



Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织

Global Energy Interconnection Strategy and IoT Standard Demand

GEIDCO
24 May 2017

Global Energy Interconnection Development and Cooperation Organization (GEIDCO)

Established in: March, 2016

Mission: Promote GEI to meet global power demands with clean and green alternatives; Help to realize UN's goals of "Sustainable Energy for All" and combat climate change; Serve the sustainable development of human society.

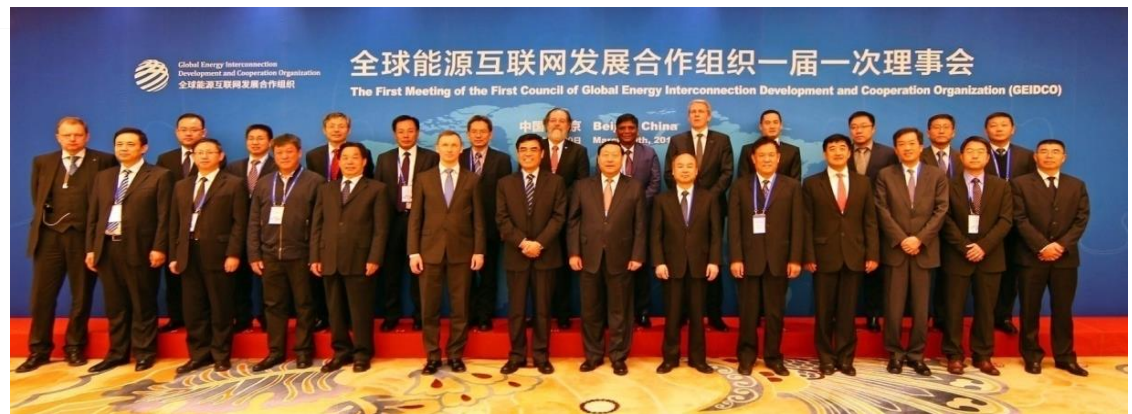
Members: Over 260 members from 22 countries and regions on five continents, covering sectors of energy, electric power, information, environmental protection, scientific research, consulting and financing.

Chairman: ZHENYA LIU

Vice Chairmen: STEVE CHU, former U.S. Secretary of Energy Ministry and Nobel Prize winner in physics; YINBIAO SHU, Chairman of State Grid Corporation of China (SGCC); MASAYOSHI SON, Chairman & CEO of SoftBank Group Corporation; ROMAN BERDNIKOV, First Deputy Director General of PJSC ROSSETI.



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Through high-level exchanges and publicity events in a wide scope, GEI has become a common understanding and action with extensive impact and enforcement in the international arena.



Talks with UN Secretary-General António Guterres at UN New York Headquarters on January 9th, 2017

UN Secretary-General António Guterres points out that :

“ The China's GEI initiative aligns with the UN's SDGs, and GEI should be one of action plans to achieve the 2030 Agenda for Sustainable Development to guide UN member countries' participation. ”

Established partnerships with over 120 international organizations, government departments, enterprises, institutes and universities.



Friendly cooperation with numerous international institutions and universities



Sign MOU with the UNESCAP



The MOU on Energy Interconnection spanning across Northeast Asia was signed among Chinese, South Korean, Japanese, and Russian companies



1. Challenges

2. Solutions

3. IoT Standard Demand



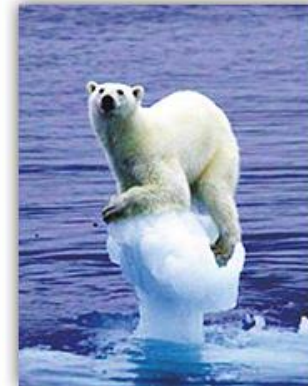
1 Challenges



*Energy
Security*



*Environmental
Pollution*



*Climate
Change*

1st Challenge - Energy Security



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Natural Gas



187 trillion m³
54 years

Coal

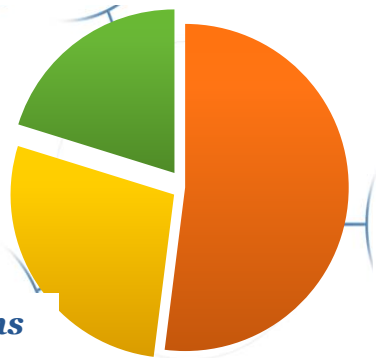


891.5 billion
tons 110 years

Petroleum

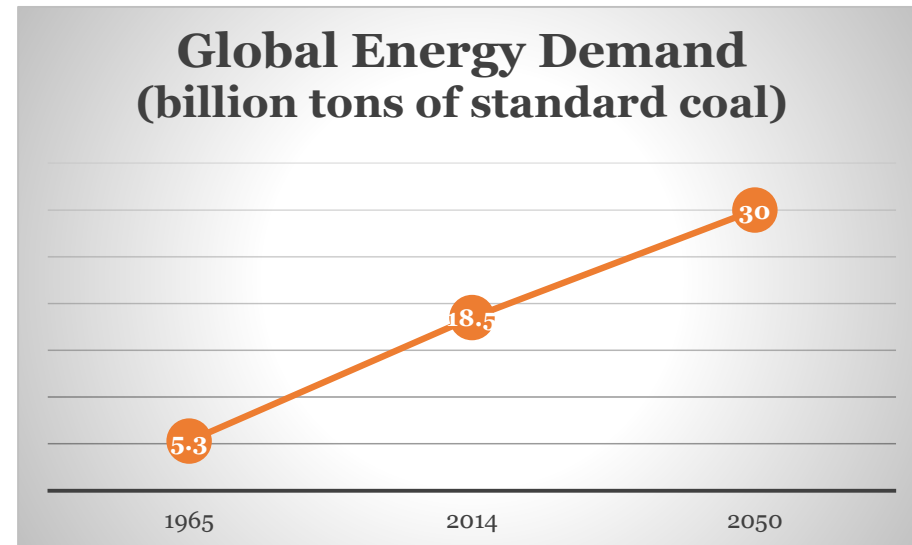


239.8 billion tons
53 years



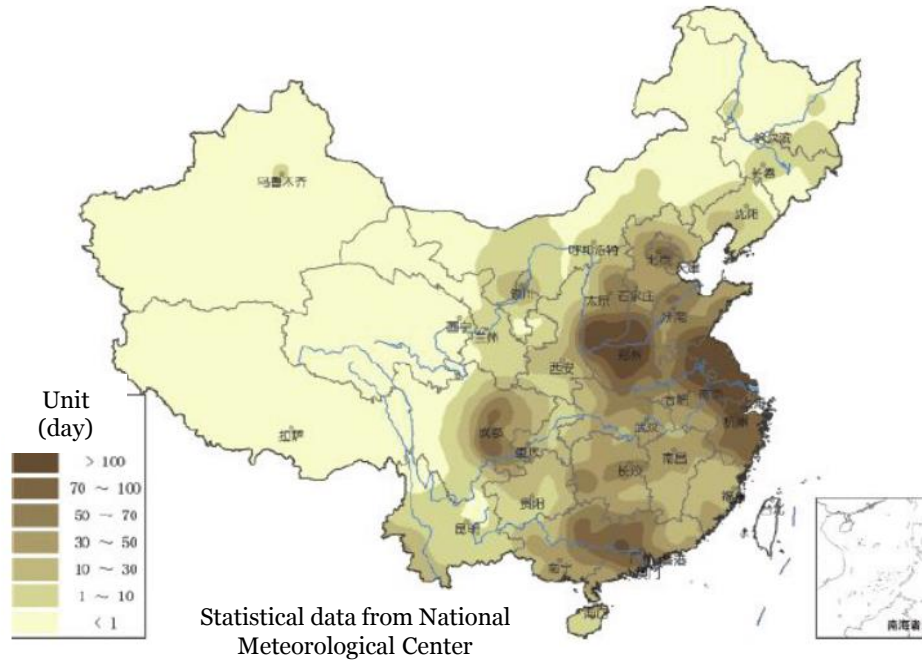
Global proved reserve of fossil energies

Global Energy Demand (billion tons of standard coal)



**Global energy demand will
nearly double by 2050 !**

2nd Challenge - Environmental Pollution



2013 China haze days distribution



Los Angeles photochemical smog



Beijing haze

Smog, haze and acid rain occur frequently.

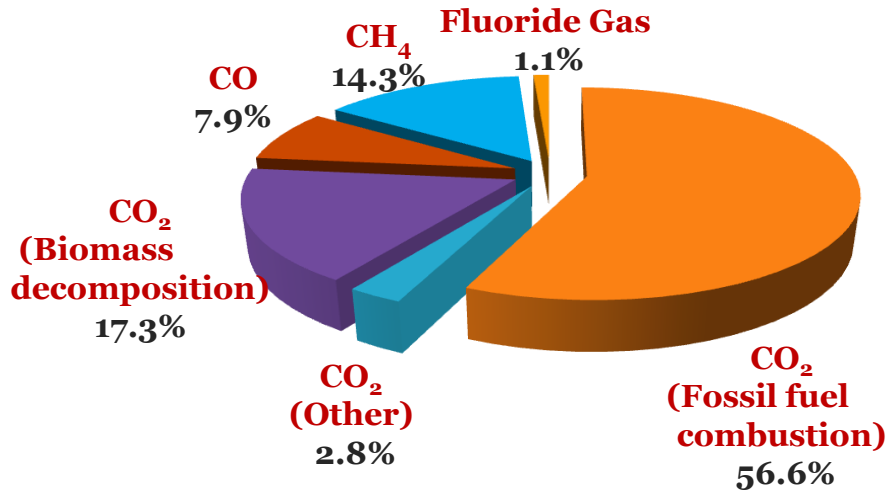


London great smog in 1952

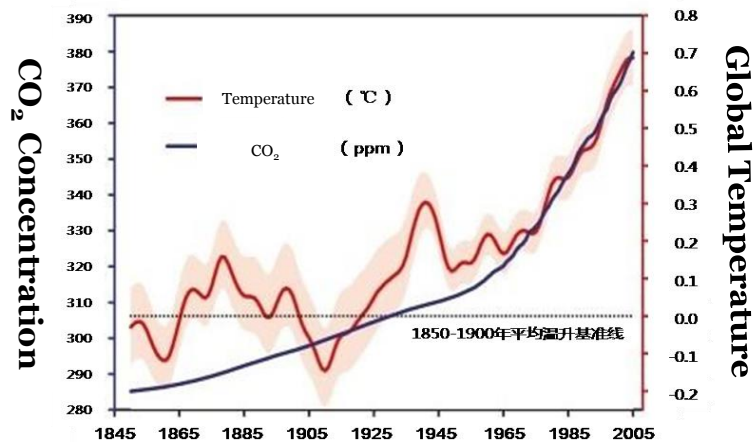


Meuse Valley fog in 1930

3rd Challenge - Climate Change



Global CO₂ emissions in 2014



Emissions of CO₂ from 1 ton of standard coal :

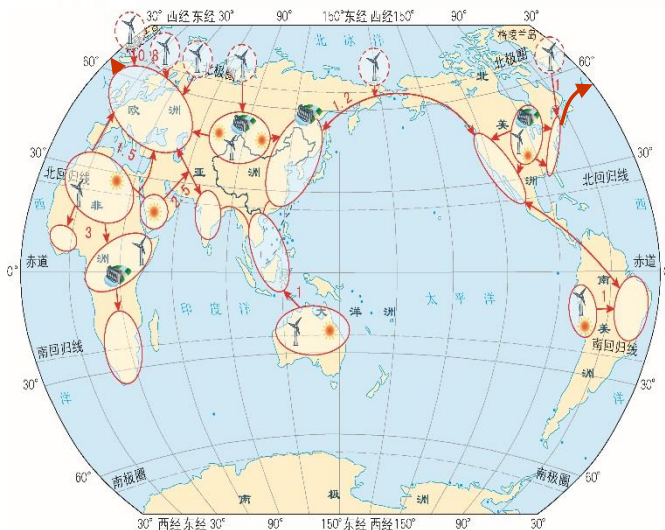
- Coal ~ 2.77 t
- Petroleum ~ 2.15 t
- Natural Gas ~ 1.65 t

1 Fossil Fuel = 2 CO₂





2 Solutions

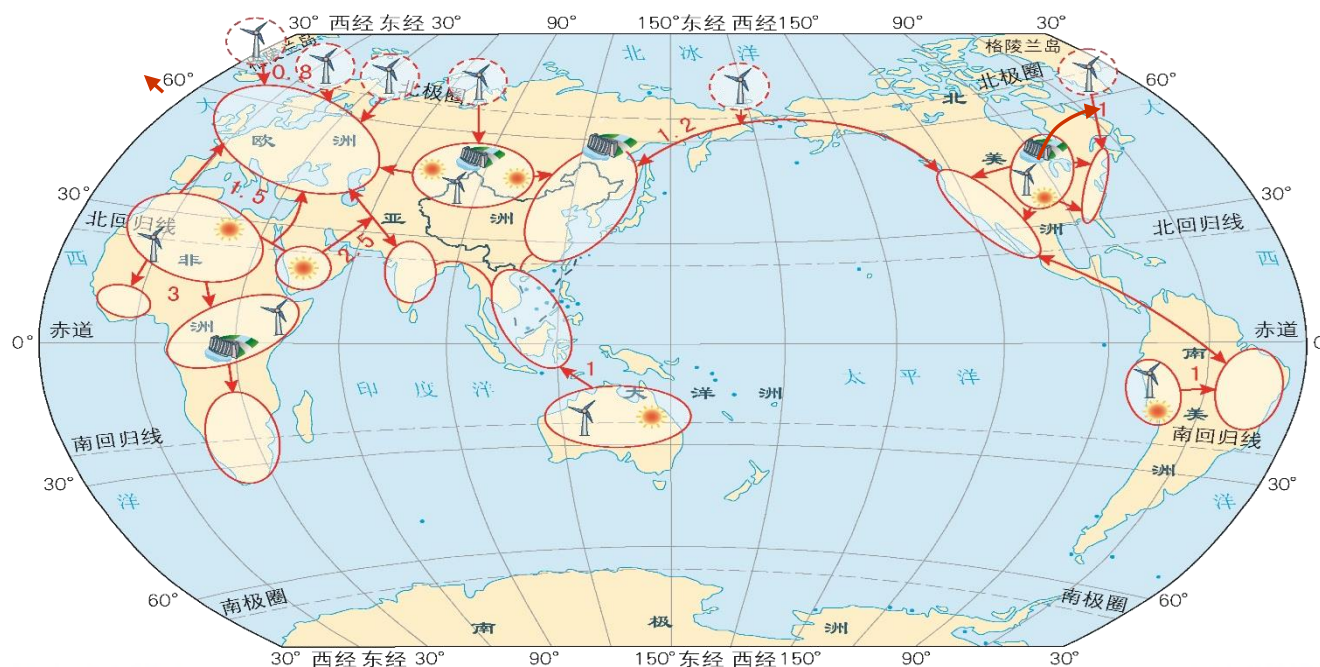


Solutions - GEI



The fundamental solution to the challenges of global energy is the **Global Energy Interconnection (GEI)**. GEI is a globally interconnected strong and smart grid backboned by UHV grids. It is the basic platform for large-scale development, allocation and utilization of global clean energy.

GEI = Smart Grid + UHV Grid + Clean Energy



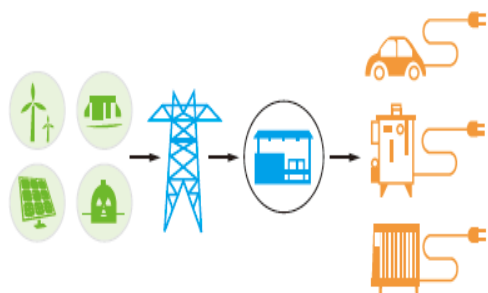
Energy Reformation



Two Replacement

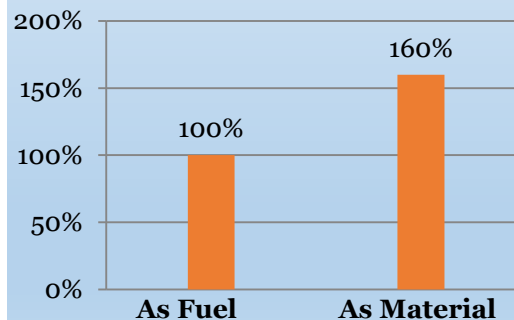
Clean Energy Replacement
in Generation

Electricity Replacement
in Consumption



One Return

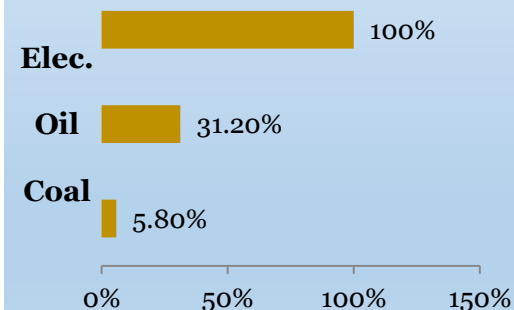
Return fossil fuel to its
original attribute as the
raw materials of
industrial production



Economic Value of
One Unit Crude

One Improvement

Improve the degree of
electrification and the
percentage of electricity
in energy consumption

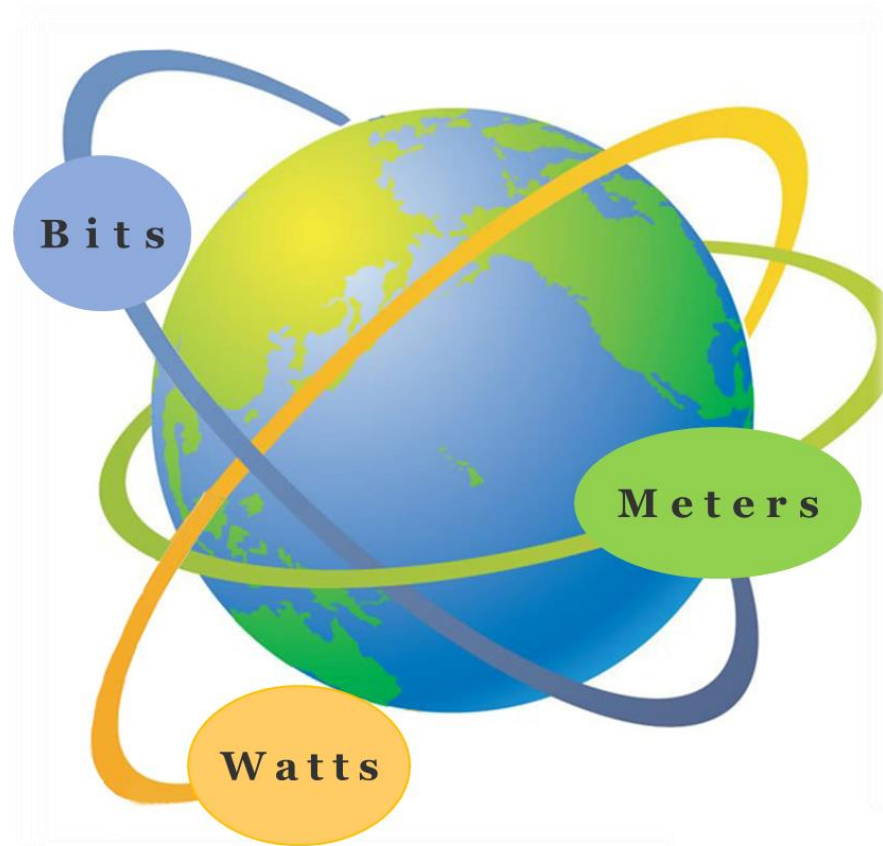


Economic Value of
Equivalent Energy

Energy, Information and Transportation Integration (EITI)

EITI refers to Energy, Information and Transportation Integration or "Bits, Watts and Meter" Intergartion.

This EITI pattern will take shape by seizing the opportunities of global energy transition and information technology revolution, and by giving full play to network economy and scale economy effect, also with the intensive infrastructure connectivity as the basis.



The establishment of GEI will be divided into three phases: domestic, intracontinental, and intercontinental interconnection.

- From now on to 2020, countries will focus on their own clean energy development and grid interconnection projects
- By 2030, large-scale energy bases and cross-border grid interconnections will be promoted within each continent.
- By 2050, energy bases of the Arctic region and Equator region and intercontinental interconnection will be set up. Global Energy Interconnection will be basically constructed.



- Boost grid interconnections within each country and construct smart grids

- Promote cross-border grid interconnection within each continent

- Promote intercontinental UHV backbone grids



3

IoT Standard Demand



Application in the Grid Value Chain



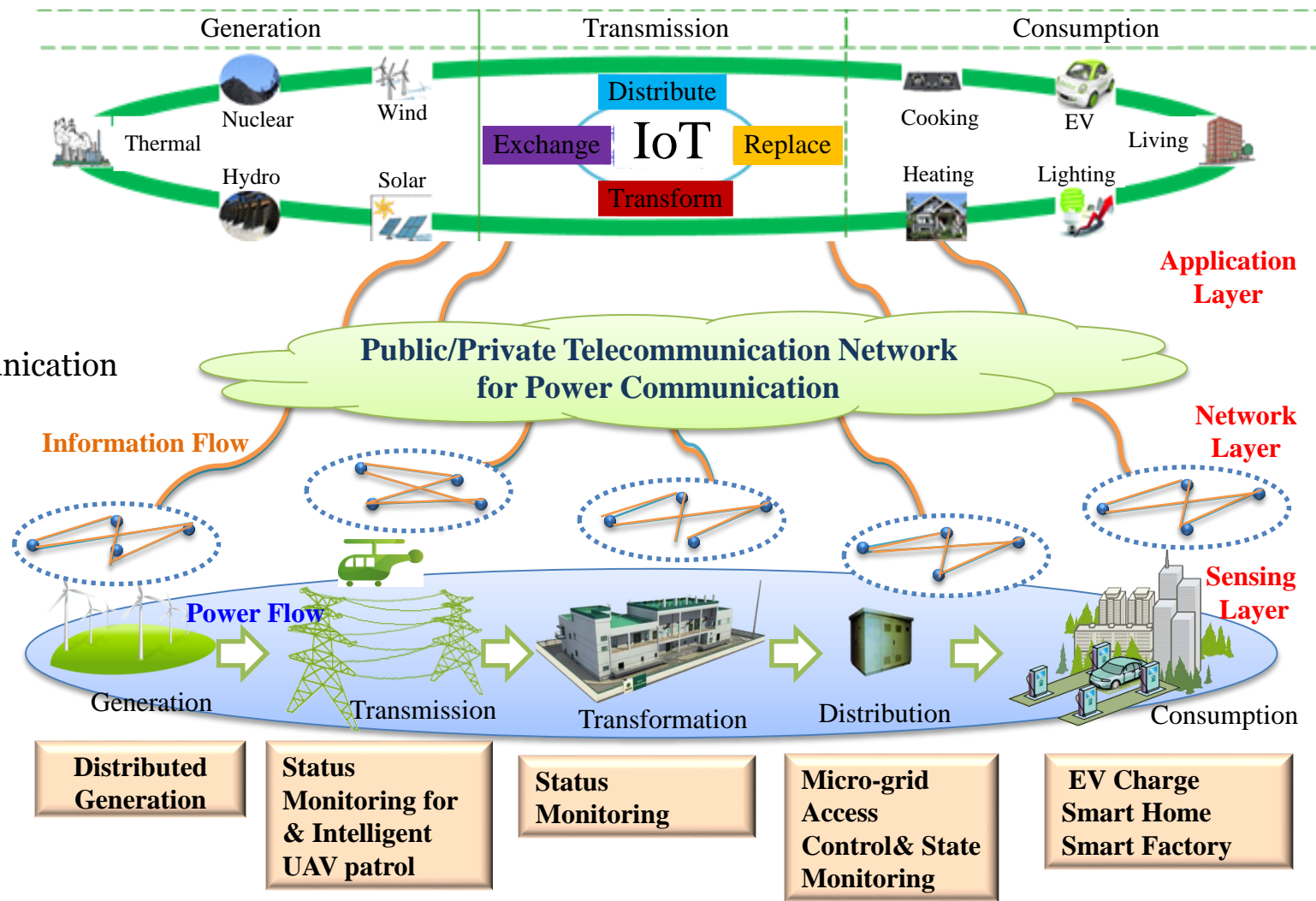
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Processing
Storage
Processing
Analyzing

Networking
GRPS
Optical fiber
Wireless communication

Sensing
Sensor
RFID
D barcode
GPS terminal

Equipment
Generator
Transformer
Insulator



Application: Grid Monitoring

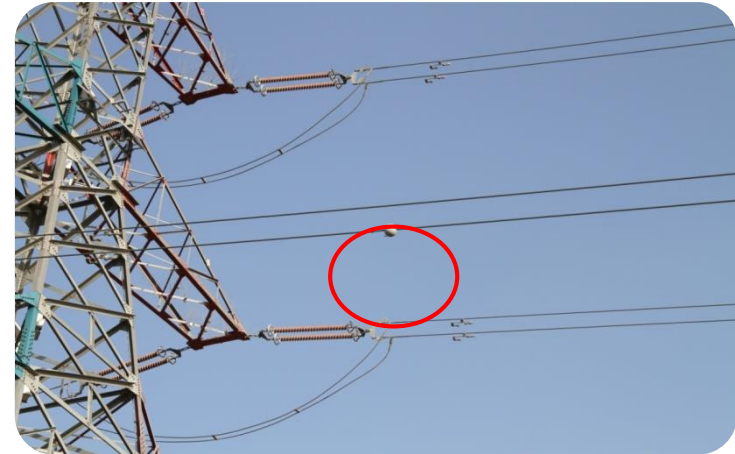


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Visual status monitoring in power transmission and early warning system on line.



Real-time weather monitoring



Power line temperature monitoring



Arrester data monitoring

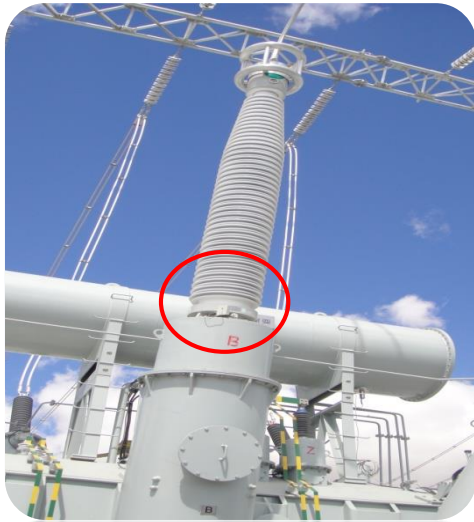


Early warning system

Application: Grid Monitoring



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Capacitive equipment monitoring in substation



Arrester monitoring in substation



Power line monitoring



Video monitoring system

Application: Grid Monitoring



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Intelligent patrol using UAV in power transmission line.



Patrol using UAV - 1



Patrol using UAV - 2



The pod of UAV

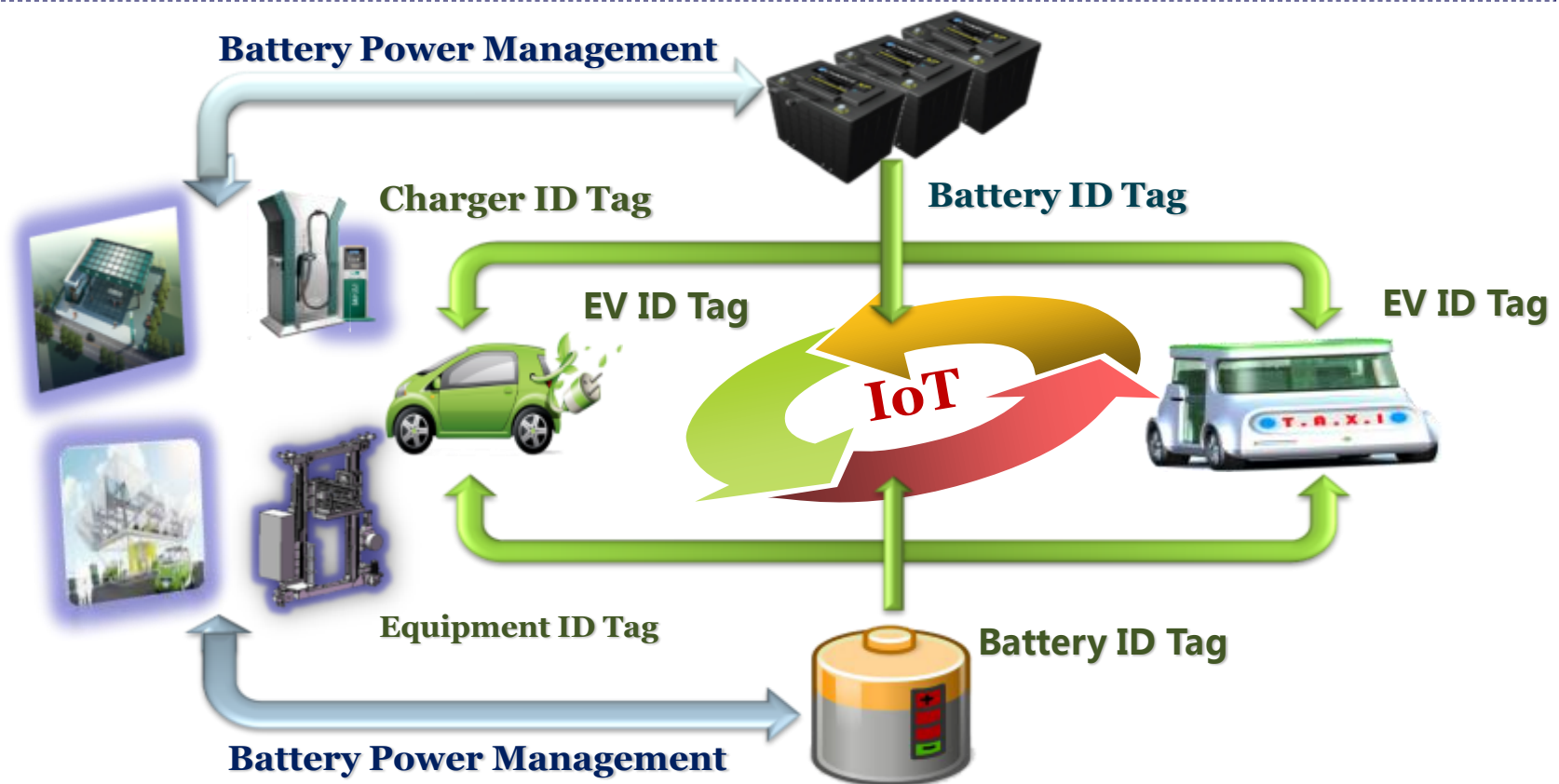


The console of UAV



Application: Electric Vehicle

Battery power capacity, charging, power station location and equipment security could be monitored on line and managed by IoT technologies.



Application: Electric Vehicle



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Smart Charging Station
Management System



Battery Charger



Smart Vehicle-mounted
Terminal



Charger Control System

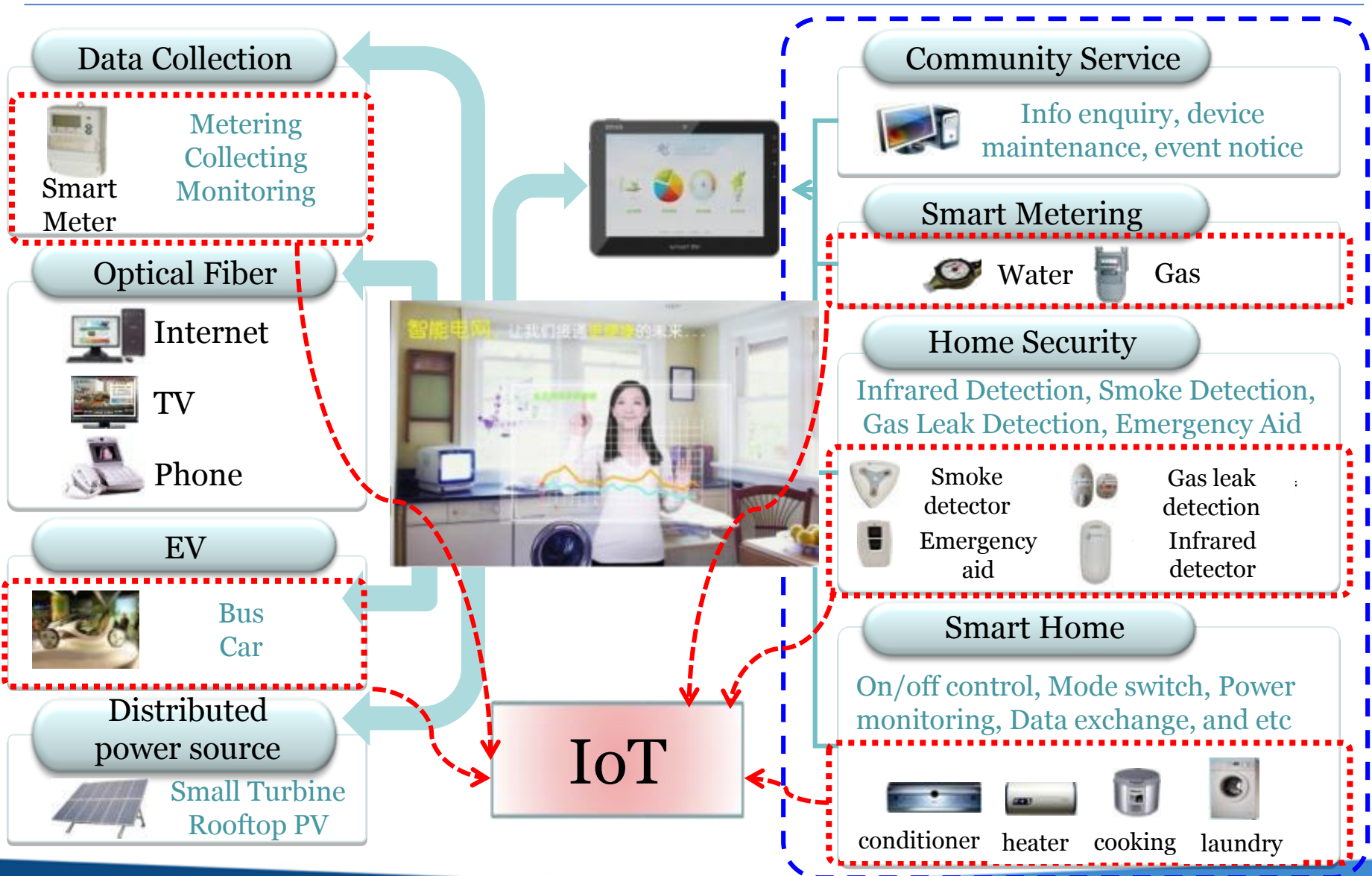


Charging Station of SGCC at
Nanning

Application: Smart Community



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Application: Smart Community



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Optical Fiber Composite
Low Voltage Cable



Smart
Interactive Terminal



Smart
Portable Device



Visual
Intercom



Smart
Service System



Energy
Management System



Community
Operation Website



Information
Acquisition System

Application: Smart Factory



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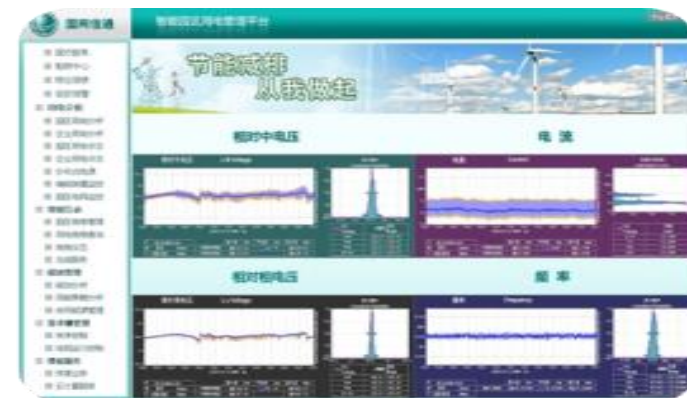
Smart Factory



Energy Management System



Distributed Energy source &
Battery monitoring system



Energy Quality Monitoring

IoT Standard Demands in GEI



1. CPS in power grid
2. EITI safety protection & Information security

1. Power optical fiber sensing
2. CPS-based smart sensing network
3. Perceptual transmission integration for future grid

1. Optical communication in ultra-long span
2. Heterogeneous grid in transnational transmission
3. Quantum communication
4. Coordinate communication

1. UWB short-range wireless communication
2. Ubiquitous network interconnection
3. LPWAN
4. Visible light communication

EITI (Watt, Bit, Meter Integration)

Smart Sensing

Transmission Grid Communication

Access Grid Communication

IoT Technologies in Power System

Data Sharing & Control

1. Data quality management, Analytical algorithm
2. AI, Machine learning, etc
3. Future intercontinental data interaction & sharing

Cloud Computing & Analysis Platform

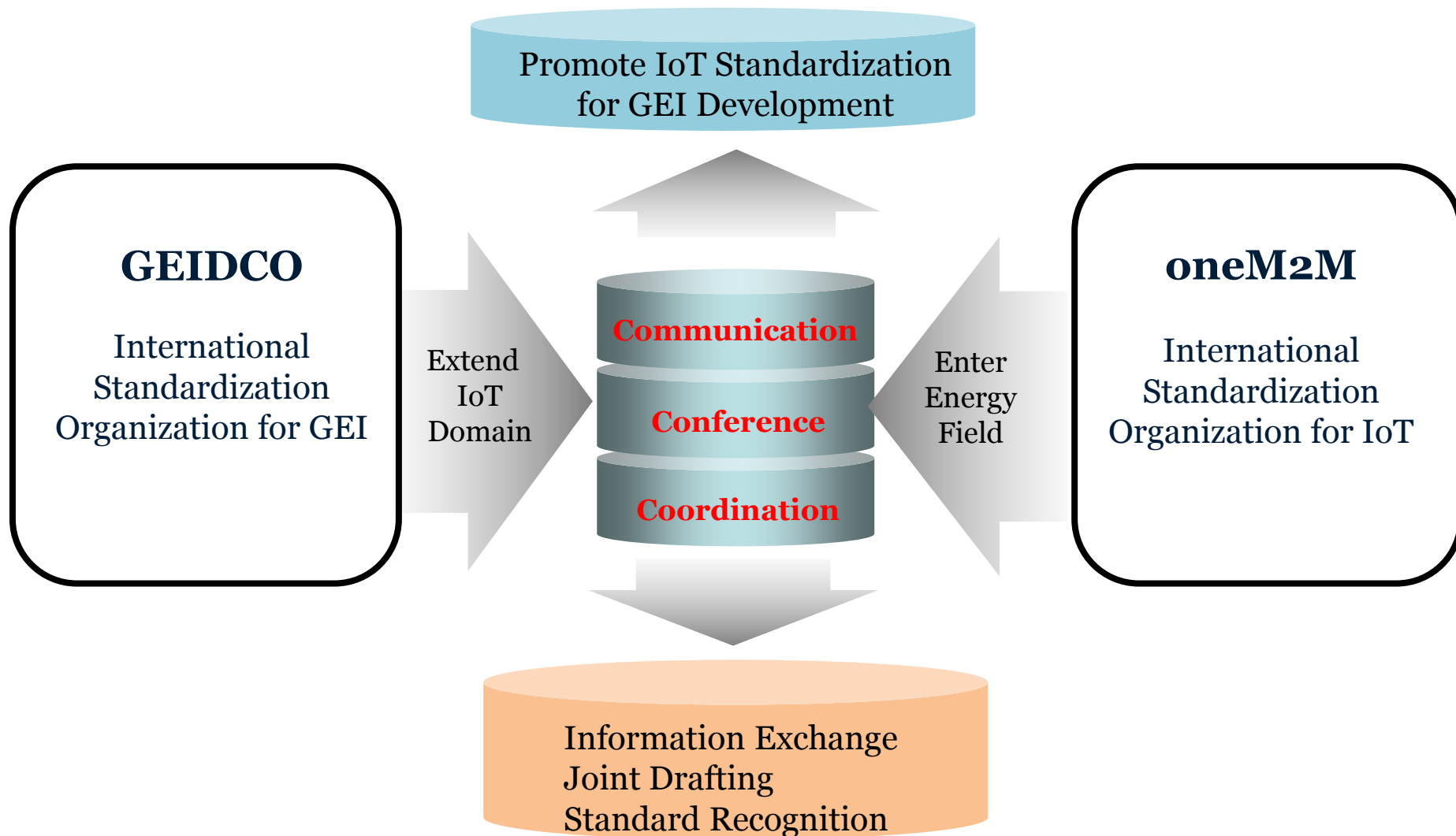
1. Cloud computing network, Data reduction & storage
2. Cloud security, Analysis platform security & privacy
3. Application & service of cloud computing

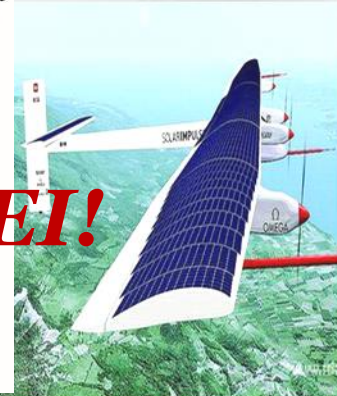
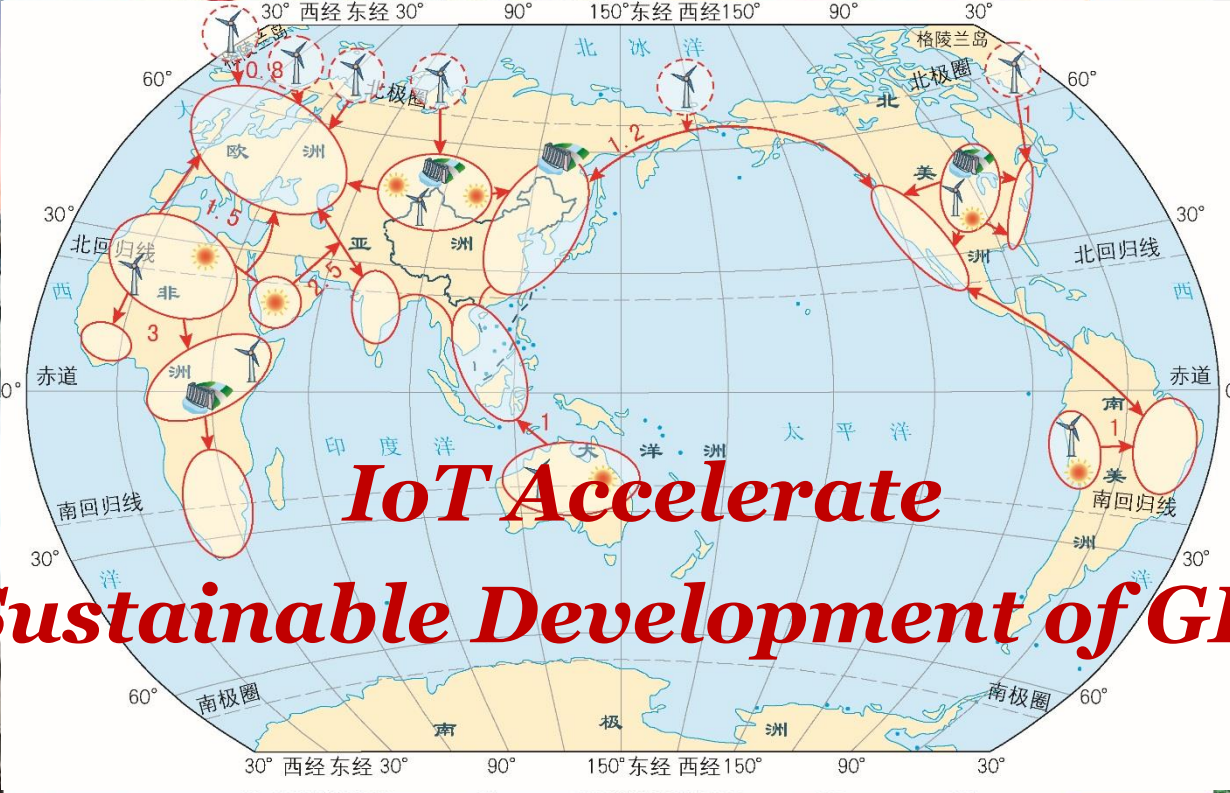
Mobile Interconnection & M2M Interaction

1. Mobile application development & evaluation
2. Mobile interconnection security protection
3. Mobile multi-sensor wearable device
4. AR

Information & Communication Security

1. Electric power control system security protection
2. Wireless sensing network communication security
3. Reliable transmission & secure data exchange for the future transnational & intercontinental grid







Thanks!

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