Outlines

1. Background
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1. Background

2°C 2030

China coal power units and PM$_{2.5}$ pollution

Green is the best air quality, yellow and orange in the middle, and brown is the worst air condition.
1. Background
Developing countries are facing enormous challenges in sustainable development of energy and environmental issues in the same time.

- Coal and Climate challenge
- Water Pollution and Supply
- Coal Power and Economic Development
- Air Pollution and human welfare
### Need Energy efficiency Improvement and Renewable Energy Replacement

#### Characters:
- Unit coal consumption decreased, but the CO$_2$ emission of the whole electricity industry is higher than that of developed countries.
- Energy Structure: Coal combustion dominates electricity generation in China.

#### Difficulties:
- Electricity: Restricted by primary energy structure.
- Renewable energy: Cannot form a large portion of the energy structure in the short term. Expensive, limited by regional resources.
Major energy consuming industries of China

Pathways for the Sustainable Future of Developing Countries?

Energy (47%), Industry (32%), Consumption (21%)

7 Key consuming industries:
Electricity, Oil, Iron and Steel, Cement, Electrolytic Aluminum, Automobile and Construction
The 4th industrial revolution

Solution: Energy internet

New economic growth area and creates job opportunities

Wind Power

PV

Energy Storage

Electric Car

Micro-grid

Energy management and energy saving monitoring

Energy router

Data Collection

Economic dispatch center

Electric load

Load could

Smart Community (demand side response and management)

Goal:
• Increase renewable energy utilization
• Increase electricity availability
• Increase energy system efficiency
• Increase shareholder benefit

Situational awareness could base

Goal:

• Increase renewable energy utilization
• Increase electricity availability
• Increase energy system efficiency
• Increase shareholder benefit
2. Aims: SDG By 2030

Access to affordable, reliable, sustainable and modern energy for all

- 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
- 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
- 7.3 By 2030, double the global rate of improvement in energy efficiency
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.

7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programs of support.
3. Methods

--- The energy internet promote in the developing countries

- Input
  - Energy Users’ Database
  - Macro economy Scenario Setting Sub Module
  - Technologies Scenario Setting Sub Module

- Algorithm
  - Energy Internet Assessment Module
  - Technology Cost-benefit Analysis Module
  - Policy Analysis Module
1. Energy efficiency improvement

- Production
  - Process A
    - Process A1
    - Process A2
    - Process An
  - Process B
    - Process B1
    - Process Bm

- Environment Technology
  - Point Technology a1
  - Point Technology an
  - Point Technology b1…m

2. Renewable energy replacement

Energy efficiency improvement Technologies
Energy - Economic Analysis

Energy- Economic Curve

Unit Cost (Dollar/Tons)

Energy Consumption (Tons)
4. Research components and outputs

4.1 By 2030, ensure developing countries to affordable, reliable and modern energy internet services

![Energy Access](image1)

**Universal Energy Access by 2030 Can Be Achieved with Less Than $50 Billion Per Year**

**Clean Cooking Solutions**

A World Bank energy access project in Ethiopia led to the adoption of improved cookstoves by 2.6 million households in just five years.

**Mini/Micro Grids**

Husk Power Systems provides power to 25,000 Indian households through biomass based mini-power plants that use discarded rice husks.

**Decentralized Solutions**

The company ToughStuff will provide up to 33 million people in Africa & Asia with low-cost solar technologies, saving consumers $529 million.

**Government Leadership**

Vietnam has increased electricity access by 1,960% in 35 years.

**Small-Scale Lighting Solutions**

Solar Sister has trained nearly 150 women entrepreneurs across Africa to start businesses selling solar lamps.
4.2 By 2030, increase substantially the share of renewable energy in the global energy mix

A comprehensive evaluation of the beneficial effect of energy internet on:

- the economic benefits achieved by users
- convenience for users to consume &/or output electricity by solar/wind
- the assurance of the energy safety level.
- more share of renewable energy for consumption
- the positive effect on the environment
4.3 By 2030, Double the energy efficiency

Strategies and plans to improve energy efficiency

Built a Unit-level thermal power industry energy-saving, and clean air technologies database to improve the energy efficiency
4.4 By 2030, enhance international cooperation to access to clean energy research and technology

- International cooperation
- Advanced and cleaner fossil-fuel technology
- Promote investment in energy infrastructure
- Clean energy technology
4.5 By 2030, build energy information sharing database and platforms

- Supply modern and sustainable energy services
- Information transparency and energy market
- Energy Internet management database
- Equality and justice
5. Working plans

1. 3 months:
   Investigation of economic/industrial/energy situation of representative developing countries. Collect new statistics and data about the technology cost and PM$_{2.5}$, etc.

2. 6 months:
   Calculate the existing technology in the database. Analyzing statistics and data with model and complete the new methodologies.

3. 3 months:
   Analysis and draw the figures, completed the first edition of the English paper. Begin to write the Sub-report and Final report.

4. 6 months:
   Revise the English paper and begin to interoperate it into Chinese and English version. Finish the first edition of the Sub-report and Final report.
Thank you!