



GREEN AND ENVIRONMENTAL-FRIENDLY DEVELOPMENT

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GREEN AND ENVIRONMENTAL-FRIENDLY DEVELOPMENT

Green development is the cornerstone to build a “beautiful China”. China Unicom views environmental protection and green low-carbon initiatives as important step in our corporate development with an aim to build an environmental-friendly enterprise. In 2016, we continued our efforts to build green network, advance green operation, strengthen green management, implement energy conservation and emission reduction, and carry out green charitable campaigns to promote green philosophies, thus contributing to the coordinated development of economy, society and nature.

Measures adopted in 2016

- Designated RMB200 million for energy-saving and emission reduction, mainly used in energy-saving renovation and application of energy-saving technology; the coverage rate of energy-saving technology in the access network room and communication room reached 64% and 72%, respectively.
- Special projects including strengthening energy-saving management, promoting network downsizing and optical fibre reconstruction; carrying out publicity campaigns on energy-saving and emission reduction, to realise ceaseless reduction of energy consumption for unit information flow.
- Implemented green actions, built haze-detection network, launched “mobile phone trade-in” service, and pushed forward green transportation.

Actions in 2017

- Further strengthen energy-saving management, promote energy-saving technology, carry out publicity campaign of energy-saving, enhance cyclic utilisation of materials, deepen co-build and co-share with associated companies, and promote harmonious coexistence between the Company and the environment.
- Further deepen the integration of green concepts into operation and production, and extensively carry out green practices.

Upholding the philosophy of green “information life”, China Unicom endeavored to cut down on energy consumption in its operation, reduce greenhouse gas emissions and enhance sewage and waste emission management in an effort to minimise its impact on the environment. The Company strengthened management on energy conservation and emission reduction and infiltrated such practices into its various operations ranging from equipment procurement to engineering, equipment maintenance, marketing and administration. By setting up and improving the energy conservation and emission reduction management framework, including encompassing system and standards, statistic indicators, appraisal and incentives, energy-saving technology and organisational structure, it would ensure effective implementation of the standards for energy saving and emission reduction. In 2016, the Company designated about RMB200 million for energy-saving and emission reduction, mainly used in energy-saving renovation and application of energy-saving technology. The coverage rate of energy-saving technology in the access network room and communication room reached 64% and 72%, respectively. Through other special programmes such as network optimisation, fibre network upgrade, as well as carrying out publicity campaigns on energy-saving and emission reduction, the Company saved energy equivalent to 156,500 tonnes of standard coal during the year.

COVERAGE RATE OF
ENERGY-SAVING
TECHNOLOGY IN
ACCESS NETWORK ROOM

64%

COVERAGE RATE OF
ENERGY-SAVING
TECHNOLOGY IN
COMMUNICATION ROOM

72%

China Unicom Head Office Building realised reutilisation of reclaimed water, producing about 800m³ of reclaimed water every year. By water balance measurement, the Company met as a qualified water-saving company, recognised rainwater-sewage separation and obtained the License for the Discharge of Urban Sewage into the Drainage Network.

BUILD GREEN NETWORK

Insist on green procurement

The Company actively promotes the procurement of energy-saving and emission reduction equipment, and implements green and safe procurement in terms of equipment model selection; specifies clearly on energy consumption standards and energy-saving requirements for equipment, and takes energy consumption, energy-saving product certification and radiation indicator of equipment as important procurement indicators for evaluation; promotes centralised procurement of efficient and energy-saving equipment. In 2016, the Company completed group procurement of energy-saving air conditioning system with direct current system, efficient module and intelligent double-circulation, which will safeguard the implementation of subsequent energy-saving construction plan.

Energy-saving technology application

The Company runs existing network tests on three new energy-saving technologies, including 336V high voltage direct current system, high magnification discharge battery, and aluminum alloy cable. The “AC main power supply +336V high voltage direct current” power supply mode is used to verify the energy-saving effect of the new two-circuit power supply mode; high magnification discharge battery is used to verify the high current discharge performance of new battery and the effect of battery with low configuration; aluminum alloy cable is to verify the performance of new cable and evaluate its effects under environment and construction requirements, as well as the cost-saving effects for the investment.

Note: Currently the amounts of hazardous waste discharge, non-hazardous waste discharge and the total amount of packaging materials used in manufactured products have not been calculated and we will establish a statistical system for such data as soon as possible.

In order to solve issues such as enhanced integration of main equipment, ceaselessly increased single cabinet power and high energy consumption of traditional operation room, idea of constructing energy-saving machine room is proposed. From customisation, modularisation, zoning and other perspectives, this proposal achieved air distribution optimisation in machine room and modularisation construction of machine room, carrying out the research and standardisation of green mode construction of machine room and pushed forward main equipment standardisation, as well as completed the standards for the air distribution specifications and size of the main equipment.

Green data center

- Hohhot Data Center was awarded as advanced energy-saving technological innovation company in the telecom industry for two consecutive years;
- Langfang Data Center was awarded as advanced energy-saving technological innovation company in the telecom industry for two consecutive years; acquired AAAA grade certificate of data center green energy conservation demonstration project; and won the qualification of China green data center pilot unit which was jointly issued by MIIT, National Government Offices Administration and National Energy Administration;
- Gui'an Data Center was awarded the qualification of China green data center pilot unit.

Implement co-building and co-sharing

Actively fulfilling the requirements of the State to promote construction of ecological civilisation, the Company carefully implements the yearly guideline of MIIT and NDRC "Opinions on Implementation of Telecommunication Infrastructure Co-Building and Co-Sharing", and deepens cooperation among enterprises in construction fields of pole line, pipeline and indoor distribution system, reducing repeated construction and strengthening resource sharing. In 2016, the Company cooperated with China Tower and built 160,000 base stations and saved RMB11.5 billion of investment.

Responsible performance indicator	2014	2015	2016
Co-building rate of indoor distribution system (%)	64.56	69.07	73
Co-sharing rate of indoor distribution system (%)	98.19	94.66	63
Pole line co-building rate (%)	71.46	67.76	85
Pole line co-sharing rate (%)	94.79	94.16	92
Pipeline co-building rate (%)	83.90	82.17	85
Pipeline co-sharing rate (%)	92.55	92.23	86

Electromagnetic radiation management

The Company strengthens application of new technology, and adopts such advanced technical means such as Micro BS in densely populated cities as to optimise the layout of wireless network, making the electromagnetic radiation indicators of base stations being better than national standards. During the construction process of the base stations, the Company performed assessment on electromagnetic environmental impact, as well as testing on acceptance upon completion of the base stations, and conscientiously accepted supervision, administration and inspection of environmental protection departments, in accordance with the relevant national requirements of the *Measures on the Management of Electromagnetic Radiation Environmental Protection*.

By bringing new media platform into full play and actively publicise electromagnetic radiation knowledge, telecommunication knowledge has been popularised by continuously collaborate with governmental agencies and public-welfare organisations; Through collaboration with multi-parties and active communication, as well as introducing the public to learn the correct electromagnetic radiation influence of base stations, public doubts and misunderstanding are eliminated through on-site demonstration, field inspection and testing, and popularisation of base station equipment and telecommunication knowledge.

China Unicom Guangxi Branch strengthened the management of electromagnetic radiation, and minimised the impact of battery radiation in the following five aspects:

- Purchase equipment according to the frequency scope and rated power output as required in national regulations, and change to low radiation equipment when proper;
- Adopt advanced technical means to optimise layout of wireless network and make electromagnetic radiation indicators better than national standards;
- Avoid kindergartens and primary schools when selecting the site of base station, and communicate with nearby companies and residents to seek for understanding and support on a regular basis;
- Evaluate environmental impact of base station, disclose relevant reports in a timely manner and accept public supervision;
- Conduct activities to popularise knowledge of electromagnetic radiation, and offer professional explanation and carry out on-site inspection on radiation at base stations to eliminate public doubts;

In 2016, over 14,000 base stations passed the environmental impact assessment carried out by professional environmental administrations such as the Environmental Protection Bureau and the Radiation Environment Supervision and Management Station.

PROMOTE GREEN OPERATION

China Unicom continuously carries out green operation. In 2016, it designated approximately RMB200 million to conduct special projects for energy conservation in technology and management, streamlined network and machine room integration, effectively reduced energy consumption in the network.

Promote energy conservation technology

- The Company promoted new technical application such as high-frequency UPS and efficient module for switch power supply, improving operating efficiency of power supply by 4-5%. The promotion of equipment application such as the smart double-circulation air conditioner and others have reduced the energy consumption in air conditioning by 20%; The inspection on power supply switch in the entire network and UPS configuration, and the closure of over-configured module for switch power supply and UPS equipment, both improved system efficiency by 2%;
- Based on the characteristic of different indoor phone traffic at different time periods, the "time controller" is installed on the indoor distribution equipment targeting in office buildings, stations, large-scale supermarkets, shopping malls and shopping areas. From 10:00pm-6:00am in which there is almost no phone traffic in the aforementioned places, the "time controller" would reduce power supply by periods and achieves the purpose of energy conservation and consumption reduction. For double-frequency high configuration stations and high configuration 3G network base stations, there will be automatic reduction during night time when there is low phone traffic and automatic start-up in the morning.

China Unicom Jiangxi Branch strengthened management and technical innovation to promote energy conservation and emission reduction with the focus in the large energy-consuming core machine room and basic station. The first measure is to set up theoretical benchmark for basic electricity consumption, and analyze the difference between actual electricity consumption with the benchmark every month to find out the problems; the second is to install power supply time controller in indoor distribution equipment, and turn the power off during 0:00am-6:00am every day to accomplish energy conservation; the third is to adopt underground power storage for outdoor (ground) base stations, which not only to serve to theft-proof, but also to extend the service life of the power storage. Furthermore, unfolding the waste power storage and replacing the old with the new ones would replenish approximately RMB1.6 million worth of power storage, which helped reducing environmental pollution.

China Unicom Zhejiang Taizhou Branch implemented frequency band and capacity reduction of 2G/3G networks, removing old equipment from the fixed network; independently researched and developed base station air conditioning controller to automatically turn on/off power of the air conditioning according to temperature change in the machine room of base stations; automatically reduced configuration during night idle hours and started up in the morning for macro cellular base stations with extremely low phone traffic; eliminated old electrical equipment in complex buildings, and used energy-saving air conditioning and lighting. During the year, the Company saved a total of 3.987 million KWH of electricity, which is equivalent to 1,610.75 tons of standard coal, and reduced 3,975.04 tons of CO₂ emission.

Implement energy conservation management

- Set up benchmark value of electricity consumption for machine rooms where various types of base stations, indoor distribution systems and access sites are located. By benchmarking, the difference between electricity consumption in machine room of similar type and the benchmark value could be less than 10%, as to eradicate issues arising out of evaporation, emission, dripping or leakage;
- Implement list-based PUE management and control for communication machine room while setting up historical account, and gradually reduce PUE value at machine room by measures such as reasonably increasing pre-set temperature of air conditioning at communication machine room, switching off redundancy equipment, and saving electricity of lighting;
- Actively negotiate with China Tower to adopt lump-sum charging of China Tower bills.

China Unicom Jiangsu Branch strengthened electricity bill management, especially focused on analyzing and finding out the issues for base station and machine rooms with abnormal difference between actual electricity consumption and theoretical electricity volume. Through over one year of efforts, the phenomenon of “evaporation, emission, dripping or leakage” associated with electricity at base stations is significantly reduced.

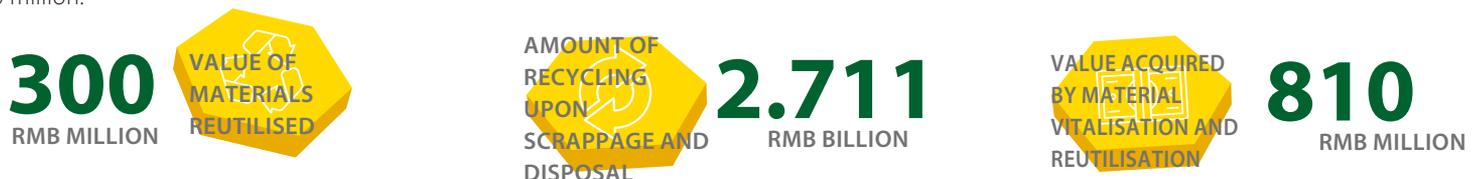
Promote streamlined network

- The Company promoted frequency band and capacity reduction of 2G/3G networks, and pushed forward SDR base station to replace old 2G equipment by evaluating energy consumption, continuously urge withdrawal from fixed network of old equipment with high failure rate and high energy consumption; during the year, a total of 18,556 base stations are closed, 28,694 SDR base stations are newly added, saving energy conservation cost of over RMB200 million.
- The integration of station and machine room location for optical fibre reconstruction is carried out; a total of 1,311 stations and 5,705 machine rooms are integrated, which in turn, vacate an area of 375,000m² for machine room, and save electricity of RMB196 million per year.

China Unicom Yunnan Branch greatly downsized network. In 2016, 531 base stations withdrew from the network and reduced energy consumption of 279,000W; 77 utilised old 2G base stations withdrew from the network and reduced repeated investment costs in network; special project of ES energy-saving aiming at 4G network was carried out, with an average daily electricity conservation of 7,102KWH; business platform downsizing plan was carried out, and removed 118 sets of equipment, released 17 cabinets of machine room space, and reduced 13.79kW energy consumption. Since 2013, China Unicom Yunnan Branch has been rewarded corporate income tax exemption of a total of RMB1.23 million by energy conservation and emission reduction projects for three consecutive years.

Cyclic utilisation of materials

In 2016, the Company ceaselessly improved material vitalisation and reutilisation rate. During the year, the value of materials it reutilised reached RMB300 million, its amount of recycling upon scrappage and disposal reached RMB2.711 billion, and the value acquired by material vitalisation and reutilisation reached RMB810 million.



Popularise paperless handling

Online paperless handling system was launched nationwide, realising automatic ID card information reading and preservation by taking photos while users can put down electronic signature on handwriting panel to create e-handling form. The paperless handling saves large amount of paper, consumables, printing, and inventory management costs, shortens handling time and users' time for queuing, and realises automatic generation of accounts, electronic audit and electronic retrieval, enhances work efficiency and reduces errors.

CARRY OUT GREEN ACTIONS

China Unicom upholds on the philosophy of “low-carbon communication and green development”, and takes environmental protection and the construction of “beautiful China” as its own responsibility, actively takes green actions, promotes green ideas and boosts green social development; it ceaselessly publicises and promotes green lifestyle, such as mobile phone recycling and battery disposal, in a way to popularise knowledge and to increase public awareness in environmental protection.

To avoid environmental impact posed by old mobile phones, China Unicom carried out activities for trade-in old mobile phone terminal for new one, and launched mobile phone recycling action with various phone recycling companies at the China Unicom stores; when conducting assessment, the process was open and transparent, effectively protecting users’ information; when conducting technical process, the cooperative recycling companies extracted rare and precious metals by chlorination-free hydrometallurgical technology, and achieved innocuous treatment and cyclic utilisation. China Unicom, by virtue of smooth mobile phone recycling chain of the recycling companies, promoted cyclic utilisation, reduced heavy metal pollution from electronic waste, and created environmental protection value while benefiting the users.

In order to support weather detection work in Beijing Municipality, China Unicom Beijing Branch built haze detection network using extensive station and transmission network, together with network construction experience to build 4G haze detection network integrating all points and aspects; it has built a total of 4,000 collection points, collecting weather data and information via the perception layer, and sent to central server of Beijing Meteorological Service every 5 minutes after data transmission and reshaping. After the haze monitoring network is deployed and promoted, it has brought positive impact on the society, and enhanced the precaution awareness of citizens. Beijing Meteorological Service improved release timeliness of air quality index, which significantly enhanced haze prevention and treatment capability of the entire society.

China Unicom Fujian Fuzhou Branch conducted youth networking activity themed as “volunteering for public welfare together”. Over 60 youth league members passionately participated in tree planting activity and made contribution to green environment and air purification.



China Unicom Anhui Ma’anshan Branch conducted the “Learning from Lei Feng” voluntary tree planting activity. With clear division of labour and high efficiency, employees enthusiastically participated in the activity by digging holes, planting trees and filling soil. After two hours of work, rows and rows of newly-planted trees were waving in the wind and greeting the passer-by.



China Unicom Guangdong Zhuhai Branch actively built communication and transmission network for public bike system, and helped realising “green transportation” for Zhuhai citizens. From 2013 to 2016, Zhuhai Branch set up the bike rental system project in three phases and provided communication services. It provided VPN dedicated communication service to a total of 595 stations, and put 13,000 public bikes to the mass.

Analysis and statistics of energy conservation and emission reduction

Based on bus-taking for short distance
Directly saved RMB2.36 million expenses for citizens in November 2016

Based on traffic distribution at intersection for transportation by private cars
Reduced about 7,072 private cars on road daily in November 2016, i.e. 707 vehicles/day per intersection

Based on gasoline and carbon emission for transportation by private cars
Saved about 250,000 liters of gasoline and reduced about 160 tons of carbon emission in November 2016