of telecom service shall decrease by 20% compared with 2020 (China Mobile's target).</p>
	<p><b>Description of the model</b></p>	<p>Based on forecast on network scale and the energy-saving requirements of the two scenarios, we can calculate the maximum annual electricity consumption that would meet the energy-saving requirements (the expected annual electricity consumption less the maximum annual electricity consumption equals annual electricity savings needed).</p>
	<p><b>Application of business strategies and decisions</b></p>	<p>We determined energy conservation goals at different levels by subdividing the potential impact of the different scenarios.</p> <p>By 2025, the comprehensive energy consumption per unit of telecom service shall decrease by 20% compared with 2020. Subdividing this target, we need to reduce comprehensive energy consumption per unit of telecom service by at least 4% in 2022. We devised specific strategies and measures based on this year's target, including:</p> <ul style="list-style-type: none"> <li>● In terms of communication network, we promoted the transformation of network architecture including C-RAN and network cloudification, took solid steps in promoting construction of all-fiber foundation, furthered deployment of wireless network energy-saving technologies, continued to raise the energy efficiency of data centers and server rooms, and phased out old 2G and 4G equipment;</li> <li>● We actively utilized clean energy and gradually reduced conventional energy use;</li> <li>● Along our supply chain, we incorporated green and low-carbon technology evaluation results into the procurement scoring system, tightened procurement requirements on energy use efficiency, energy-saving functions and green manufacturing processes for 5G and other network equipment, power supply equipment, air conditioners and other supporting facilities, encouraged equipment suppliers to expand R&amp;D and supply of green technologies and products, and recycle waste materials;</li> <li>● In office, we saved office resources, reduced emissions relating to commuting and business travel, and advanced green marketing.</li> </ul>

## ► Specifying management goals

Our primary indicators for measuring and managing climate-related risks and opportunities include Scope 1 GHG emissions, Scope 2 GHG emissions, Scope 3 (employee commuting and business travel) GHG emissions, comprehensive energy consumption per unit of telecom service, reduction in comprehensive energy consumption per unit of telecom service, reduction in comprehensive energy consumption per unit of data traffic and total water consumption, among other indicators. We pledge to reduce Scope 1 and Scope 2 GHG emission intensity target by 20% by 2025 from the 2020 baseline, and no target has been set for Scope 3 GHG emission yet.

We incorporated climate-related major issues into our compensation policy. For the Board of Directors, the State-owned Assets Supervision and Administration Commission (SASAC) included the energy conservation and ecological environmental protection by central SOEs into the operating performance evaluation of persons-in-charge of central SOEs in 2022, and linked such performance to compensation. As for the execution level, planning and implementation of climate actions has already been included as a KPI for performance assessment for the Planning and Construction Department. Compensation for general managers and energy managers of each subsidiary will also be directly linked to KPI assessment results.



# Building Green Networks

With setting up a green network architecture and developing energy-saving network technologies as our goals, China Mobile continued to build green networks by advancing green and low-carbon development of base stations and data centers throughout their lifecycles, and retiring and renovating equipment.

<p><b>Advancing the green transformation of network architecture</b></p>	<ul style="list-style-type: none"> <li>● We delayed our networks and reduced the number of network devices to form a linear, cloud-network integrated, cloud-edge-terminal coordinated network architecture and computing force infrastructure centered around data centers;</li> <li>● We built wireless networks using a C-RAN architecture, which simplified power and air-conditioning setup and reduced power consumption of supporting facilities, enhancing the overall energy efficiency of base stations;</li> <li>● We set up a well-designed cloud infrastructure with scale efficiency based on advanced architecture and technologies, to continuously increase resource utilization efficiency and promote virtualization of core network element functions;</li> <li>● We advanced the construction of an all-optical architecture, deployed 200G/400G optical transmission systems at scale with new ultra-low-loss optical fibers, and led the deployment of 100G and above optical transmission systems in Metropolitan Area Networks (MAN); increased the deployment and application of the 200G OTN systems in the interprovincial backbone transmission networks, covering large regional and provincial-level data centers.</li> </ul>
<p><b>Monitoring and analyzing energy efficiency and consumption</b></p>	<p>We strictly controlled power consumption of our networks and progressively digitalized the management of energy efficiency and consumption monitoring. We used big data and AI technologies to track and analyze power consumption trends, compared and analyzed energy efficiency distribution, and took timely measures in response to abnormalities in energy efficiency and consumption. By the end of 2022, we had implemented centralized monitoring and analysis of energy consumption at more than 9,800 stations, including all kinds of data centers, core machine buildings, key convergent server rooms, and energy-intensive base stations across our networks.</p>
<p><b>Deploying wireless network energy-saving technologies</b></p>	<ul style="list-style-type: none"> <li>● We applied a range of wireless network energy-saving technologies, such as sub-frame silence, channel silence, shallow hibernation, deep hibernation and multi-layer network coordinated energy saving, and deployed them in our wireless networks by defining scenarios where these technologies can be applied. We also shut down unnecessary hardware by time, frequency and space to dynamically adjust resources utilization based on our business needs;</li> <li>● We achieved energy savings by coordinating our multi-layer wireless networks without noticeably affecting user experience. In 2022, the energy efficiency of individual 5G base stations increased by 12% from 2021, and we deployed energy-saving technologies in 99% of applicable scenarios and extended intelligent wireless multi-layer network coordinated energy-saving management to more than 80% of our 5G base stations.</li> </ul>
<p><b>Improving the energy efficiency of data centers</b></p>	<ul style="list-style-type: none"> <li>● We built data centers with new air-conditioning terminal equipment, high-temperature chilled water, natural cooling source, direct power supply from the power grid, high-voltage direct current (HVDC), liquid cooling, micromodules and comprehensive utilization of waste heat. All new large and mega data centers we built in 2022 had designed power usage effectiveness (PUE) of no more than 1.3;</li> <li>● We strengthened energy consumption management, operations and maintenance, and applied AI technologies to achieve automated and intelligent energy consumption management. We also managed and controlled energy consumption by grade and category, and define benchmarks for energy-saving operations and maintenance by regions; in 2022, actual PUE of the 44 mega data centers across our networks decreased by an average of over 4%.</li> </ul>
<p><b>Enhancing the energy efficiency of server rooms</b></p>	<ul style="list-style-type: none"> <li>● We conducted an assessment of the existing networks' energy efficiency, and strengthened energy consumption management, operations and maintenance. By optimizing resource allocation, retiring outdated and idle equipment, and improving the air flow in server rooms, we promoted energy-saving technology solutions with different power supply guarantee grades while meeting our business security needs, explored energy-saving potential within the existing network and improved its performance;</li> <li>● We undertook green and low-carbon transformation of core server rooms, and promoted the application of technologies such as cold/hot aisle containment, micromodules, whole-rack servers and waste heat recycling in our server rooms;</li> <li>● We actively promoted the application of natural cooling sources such as fresh air, heat exchange, and heat pipe by applying technologies such as the integration of server rooms and racks;</li> <li>● In 2022, the actual PUE of the 938 core machine buildings across our network decreased by an average of over 4%.</li> </ul>
<p><b>Repurposing high-energy-consuming retired equipment and low-energy-efficiency retired equipment</b></p>	<ul style="list-style-type: none"> <li>● We implemented the requirements to retire and renovate equipment under the <i>Guidance Directory for Retiring High-Energy-Consumption and Old Communications Equipment and the Directory for Retiring High-Energy-Consumption and Outdated Electromechanical Equipment (Products)</i> issued by the Ministry of Industry and Information Technology;</li> <li>● We optimized management measures in respect of energy-intensive and inefficient network equipment in our existing networks, defined classification standards, and continued to advance rectification measures;</li> <li>● We continued to carry out energy efficiency benchmark management, and optimize, renovate or retire outdated equipment in our existing networks.</li> </ul>



### Case Henan Mobile built green networks through “cloud-management-terminal” coordination

To further improve the management and controls over energy conservation and emission reduction, Henan Mobile promoted “cloud-management-terminal” coordination to build green networks, with a view to becoming a “vanguard” and a “hub” of green and low-carbon development.

**Terminal:** With AI-based management and controls, Henan Mobile explored a “software + hardware” power-saving combination strategy model, and built a multi-dimensional and digital intelligence main equipment power-saving control system, for comprehensive management and controls over energy consumption. It formed an energy consumption management and control taskforce to increase efficiency of high-energy-consumption systems, enhanced energy-saving management and control powered by “AI + digital-intelligence”, furthered centralized management and control over energy consumption of the server rooms, and worked to achieve the energy consumption targets for core machine buildings. It gave all-out efforts in building China Mobile data centers, and achieve comprehensive data collection and monitoring of data centers’ energy consumption. It optimized server room construction from “N” to “1” under our minimalistic CRAN server room reform plan, driving further reductions in energy consumption and carbon emissions of our server rooms across the network.

**Management:** Based on in-depth research on all aspects of the green supply chain system, Henan Mobile created a full-cycle green supply chain system, achieved refined management by implementing translation between supplier-side codes and internal codes, reduced suppliers’ costs and drove the digital transformation of the industry chain.

**Cloud:** Based on full-scale collection of energy consumption data, Henan Mobile built various models such as business volume-energy consumption model for main equipment and correlation models for air volume, temperature and energy consumption for air conditioners, and advanced scenario-based and digital intelligence development of energy-saving efforts. At present, it has built three major “Smart Cloud Brain” energy consumption management and control systems for multi-dimensional intelligent monitoring of energy efficiency of main equipment, real-time monitoring and analysis of energy efficiency and consumption of dynamic environment system, and comprehensive management of energy efficiency and consumption in data centers.



### Case Creating intelligent green and energy-saving networks with refined management

Jiangsu Mobile actively carried out green practices, such as refining energy-saving operations and maintenance of networks, AI-based energy efficiency management, and replacement of high-energy-consumption equipment, from the four dimensions of data centers, core machine buildings, 5G base stations and resource operations. Jiangsu Mobile pioneered “COLD” energy-saving work practices based on the Standard & Poor’s ratings system, developed AI-based water-cooling adjustment and optimization to achieve precise cooling, and reduced electricity waste in distribution by optimizing systems and architectures. Through core machine building inspections and renovations of energy-extensive equipment, Jiangsu Mobile increased the operating efficiency of old machine buildings with specific, “floor-by-floor” policies. It improved energy efficiency of base stations by promoting software-based energy saving and hardware shut-downs at 5G base stations, AI self-adaptive control of air conditioning, and energy-saving renovations of server rooms. It also set up a resource operation platform, refined resource management, and conducted stock-take of assets and retired outdated equipment. Jiangsu Mobile’s program for retiring and renovating high-energy-consumption and outdated equipment was certified by the Jiangsu Province Energy Savings Trading Center and received three certificates evidencing energy-savings equivalent to 8,671 tons of standard coal, making us the first and only telecom operator in China to obtain an energy-saving certificate. In addition, the data center parks in Nanjing, Suzhou and Wuxi parks were all included in the list of “National Green Data Centers”.



© Temperature-based control of plate heat exchanger



© Replacing missing blind flanges to avoid waste of refrigeration capacity



### Case Leading low-carbon development with the industry’s first technology suite for modern green data centers

In June 2022, the China Mobile Design Institute officially released the “China Mobile Technology Suite for Modern Green Data Centers”. Starting from the key and core technologies for data centers, we tackled the difficulties in green energy conversation with five approaches: scientific layout, overall architecture, prefabricated construction, digital intelligence maintenance and optimization, and efficient operation. This formed a full suite of technologies for modern green data centers, covering the full lifecycle of planning, design, construction, maintenance and operation, thereby enabling green and low-carbon operation, flexible deployment, and intelligent operation and maintenance of data centers.

8

data centers were selected for the *List of Featured Cases of National Modern Data Centers*

8

data centers were selected for the *List of National Green Data Centers*

### Empowering green data center construction with “5G+”

To improve energy efficiency and reduce environmental pollution due to construction, our second data center in Hong Kong focused on building a modern, sustainable and green data center.

**In terms of intelligent design and energy efficiency and utilization enhancements,** we used AI technology and 5G networks for real-time monitoring to ensure optimal system performance. Through the use of high-efficiency chilled water units, smart irrigation systems, intelligent lighting control, and lift power recovery systems, we reduced the energy consumption by approximately 20% compared with the use of traditional facilities.

**In terms of green and low-carbon development,** in compliance with requirements of BEAMPLUS and LEEDGOLD green building certifications, the data center formulated a set of guidelines for materials sourcing, waste disposal, environmental protection, etc. It also minimized material and energy waste as well as ecological and environmental impact during construction by using renewable materials, a rainwater recycling system and a direct natural cooling system.

The China Mobile Park Construction and Development Company explored energy-saving measures for data centers and realized innovative energy-savings by applying technologies such as adding cold storage and heat exchange equipment and piloting the use of permanent magnet motors for cooling towers, earning the “2022 Featured Project Award for Efficient Cooling at Data Centers” issued by the Chinese Association of Refrigeration.

## Promoting Green Energy Consumption

With the goals of electrified energy consumption and application of green power at scale, China Mobile increased the use of green energy, steadily reduced the use of traditional energy and promoted the integrated utilization of energy to achieve green energy consumption.



**Increasing the use of clean energy**

In regions with suitable climate conditions, we built small-scale renewable energy generation sets, such as wind turbines and rooftop solar panels; tapped into the potential of battery equipment, turning their role from a “static power backup” into a “dynamic energy storage”, coordinating and promoting consumption of green power; and we also purchased green power by way of direct bulk purchases in regions where green power is offered at competitive prices.



**Steadily reducing the use of traditional energy**

We strictly controlled the consumption of fossil fuels and actively utilized non-fossil energy sources; phased out coal heating, improved the operation and maintenance standards for stationary power units, optimized the allocation and scheduling of mobile fuel sets, and curbed diesel and gasoline consumption in our networks and production while ensuring emergency power supplies for networks; increased utilization of energy cascades, and improved energy efficiency by developing integrated energy projects that promoted the synergistic use of multiple energy sources such as electricity, heat, cooling and gas.



© Anhui Mobile set up lower-carbon base stations



© A green and energy-efficient server room of Hubei Mobile



## Contributing to a Green Winter Olympics

"Green Olympics" is the foremost of the four concepts for the 2022 Beijing Winter Olympics: "green, inclusive, open and clean". Beijing Mobile actively researched and innovated green and low-carbon base station technologies and created a "low-carbon" base station model covering the full lifecycle of planning, construction, operation and maintenance, taking active steps to contribute to a Green Winter Olympics.

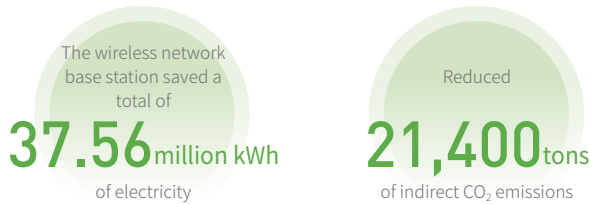


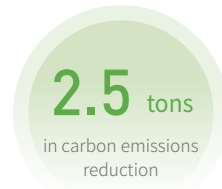
Diagram of BBU integration on the C-RAN machine room side



© Our minimalistic NR2.6G+700M planning model based on our C-RAN architecture reduced network energy consumption of individual stations in a multi-station frame by 2.4 kWh per day by integrating BBUs

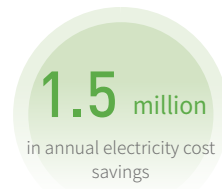
## Henan Mobile built a PV low-carbon base station with 5G-based integrated energy cabinets

Henan Mobile adopted an integrated power supply solution based on "MIMO (multi-input and multi-output) power + solar energy". Under intelligent management and control with integrated energy cabinets, base stations fully utilized solar energy for power supply, saving 4,471 kWh of electricity and reducing carbon emissions by 2.5 tons per year, and enabling "low-carbon operation" of base stations.



## Chongqing Mobile and China Mobile Chengdu Institute of Research and Development jointly developed an intelligent power-saving platform

In collaboration with China Mobile (Chengdu) Industrial Research Institute, Chongqing Mobile optimized energy-saving algorithms and strategies based on data on 4/5G network coverage, network quality and user perception, and completed the intelligent retirement and renovation of 1,124 stations with energy-saving potential. The efforts stood to save approximately 1.8 million kWh of electricity per year, equivalent to over RMB 1.5 million in electricity cost savings.



## Yunnan Mobile built a "Zero Carbon" 5G emergency response cabin powered by wind-solar green energy

Yunnan Mobile built a new integrated cabin for emergency communications – the "Zero Carbon" 5G emergency response cabin – using the hybrid wind-solar power generation technology. Its hardware mainly comprised a wind-solar power supply system and a base station system. It applied non-line-of-sight (NLOS) transmission automatic addressing, transmission resource pre-planning, and modular solutions for wireless configuration information. With these efforts, it offered self-sufficient power supply, self-locating radar addressing, and fast equipment dispatch and activation. This low-cost 5G emergency response base station with self-sufficient power supply and automatic transmission addressing had low construction costs and energy consumption, improved efficiency in deployment of emergency response base stations and filled the gap in the industry. The average daily power generating capacity of the green energy cabin was 23.14 kWh. Compared with traditional coal-based power generation, the new cabin could reduce daily carbon emissions by 23.07 kg and daily carbon dust by 6.29 kg.

## Water recycling at China Mobile (Xiamen, Fujian) Data Center

Equipped with a rainwater recycling unit, China Mobile (Xiamen, Fujian) Data Center collected rainwater from the roof and ground, and recycled it in a concave green space (7,300 m<sup>2</sup>) and a rainwater recycling pond (200 m<sup>3</sup>) in the park. The rainwater recycling system enabled the data center to adjust its water use strategy for green space and landscape irrigation and landscape water supplementation based on the seasonal precipitation and water storage volume. This removed the need for a 1,000 m<sup>3</sup> rainwater recovery pond, saving approximately RMB 1.5 million in investment. According to assessment by relevant agencies, the total annual rainfall in the park could reach 3,260.6 m<sup>3</sup>, and the total volume of water that could be recovered could reach 2,234.6 m<sup>3</sup>.

## Fostering a Green Culture

China Mobile actively promoted the vision of green development, fostered a green culture, and carried out extensive public welfare activities on environmental protection as we continuously endorsed a green and environment-friendly lifestyle.



**Carrying out green training:** We organized professional and systematic training on carbon emission reduction, carbon management, and carbon trading to cultivate professionals in green development.



**Organizing green activities:** We actively fostered awareness of environmental protection internally on a multi-dimensional, multi-level and regular basis by organizing activities on the National Energy Conservation Awareness Week, the National Low-Carbon Day, afforestation, etc. Through these events, we conveyed knowledge on low-carbon operations and continued to integrate green concepts into our production and operation as well as the daily work and life of our employees.



**Summarizing green experience:** We summarized advanced practices, successful experience and featured models with regard to energy conservation and emission reduction, and promoted them through regional exchanges, special training and other means of communication.



© Chaohu (Hefei) Branch of Anhui Mobile carried out the "Live a Green and Low-carbon Life" public welfare activity on environmental protection



# Supporting Social Initiatives in Energy Conservation and Environmental Protection

China Mobile actively builds a green supply chain and sets green standards in the industry. We actively leveraged information technology to empower carbon emission reduction and drive the green transformation of the society. Consistently attaching high importance to protection of the ecological environment, we optimized and improved our environmental management system and continually explored new methods and paths of environmental protection, thereby promoting harmony between humanity and nature and contributing to the conservation of our beautiful planet Earth.

## Building a Green Supply Chain

We extended our green philosophy throughout the lifecycle of our products and businesses. By constantly improving our green procurement system, we promoted green production along our supply chain and drove the green transformation of the industry chain.

### Developing “green procurement” standards

- We included evaluation on green energy-saving technologies in procurement scoring of more than 90% of our equipment to improve energy efficiency of equipment procured through centralized procurement;
- We incorporated SA 8000 (Social Accountability Standards), OHSAS 18001 (Occupational Health and Safety Assessment Series), and ISO 14000 (Environmental Management Standards) certifications into our supplier qualification review, dynamic quantitative assessment, and comprehensive strengths evaluation;
- We conducted information verifications on centralized procurement suppliers on a regular basis and guided our suppliers to save resources, reduce environmental pollution, and our work and occupational safety.

In 2022, our Tier 1 centralized procurement catalog included 102 categories of equipment, including mobile communications network equipment, transmission network equipment, IT hardware equipment, power supply, and active equipment for power environments.

### Promoting paperless procurement and “contactless procurement”

- Implementing the digital procurement approach, we designed a digital tendering, evaluation and contract signing model, promoted standardized, online and automated tendering document and response templates, and achieved digitalization of the entire workflow from announcement, tendering, bidding, bid evaluation and contract signing;
- We increased procurement efficiency by implementing a new “continuous, contactless and paperless” procurement model based on the China Mobile’s procurement and tendering system, online video and remote monitoring.

In 2022, we carried out close to 40,000 paperless procurement projects and achieved a paperless procurement rate of 99.9%, reducing the use of paper by approximately 120 million pieces and reducing carbon emissions by approximately 240 tons. We further expanded the application of e-signature, with 53 bodies signing bidding evaluation reports for 8,354 projects electronically.

### Creating a green and recyclable logistics system

**Green packaging:** We developed the equipment packaging with recycled paper together with our suppliers and reduced the use of non-degradable adhesive materials; required all suppliers to sign the *China Mobile Procurement and Bidding Commitment for Pine Wood Nematode Disease Prevention and Control*, and inspected plant quarantine certificates when receiving materials with wooden packaging, promoting our suppliers to meet their responsibilities and jointly build a sustainable supply chain.

#### Simplifying packaging to create a green supply chain

Taking green logistics as an important topic for coordinated development, China Mobile Terminal Company actively promoted green packaging. Through policy guidance and institutional requirements, it recycled the logistics packaging boxes from its internal distribution business, thereby promoting the circular utilization of packaging among upstream and downstream companies along the supply chain and building a green supply chain with concrete actions.

- **Green packaging:** Progressive reduction in outer packaging and lining of products, which also gives them a neater and cleaner look.

- **Green logistics:** Using smaller logistics boxes to save more paper, transportation space and costs.

**Green circulation:** We encouraged our strategic suppliers to use RFID labels, which can be used “end-to-end” from production and transportation to warehousing operations.

# Empowering Carbon Emission Reduction in Society

We actively leveraged information technology to drive carbon emission reduction, accelerated the low-carbon and clean supply of energy, promoted the low-carbon transformation of energy-intensive industries, and helped enterprises save energy and reduce emissions. We worked to reduce "carbon footprints" (i.e., greenhouse gas emissions from human activities) while creating more "carbon fingerprints" (i.e., human initiatives to reduce greenhouse gas emissions). We actively promoted information-based applications in pollution prevention and control and developed "smart environmental protection" solutions.



## Leveraging information technology to drive reductions in carbon emission

China Mobile stepped up efforts to empower cloud migration, digitalization and intelligent transformation, and promoted the digital transformation and upgrade of traditional industries such as power and metallurgy. We popularized online meeting, office, medical service, information consumption and other applications, and built big data platforms for urban transportation, travel and delivery, thereby improving the green and low-carbon supply of public services and contributing to a green and smart city and a green life for all.



## Promoting information-based applications in pollution prevention and control

China Mobile used new-generation information technologies to collect, monitor, explore and analyze ecological and environmental data to serve environmental protection needs of the public and businesses, and address difficulties in environmental management and monitoring.



### Case Offering new green and digital intelligence public power grids to save energy and reduce carbon emissions

Shandong Mobile collaborated with State Grid Shandong Electric Power Company to build 5G networks across the province dedicated to power supply, with a focus on the demands for "new power systems" that offer high-proportion access to new energy, high-flexibility and agile adjustment of power grids, and coordination among source, grid, load and storage, against the backdrop of the 30-60 Decarbonization Goals. It built three major 5G network slices and further promoted the integrated application of 5G and power grid technology. Targeting all business scenarios related to power grids, including power generation, transmission, transformation, distribution and consumption, it provided an integrated solution covering "terminal, management, cloud and application". With these efforts, Shandong Mobile successfully built a benchmark 5G project for scaled applications featuring "one network, one core, 12 scenarios and 300,000 applications".

The project focused on achieving both environmental and economic benefits. In terms of environmental benefits, it focused on creating green and digital-intelligent power grids, effectively reducing direct carbon emissions and enhancing capabilities for integrating new energy sources such as PV, thus greatly increasing the proportion of wind and PV power in power transmission. Moreover, the project enhanced efficiency, saved energy, and prevented unintended carbon emissions, alleviating energy crisis and helping optimize our energy structure. In terms of economic benefits, the project fully achieved unmanned intelligence and increased production efficiency by more than a hundred times, thus reducing costs and enhancing efficiency.



### Case Setting a pan-Asian Games energy interconnection demonstration area combining "source, grid, load, and storage" in Hangzhou with 5G technology

Hangzhou Branch of Zhejiang Mobile deployed a dedicated 5G edge MEC (UPF) device for electric power inside the core server rooms of State Grid Hangzhou Power Supply Company, and utilized 5G slicing technologies and data relay capabilities of UPF equipment to create a wireless network dedicated to power supply with high security, high bandwidth, low latency and massive connectivity. The networks were used for the pilot application of 5G distributed network intelligent switch remote control and 5G distributed network differential protection service in the comprehensive real-scenario demonstration project of the pan-Asian Games high-flexibility power grid in Hangzhou. Through the application of 5G software and hardware slicing as well as provincial and regional UPF networks, the project could meet the demand for wireless communication of 5G power business in the entire process of "source, grid, load and storage" of the "energy internet".



12 applications were implemented under the project, covering the overall structure of power source, power grid, load and energy storage. As a pilot demonstration area of 5G+ energy Internet, the project achieved the efficient interconnection of energy and set an example for the comprehensive implementation of the energy Internet.

**Source:** Offering flexible means for control over total energy consumption and energy intensity from source through distributed provisioning of new energy

**Load:** Achieving precise, effective and orderly power consumption management through interaction between the source and the load

**Grid:** Penetrating the core process of production scheduling to enhance power supply reliability

**Storage:** Integrating the load resources in reserve to help achieve control over total energy consumption and energy intensity

# Protecting the Ecological Environment

In strict compliance with the *Environmental Protection Law of the People's Republic of China* and relevant laws and regulations at places where it operates, China Mobile managed the full process of production and operation in a standardized fashion, adhered to economical and clean development, and built itself into a resource-saving and environmental-friendly enterprise. We attached great importance to environmental protection and remained committed to respecting, adapting to and protecting nature. We continued to optimize and improve our environmental management systems, made sustained efforts to protect biodiversity, and helped foster a new relationship where humanity and nature could live and prosper in harmony.

## ► Advancing pollution prevention and control

We actively applied new-generation information technologies to assist in environmental improvement and governance, and to empower the society in making improvements in pollution prevention and control and natural resource utilization.

### Empowering water services with 5G to ensure clean water supplies

In 2022, Guangdong Mobile introduced smart upgrades to urban water services in collaboration with the Shenzhen Water and Environment Group by integrating 5G with all scenarios of water services. In November 2022, the "Demonstration Project of Application of 5G in Empowering High-Quality Operation of Urban Water Services" won the national first prize in the 5th "Bloom Cup" 5G Application Competition in 2022.



Guangdong Mobile used 5G technology to improve the full space-time monitoring and early warning capabilities of urban water services, and set up a real-time monitoring system covering the source, supply, discharge and sewage treatment of Shenzhen water services. It contributed to making all tap water in Shenzhen drinkable, helped create a no-flood urban area under rain and fostered a superior water environment.



Guangdong Mobile used 5G technology to build smart factory stations with fewer or no manpower, enhanced operation and maintenance capabilities across the entire water service chain, and built the first underground 5G smart water purification plant in China.



Guangdong Mobile independently developed a 5G capsule robot for remote sewage pumping stations without fiber optic coverage. Dedicated 5G WAN enabled complete patrol from multiple perspectives and HD backhaul of instrument data, thus improving the space-time monitoring and early warning capabilities of water services. Moreover, the dispatch center could make Ultra HD video connections to emergency command vehicles via the dedicated 5G network, which enhanced the emergency response capabilities of water services.

### Improving the environment through smart monitoring

With a heightened focus on the ecological environment, Beijing Mobile integrated ecological resources to improve the urban and rural environment. It gave full play to its advantages in "IoT + big data" and applied them to garbage sorting, dust monitoring and catering fume monitoring, and offered government departments a visualization platform and a variety of intelligent monitoring tools. It installed on-board weighing devices on 64 garbage trucks, road dust load monitoring systems on two sweepers, and fume purification monitoring devices for more than 2,000 catering enterprises.



- **Garbage weighing and metering:** The device enabled more accurate upload of data and helped avoid falsification in garbage weight, thus making waste recycling more scientific and reasonable, and facilitating regulatory supervision and dispatch.



- **Road dust concentration monitoring:** The vehicles were equipped with an on-board road dust load monitoring system, which enabled continuous monitoring and local data collection, display, and real-time monitoring as the vehicles moved.



- **Catering fume monitoring:** urifier and fan operating points were set up for catering enterprises, which monitored the state of purifiers and fans. Monitoring data and alarm information were uploaded to an online monitoring platform to enable closed-loop management.

## ► Protecting the ecosystem

China Mobile is committed to protecting the ecosystem and makes every effort to avoid any impact on endangered animal and plant species throughout our business operations to pursue harmony between humanity and nature.

### Building a digital intelligence and picturesque Sanming

By leveraging information technology, Fujian Mobile invested over RMB 100 million in environmental protection, ecological recuperation and other green development activities in Sanming City. It brought 5G to mountainous, water and forest regions, upgraded ecological governance, and built smart platforms dedicated to river courses, water services, mountain forests and migratory birds. With these efforts, the project translated ecological advantages into developmental advantages and ecological resources into wealth, fostered a pleasant ecological environment in Sanming, and benefitted thousands of forest farmers and the public.

Since its launch five years ago, the project has provided integrated, full-coverage and dynamic management to more than 2,000 river chiefs and more than 1,700 river administrators in Sanming, and standardized the management of river chiefs in Sanming, making Sanming China's first place to pilot comprehensive and standardized social management and public services through a river chief system. There have been zero forest fires at the Youxi Jiufu Mountain Reserve. The project also boosted the bird-watching economy in Mingxi, drove the growth of 10 local guesthouses and promoted "ecological bird watching + forest recuperation". The project was highly recognized by the government and had extensive social influence.



© Rostratula benghalensis, a migratory bird

### Restoring the ecosystem of the saline-alkali soil land

As a major agricultural province, Jilin Province is a production base for commodity grains in China. Jilin Mobile set up a joint project team and carried out the "5G Dedicated Network Intelligent Agriculture Project on the Saline-alkali Soil Land of Da'an" in collaboration with the team of Yuan Longping Workstation. The project focused on saline-alkali land improvement, soil irrigation, and intelligent planting, among others, in Da'an City, a county-level city under the administration of Baicheng City, Jilin Province. The project was China's first workstation to practice Academician Yuan Longping's saline-alkali land remediation initiatives.

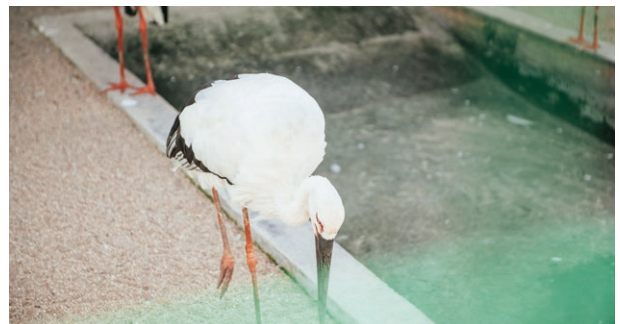
A number of 5G-empowered applications were introduced under the project, such as hyperspectral video backhaul, autonomous driving of 5G unmanned agricultural machineries and automatic cruise of 5G drones. Moreover, a number of 5G applications dedicated to agriculture, such as automatic irrigation, growth analysis, sowing and harvesting, also played a part in the project. The project increased agricultural output by about 10% and operating efficiency by more than 60%. 5G intelligent monitoring also enabled continuous monitoring of pH (potential of hydrogen) and ESP (soil alkalinity) in rice fields, thus greatly improving the efficiency of ecological restoration.



© A 5G drone cruising over rice fields

### Empowering biodiversity protection with 5G

The Yellow River Delta in the Dongying City of Shandong Province provides a pleasant habitat for oriental white storks, earning it the name of "Hometown of Oriental White Storks in China". To protect this pleasant ecological environment for white storks, Shandong Mobile's Dongying Branch assisted relevant departments in pioneering a new model of protection that used 5G+VR to monitor the living environment, quantity, population distribution and other key information on white storks in real time, thus contributing to the scientific management of the bird reserve in the Yellow River Delta.



© Shandong Mobile assisted relevant departments in pioneering a new model of white stork protection by monitoring their living environment, quantity, population distribution, and other key information of white storks in real time by 5G+VR

### Assisting in the "ten-year fishing ban" on the Yangtze River with 5G

With breakthrough 5G technologies, China Mobile built and deployed an array of intelligent networks for prevention, control and supervision. Through intelligent image recognition technology, we provided early warning of illegal fishing activities along river and lake shorelines, sand excavation management, monitoring of floating objects on the river, and river ecology monitoring. With these efforts, we formed 24/7 and all-round real-time monitoring, provided the local fishery administration with effective tools to manage the rivers and lakes and to nip illegal and criminal activities in the bud, thereby contributing to the enforcement of the fishing ban and environmental protection on the Yangtze River.