Experience and Challenges of Green and Low-Carbon Development in ICT

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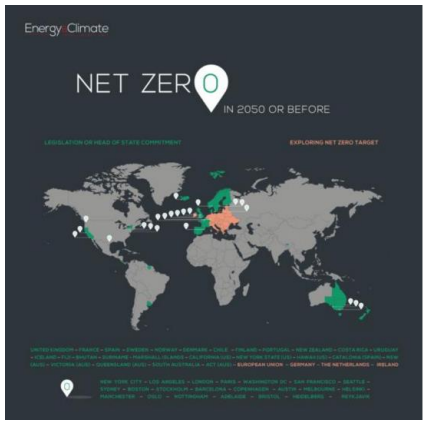
Content

The Hot Issue: Mitigation of Climate Change

Net Zero: resulting in neither a surplus nor a deficit of something specified when gains and losses are added together.



 **Net Zero in 2050**

 **Net Zero in 2045**

 **Net Zero in 2050**

 Net Zero in 2050

 Net Zero in 2050

 **Net Zero in 2050**

18th CPC National Congress
- Development of ecological civilization;
- Green, recyclable and low-carbon development in China.

19th CPC National Congress
- Establish and perfect economic system with green and low-carbon

China's Intended Nationally Determined Contribution: Enhanced Actions on Climate Change
- Reach to peak volume of carbon emission in 2030;
- The carbon emission per capital GDP reduced by 60%～65% compared with that in 2005.

The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China
- Spread out the experimental low-carbon emission projects in large scale;
- Promote working on zero CO_2 emission;
- Make 50 Net Zero projects in 2020.

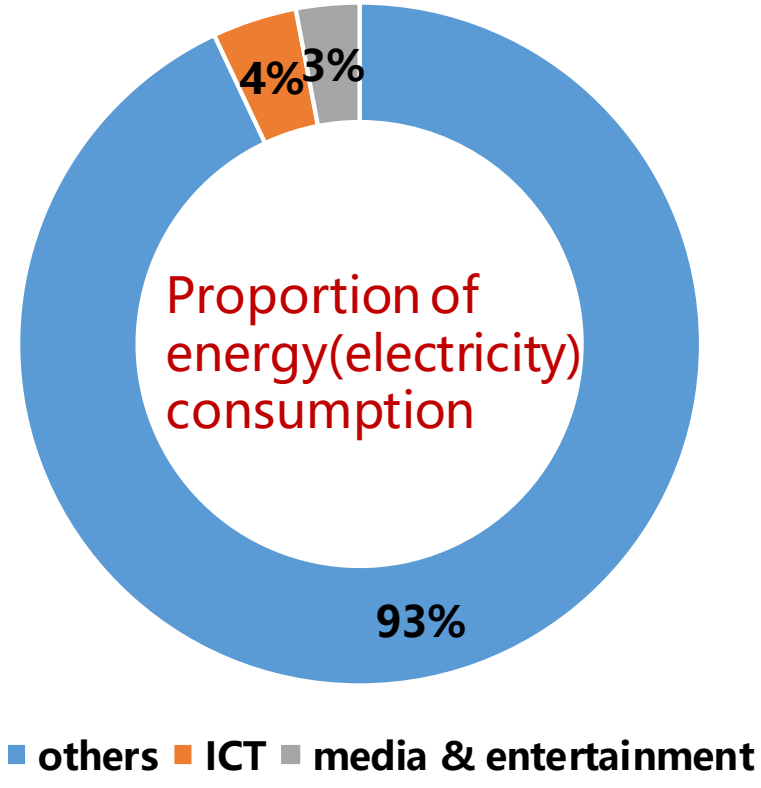
75th General Debate of the United Nations General Assembly
- China will achieve carbon neutrality before 2060.

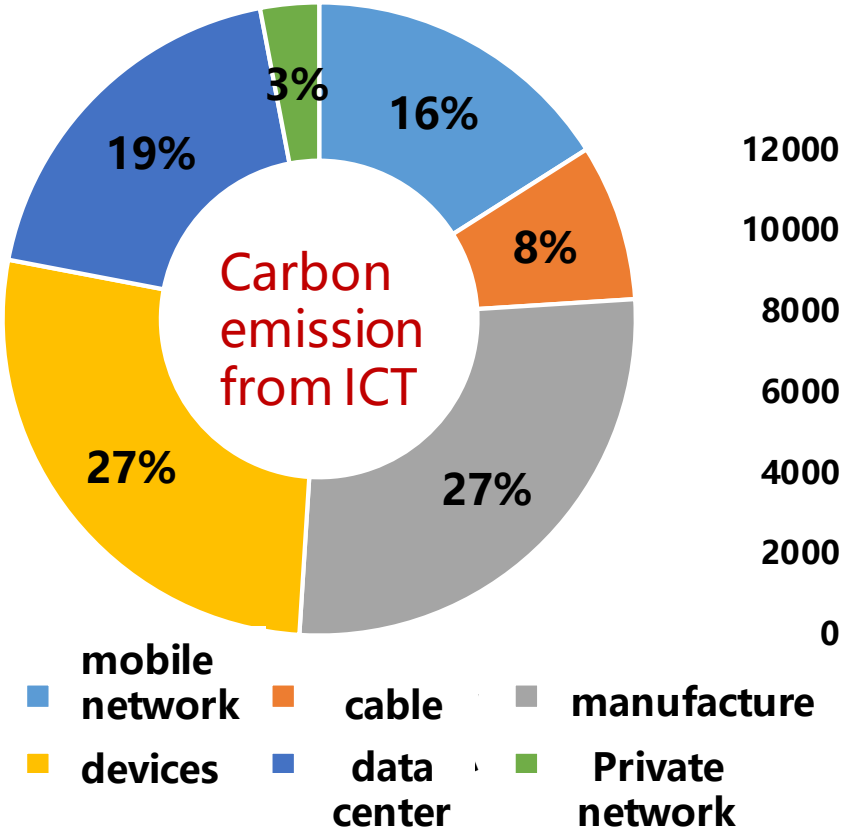
The State Council
- "Opinions of the work on completely, accurately and comprehensively implementing the new development concept and doing a good job in emission peak and carbon neutrality."
- "Emission Peak action plan before 2030."

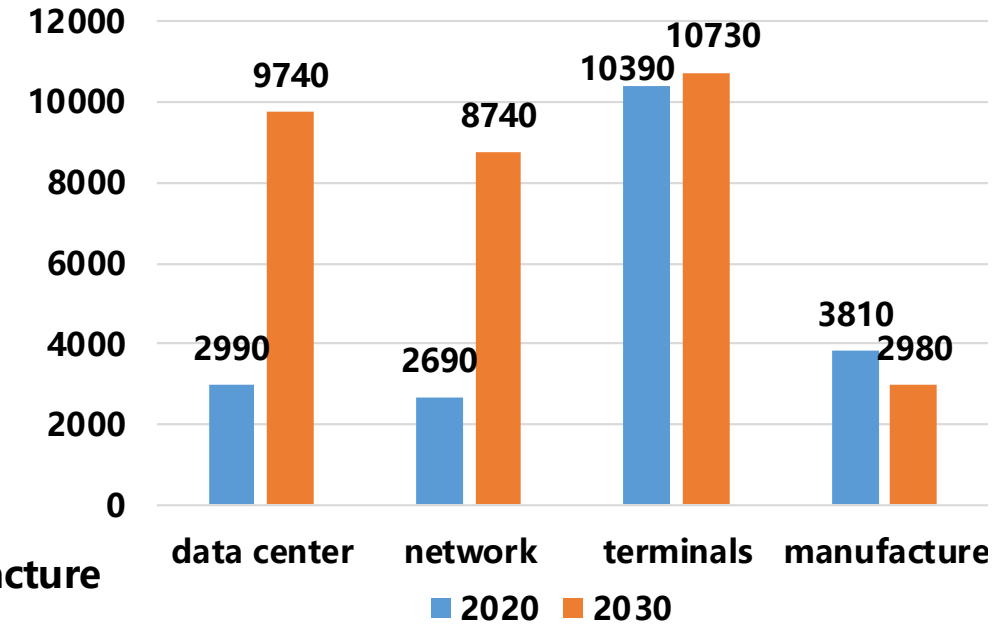
Low-carbon Development → **Reach to Peak Volume of Carbon Emission** → **Nearly Zero CO_2 Emission** → **Carbon Neutrality** → **Zero CO_2 Emission**

Energy Consumption of ICT has been Gradually Focused

- HUAWEI: In 2020, the total energy (electricity) consumption of ICT was around 2 trillion kWh which takes 4% of gross global energy (electricity) consumption in electricity.
- GSMA: The carbon emission of ICT takes 1.4% that of in global carbon emission.
- HUAWEI: The global energy(electricity) consumption will increased by 61% in 2030.







Proportion of carbon emission **small** rate or increasing of carbon emission **huge**

Carbon Emission Reduction in ICT can be Taken to Infrastructure, Communication Network and Cooperation

Business (cooperation)

High-efficiency business service

【Cooperative optimization——Optimized resource deployment】

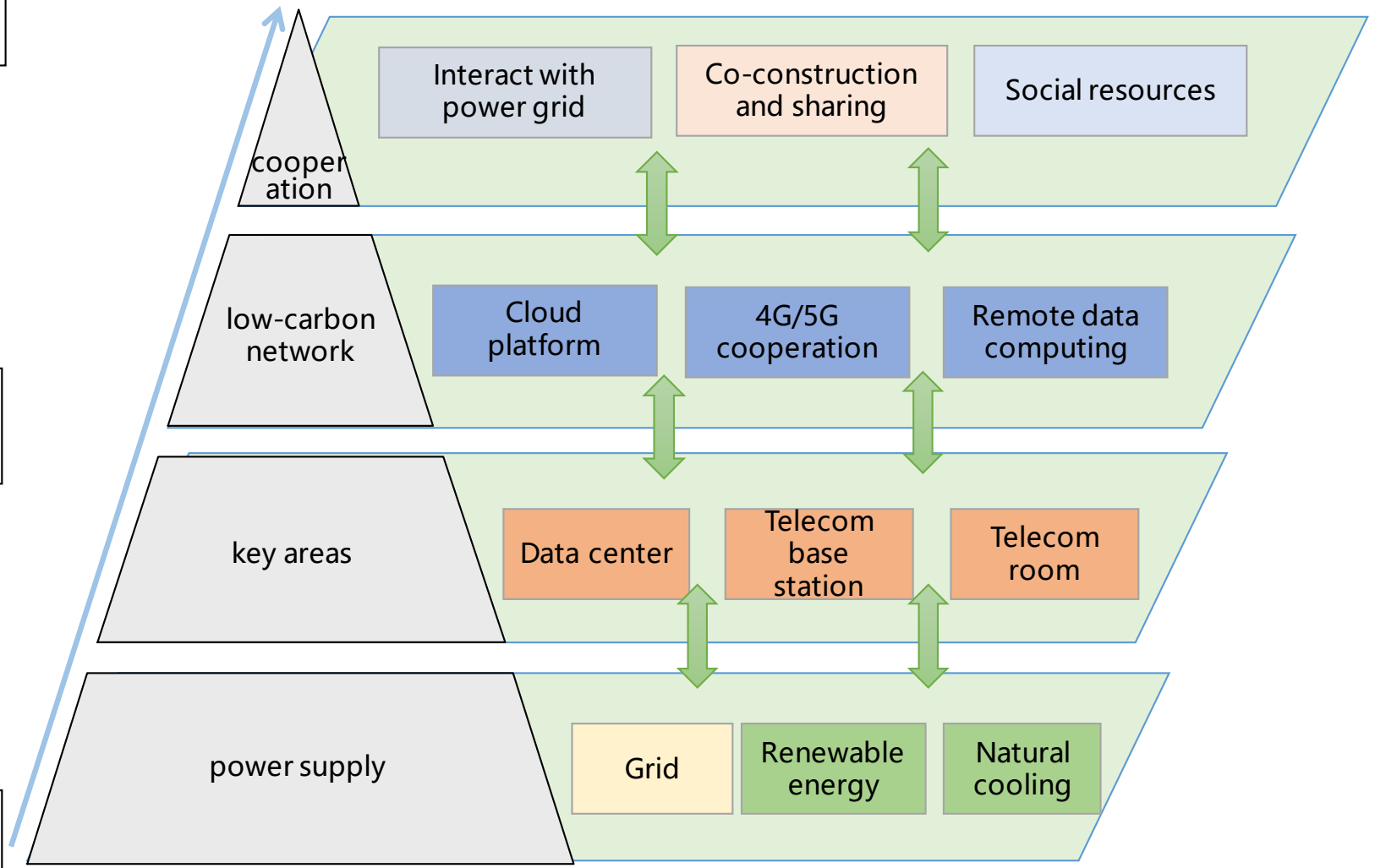
Network (communication)

Green and low-carbon communication network

【Clean and high-efficiency operation——Maximum cooperative efficiency】

Infrastructure (power supply)

Energy and circumstance supply



Best Practice on Green and Low-Carbon Development in ICT

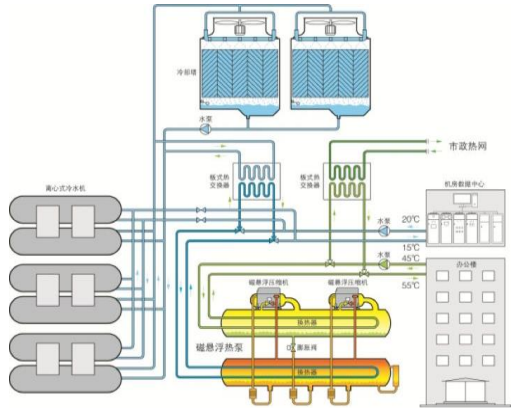
Data Center

Optimization for energy structure

- Construct solar-energy data center collaborated with new energy companies.
- Construct private new energy powering system for data center.

- Purchasing green electric power.
- Offset quantity of energy consumption in accounting.

Recycle and use for energy resource



- Residual heat recycling and using from data center

Application on advanced energy-saving technology

Energy saving on IT devices

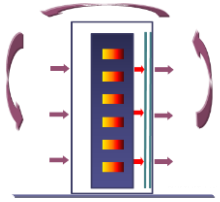
- Liquid cooling servers
- Software-defined data center

Energy saving on power system

- AC power: modular UPS, flywheel energy storage, harmonic suppression.
- DC power: smart dormancy, ≤400VDC power system

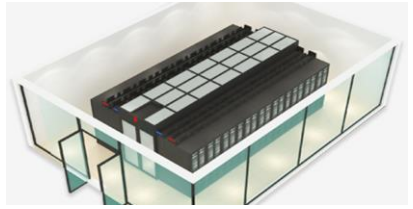
Energy saving on cooling system

- Cold and hot aisles with isolated.
- Back and Nearby cooling.



Energy saving on whole system

- Modular data center



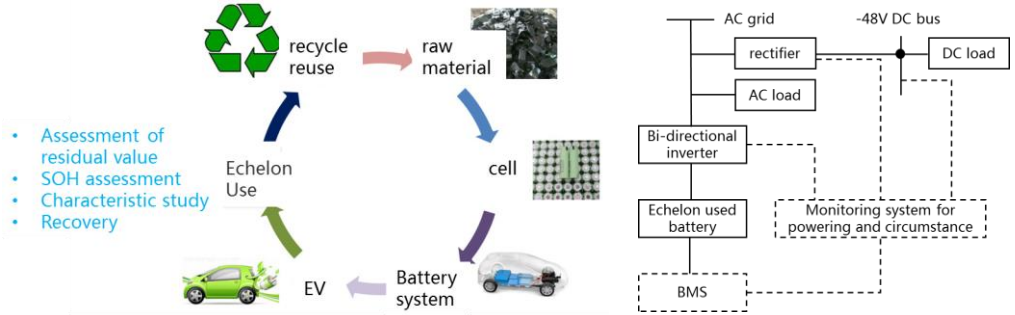
Best Practice on Green and Low-Carbon Development in ICT

5G Base Station

Increasing the percentage of green energy powering

- Making contract on energy management in places where the electricity price is relatively higher and the solar resource is relatively more adequate.
- Roof and ground of established telecom base station, small telecom room and 5G sites.

Recycle and reuse



- Recovery of Traction Battery Used in Electric Vehicle

Application on advanced energy-saving technology

Energy saving on IT devices

- Reducing energy consumption during product design and manufacturing.
- Making energy efficiency assessment for IT devices.
- Making energy-saving working mode.

Energy saving on power system

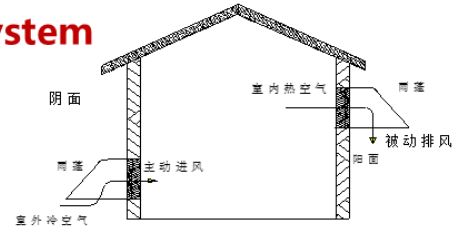
- High efficiency power supply system.
- ≤400VDC power system.
- Multi-input multi-output power supply system

Energy saving on whole system

- The cooling efficiency can be increased by 7% through increasing ambient temperature by 2-3℃.
- Air distribution optimization can make energy saving increased by 2%.

Energy saving on cooling system

- Natural cooling.



Network energy saving

- Distributed power supply and integrated power system can shorten the period of construction.
- Making co-construct and co-use to reduce the cost of energy consumption.

Work Plans of Carriers on Carbon Neutrality in China

China Telecom

1. Improve energy efficiency through infrastructure optimization, cloud network integration and intelligent operation and maintenance;
2. Promote the contract energy management mode from air conditioning and power supply to the energy-saving transformation of network main equipment;
3. Promote the construction of green industrial chain;
4. Carry out external publicity, enhance the image of green central enterprises.

中国电信 CHINA TELECOM

China Unicom

"3 + 5 + 1 + 1" action

"3" refers to management system s of carbon data, carbon footprint and energy transaction;

"5" refers to five green development ways. Increase the proportion of clean energy; build a green and low-carbon data center; promote reconstruction of communication room, promote network optimization, improve intelligent management.

"1" refers to expanding co construction and sharing.

"1" refers to the application of digital enabling industry.

中国联通

China Mobile

1. Promote 4G/5G base station and overall network energy conservation;
2. Transform and eliminate the production capacity of backward communication machine rooms;
3. Promote the application of energy-saving technology in data center;
4. Promote green supply chain;
5. Purchase or self build green power such as solar energy and wind power;
6. Enable the development of green society.

中国移动通信 CHINA MOBILE

Work Plans of Internet Companies on Carbon Neutrality in China

Alibaba

Application of liquid cooling, natural cooling and high voltage DC power supply. Make full use of renewable energy and promote waste heat recovery and reuse.

Enabling production and life: green energy supply and carbon emission monitoring in industries, power grids, transportation, etc. Realize low-carbon life through digital government.

Tencent

Empowerment of traditional industries: provide measurable parameters for carbon emissions through Tencent conference and digital technology.

Low carbon office buildings and data centers: T-block 4.0 and data center waste heat recovery, intelligent lighting, robot maintenance, photovoltaic power supply, liquid cooling application, etc.

Baidu

Optimize the energy structure: purchase wind power and build photovoltaic power plants on the roof. The use of solar heating system and low-carbon air exchange system.

Grid power supply, zero power consumption air conditioning terminal, AI intelligent control DCIM and intelligent buildings.

Intelligent transportation and Cloud Services: professional recycling of lead-acid batteries.

Low-carbon Enabling from ICT to Industry

01

For Manufacturing Devices

Technology: Expert System(AI), Big Data

Promote manufacturing workload and quality with fixed working power of devices.

02

For Manufacturing Process

Technology: Deep Learning, Modulation

Continuously optimize technological process;
Reduce redundant working procedure;
Promote working efficiency.

03

For Management

Technology: 5G network and AI

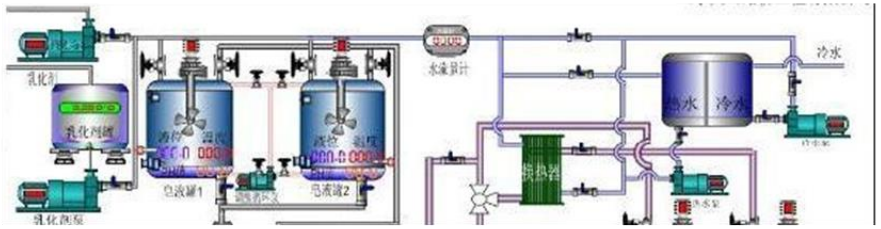
Make comprehensive management for whole working process in manufacturing;
Reduce redundant power consumption manipulated by human operation.

04

For Recycle and Reuse

Technology: Machine Vision

Making refined recycle and reuse for raw material to decrease cost while promote utility efficiency.



Steel — BAOWU 中国宝武

- 01/2021-05/2021: Save 3 million kilowatts on electricity;
- Monthly save 100 thousand m3 gas.

Coal — 中国神华能源股份有限公司 CHINA SHENHUA ENERGY COMPANY LIMITED

- Recycle 3 million tons more coal per year;
- Absorb more than 500 thousand CO2 emission per year.

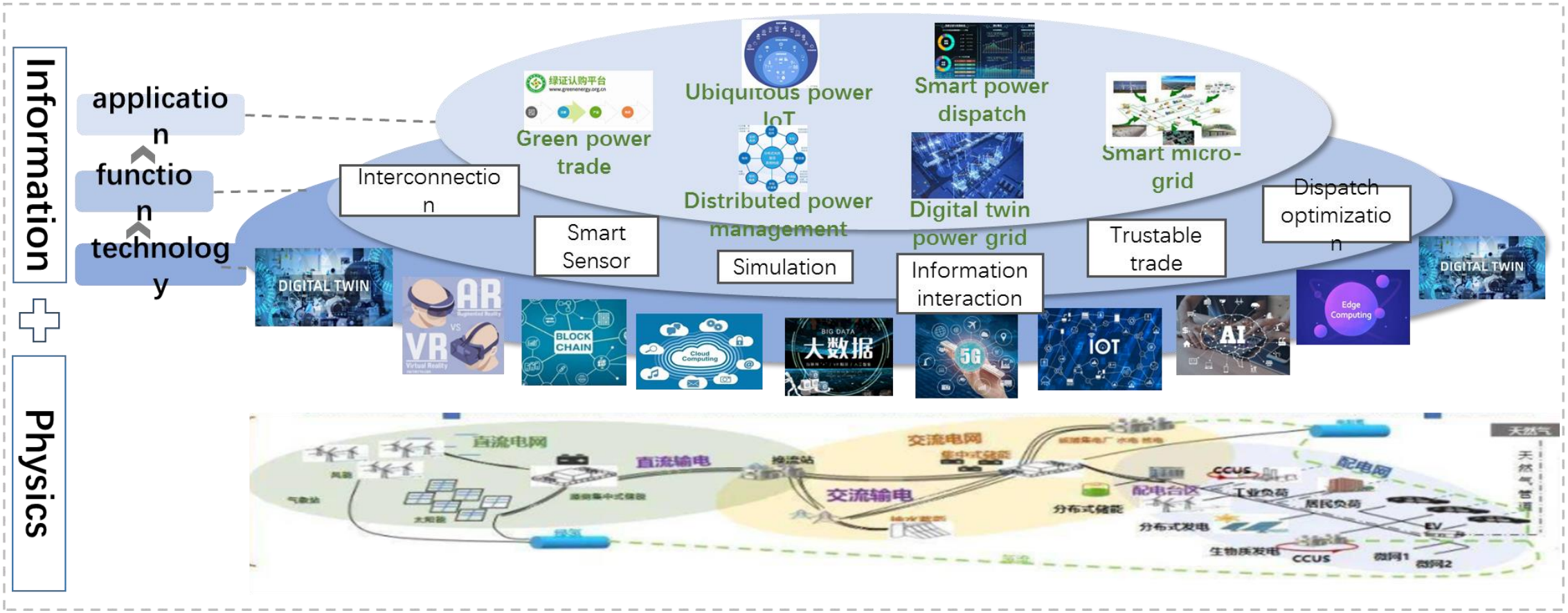
Gas — 恒力集团 HENGLI GROUP

- Achieve water recycle in 82%;
- Save 1.2 million tons of coal per year.

Cement — CONCH 海螺水泥

- Decreased 1.05 million tons of CO2 emission;
- Decreased power consumption by 1.6%.

Low-carbon Enabling from ICT to Power



中国南方电网 CHINA SOUTHERN POWER GRID

China Southern Power Grid will deeply integrate digital technology with physical power grid. It can promote the construction of digital scenes such as intelligent distribution room, intelligent microgrid,etc.

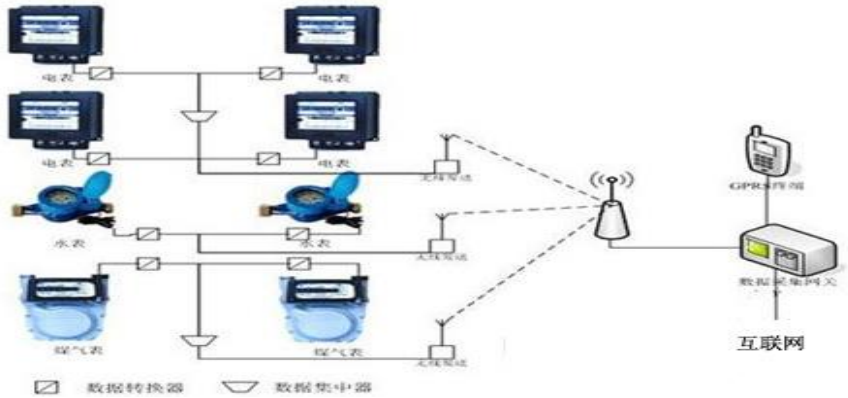
TBEA 特变电工

The photovoltaic power station e-cloud intelligent operation and maintenance platform from TBEA, making power station operation and maintenance efficiency is improved by 10%, power generation is increased by 2%, and kwh cost is reduced by 4%.

Low-carbon Enabling from ICT to Building

Energy Consumption Analysis during Construction and Operation of Buildings

Energy Consumption Data Collection and Data Share on Management Platform

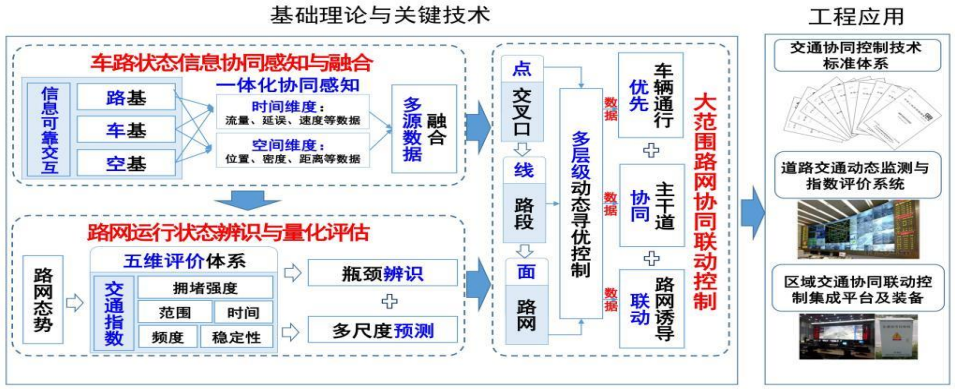


Smart Management and Control System

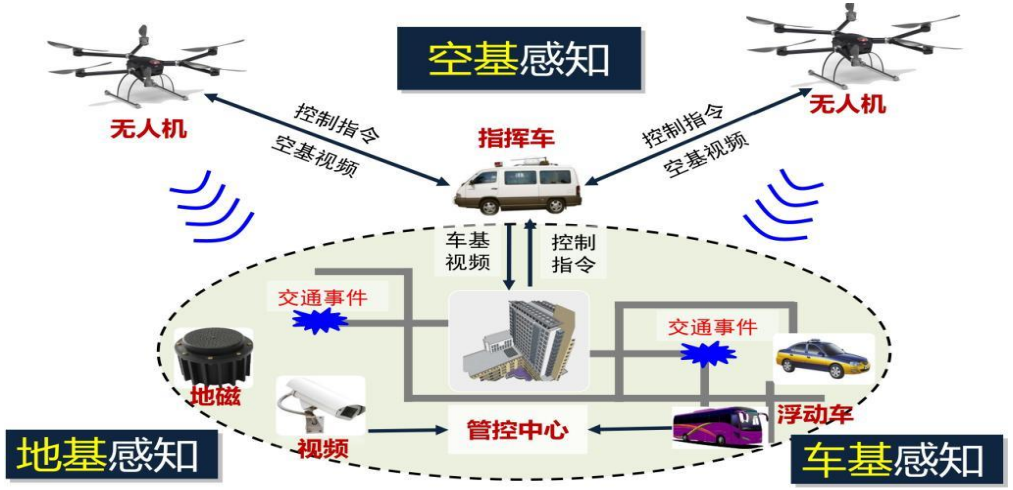
Interconnection between Buildings

Low-carbon Enabling from ICT to Traffic

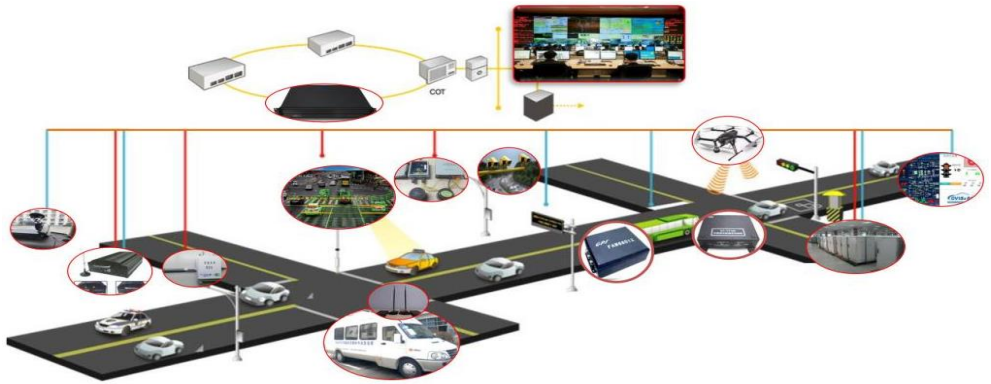
Technical Structure of Smart Traffic System



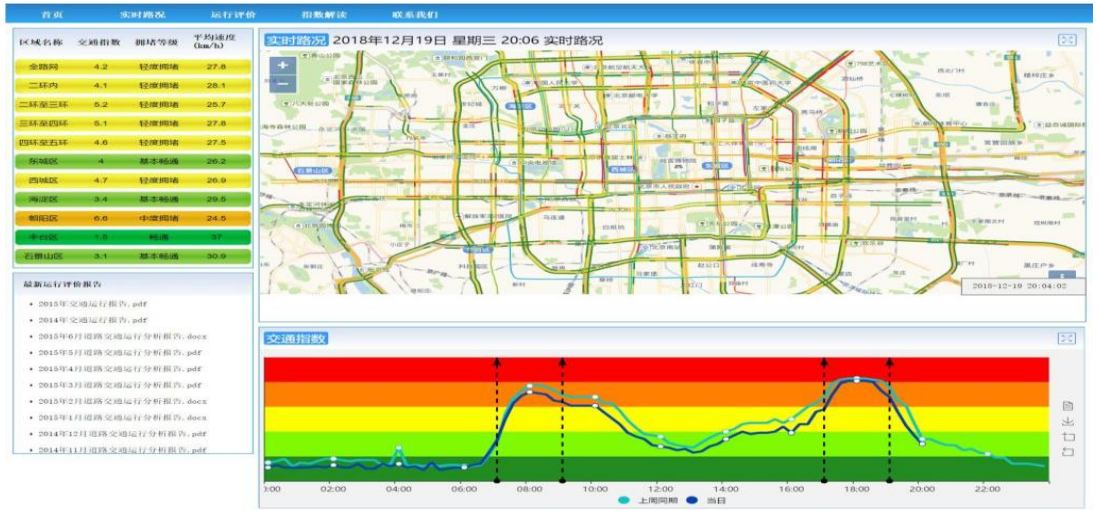
Integrated Cooperation Model with Road, Air and Vehicle



Integrated Control Platform of Regional Synergy for Traffic System



Dynamic Monitor for Traffic System



Future Development in China

What should we do next?

01

Making technology study on new-generation ICT and deeply applying on different industries

02

Study and publish international, national and industrial standards

03

Building a GHG emissions accounting and evaluation platform

04

Establishing a symbolic net zero city, area, data center, base station etc

05

Continue international cooperation in sustainable and digitalization transition and achieving Net Zero goal.


Thank you!