



Micro grid in China: Opportunity and Challenge

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Introduction

- Chinese Government Policy about renewable energy
- Micro Grid in China
- Main Challenges



1. Government Policy

Renewable
Energy law

Formulated in 2006
(revised in April, 2010)

Development plan

Industry guidance
and technical support

Promotion
and application

Price management
and cost compensation

Economic incentives
and supervision measures



Government Policy

The twelfth
Five-year plan

March, 2011
Focuses on
renewable energy

Smart grid

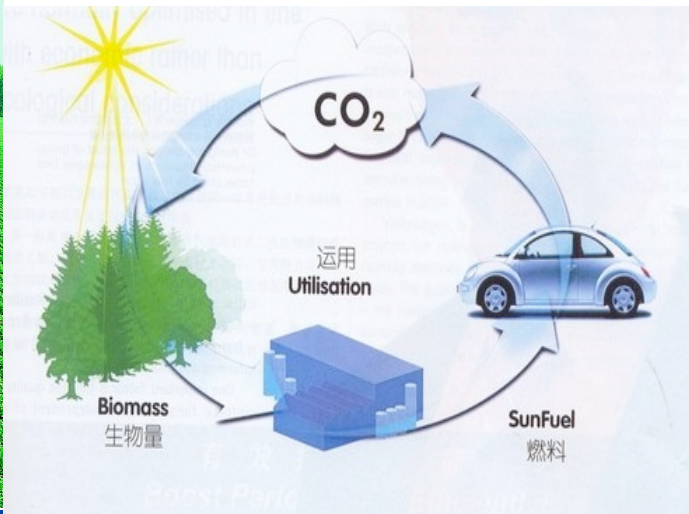
Coal-Based
Clean Fuel

Wind Power

Solar Power

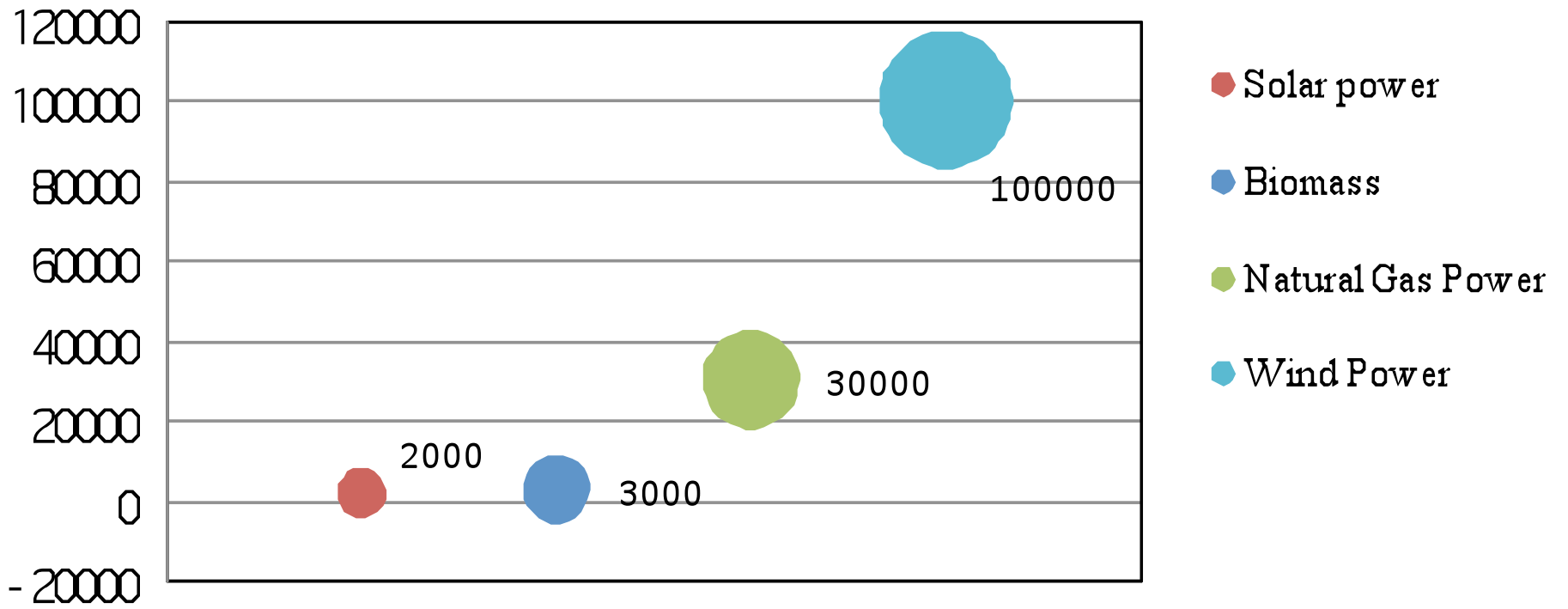
2020: satisfy needs of 10 million people;
Construct strong smart grid

Others:



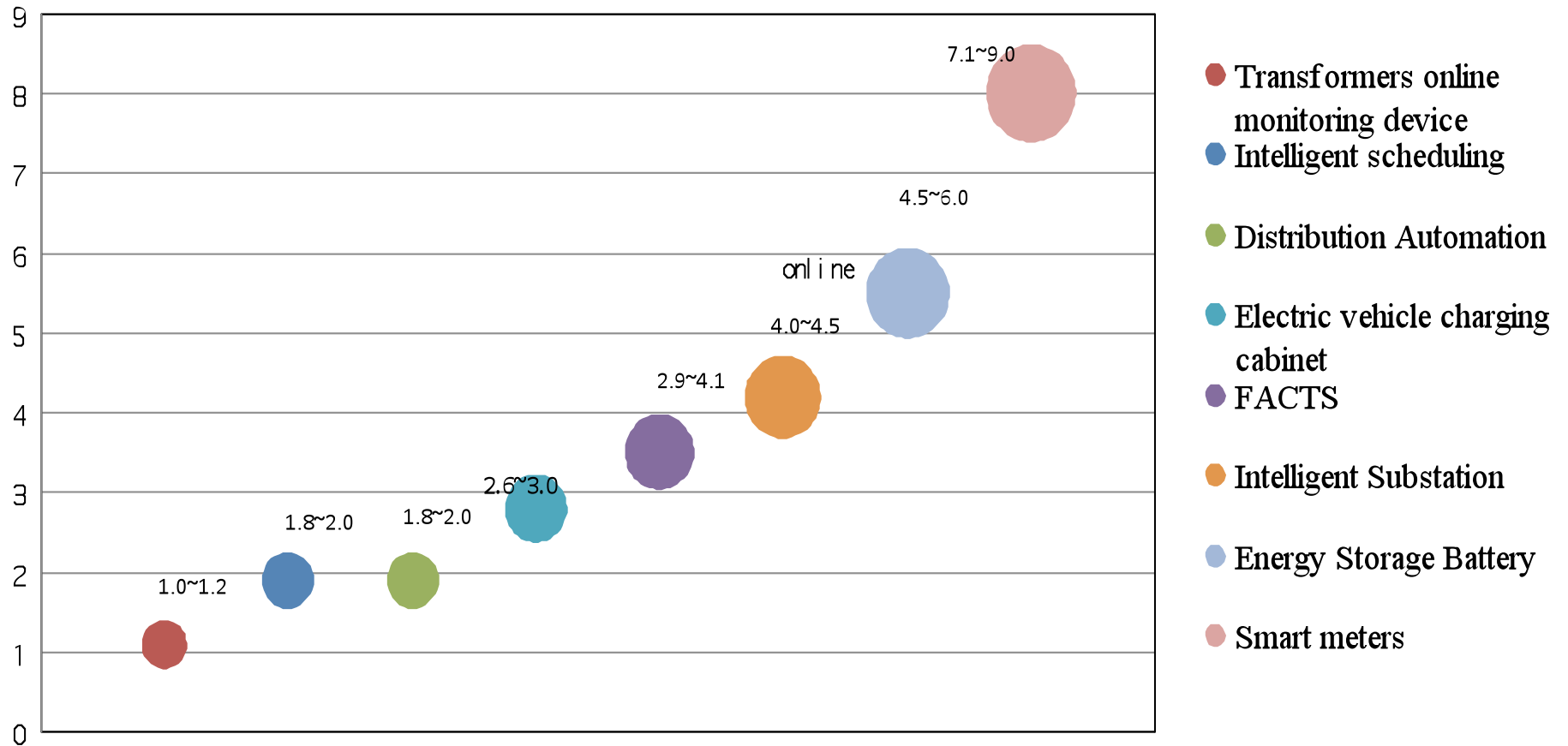


MW "the Twelfth-Five"Period New energy plan



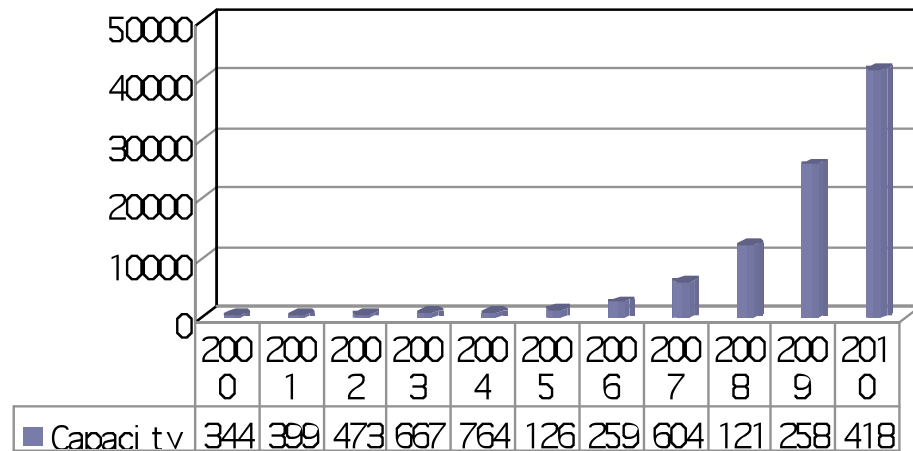
"the Twelfth-Five"Period Microgrid secondary equipment Market in China

Billion Yuan

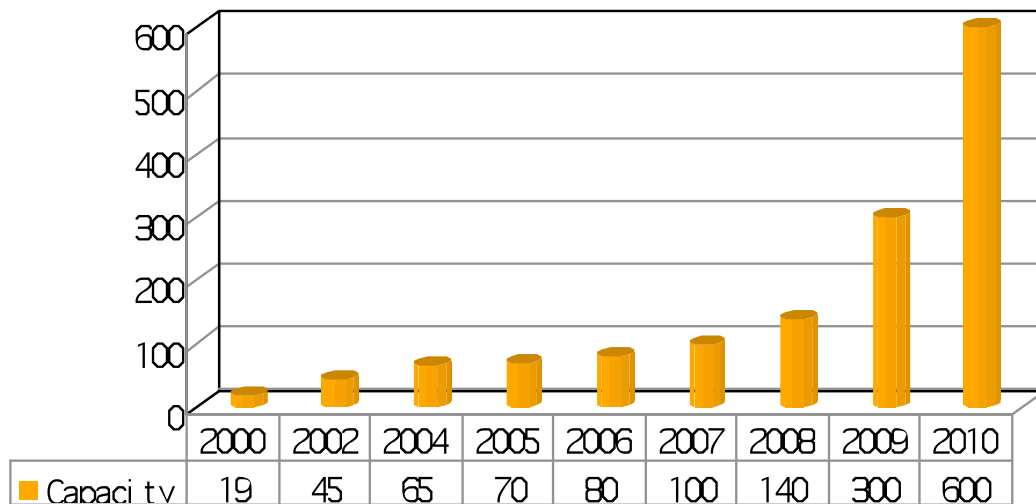


Development of new energy

MW Wind Power Installed Capacity in China



MW Solar Power Installed Capacity in China



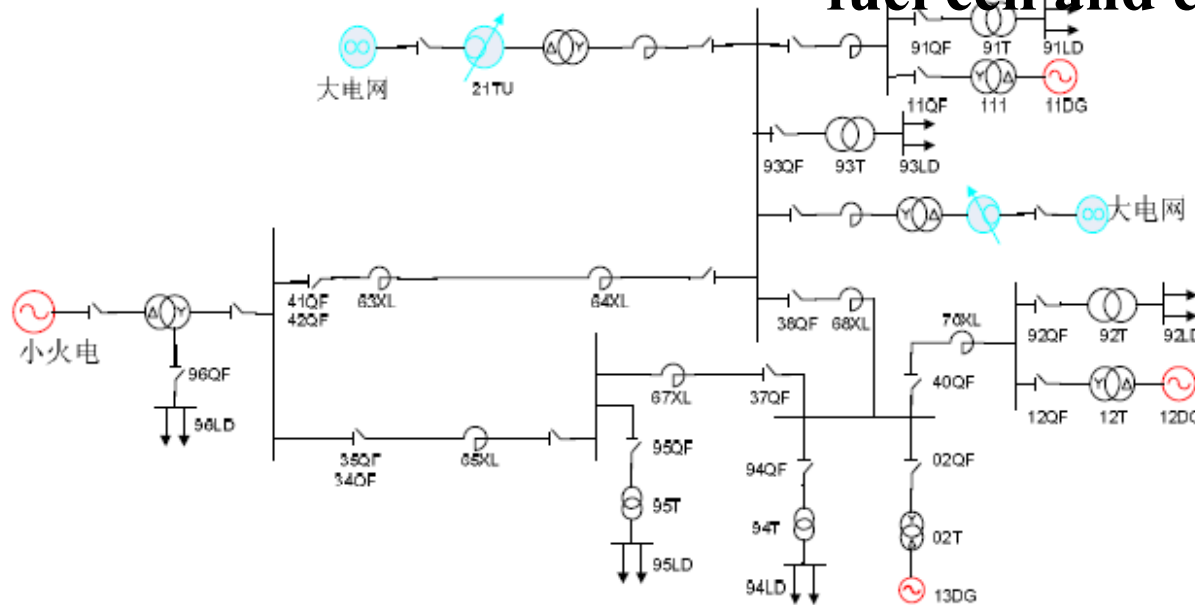


2. Present Situation of Micro Grid in China

1. Basic researches were carried out: Supported by National Basic research program (973), national high technology research (863) and development program, national natural science foundation since 2006
2. State grid: research on technology system of micro grid (**The first research program** on micro grid carried out by state grid).
3. Special funds from many province governments

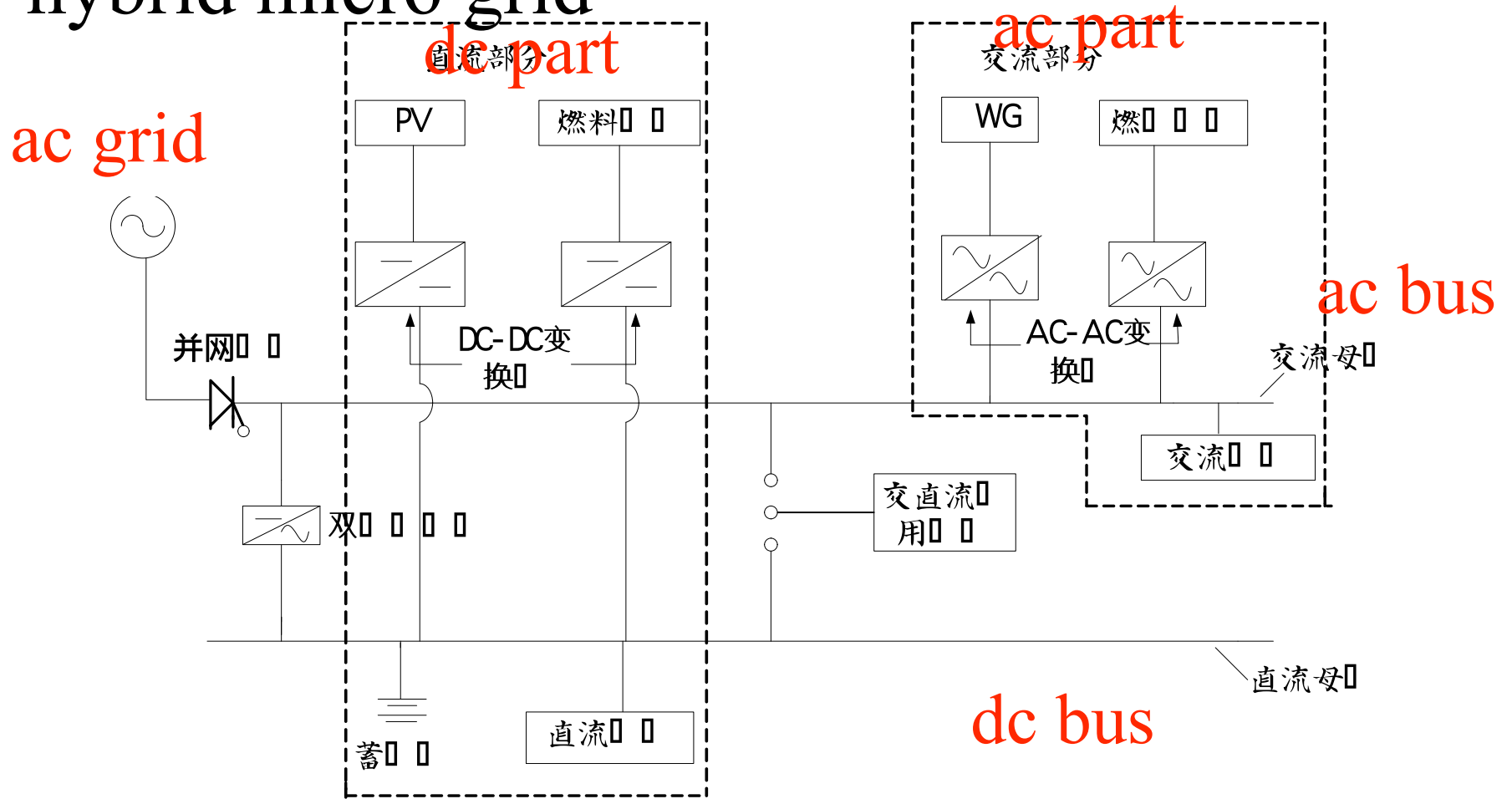
Some test-beds

Conventional power units, hydro power units, PV system, wind power, fuel cell and energy storage system



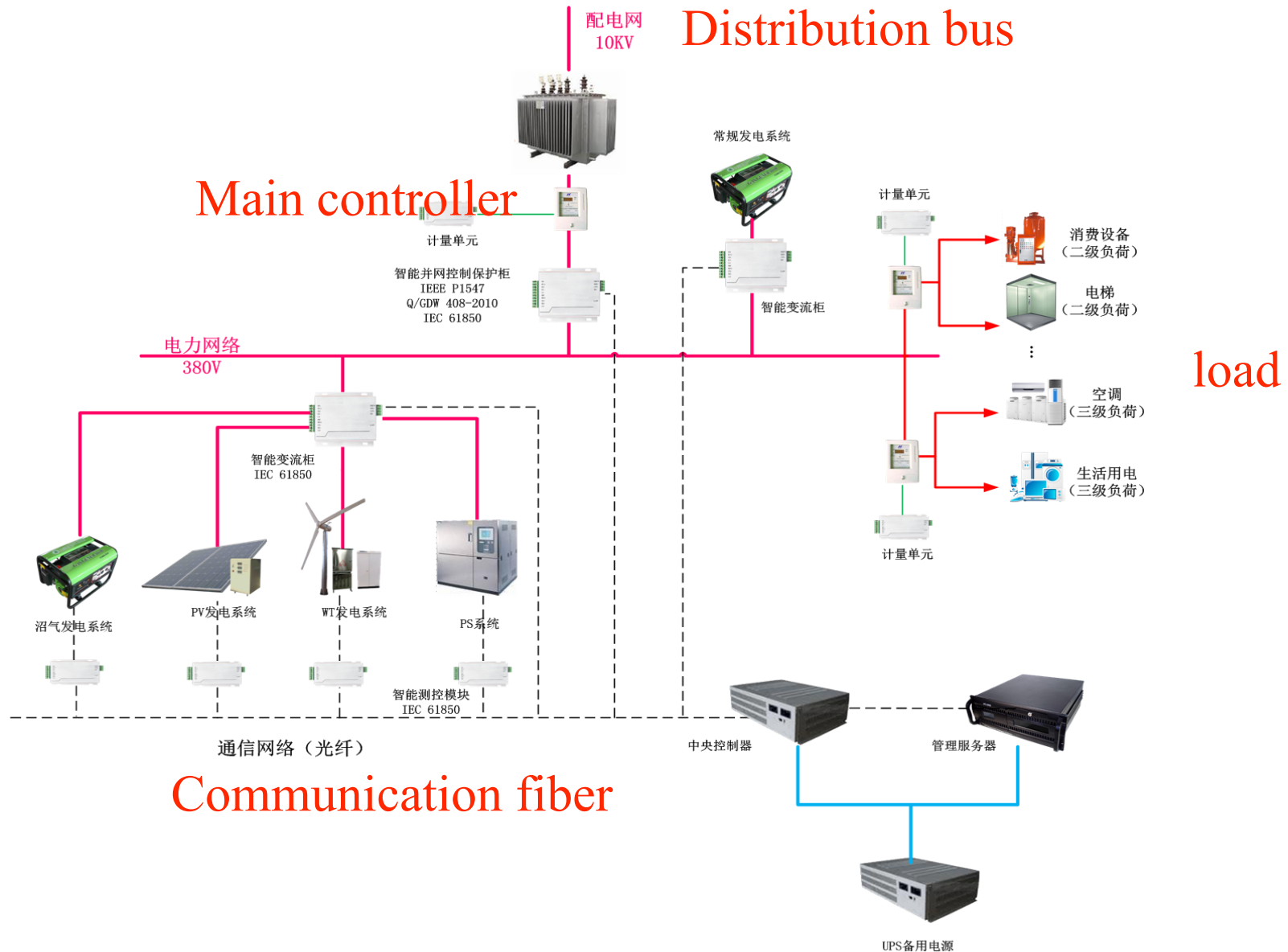
Hefei university of technology

Research of operation and control of a hybrid micro grid



carried out by Sichuan University, supported by Sichuan province

A program of MG system designed by Sichuan University and Yin Hai Co. of electric power



Main characteristics of Micro Grid in China

Type of micro grid	City	Remote area	
		Rural area	enterprise
Operation type	GDM, GIM	GDM, GIM	
Distribution area	Developed city	Rural, suburb, grassland, mountain area	
Voltage level	Middle voltage distribution (10kV)	Low voltage distribution (400V)	Middle voltage distribution (10kV or higher)
capacity	Several hundreds kW~10MW	Several kW to several hundreds kW	Several hundreds kW~10MW
target	Reliability of power supply of important load under fault; reliability of power quality; energy saving and emission decreasing; ability to resist disastrous, etc	Using renewable energy to supply electric power to rural area	Increase reliability of power supply and efficiency; decrease electrical power cost
Type of power source	Clean energy generation (Fuel cells, micro gas turbine, diesel generator) and renewable energy generation	Renewable energy generation (solar power, wind power, biogas power)	Conventional power source

GDM: grid dependent mode; GIM: grid independent mode

First Micro Grid in China—Donggao island

(2010.12.29)

1000kW



Renewable energy: 70%

CO₂ emission decrease:

1,500,000kg

Dust emission decrease:

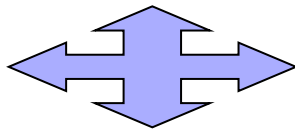
408,000kg

SO₂ emission decrease:

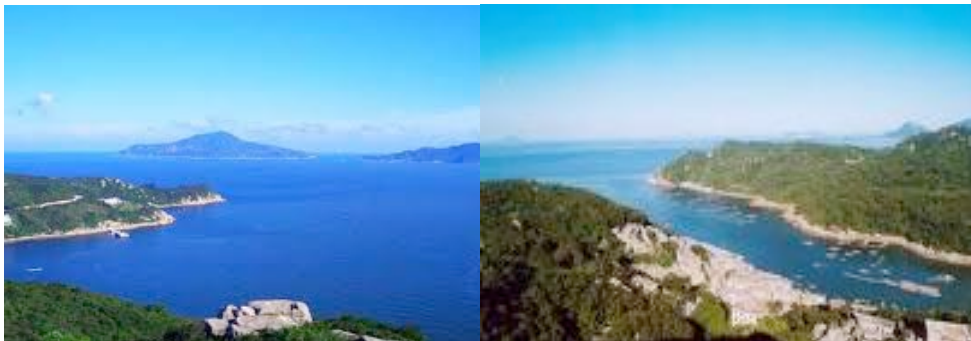
45,000kg

Electricity cost: decrease

from 3 ¥ to 1.9 ¥/kWh



50kW



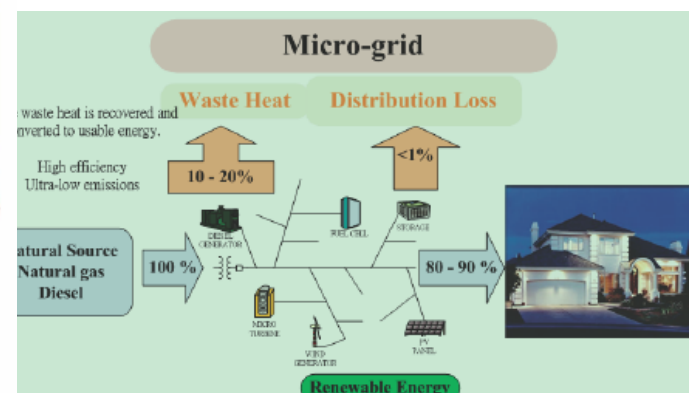
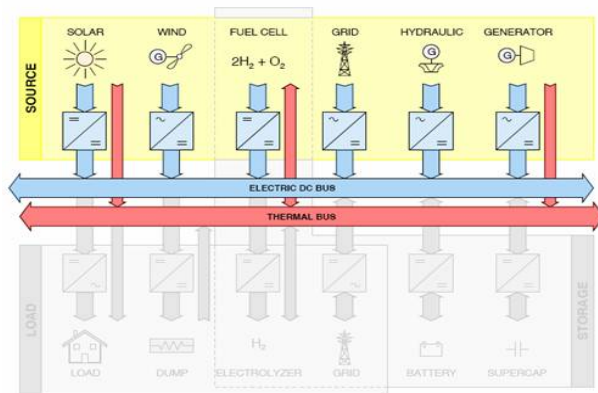
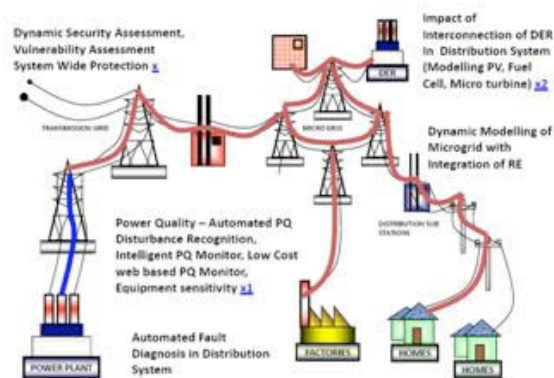


3. Main Challenges

- policy and manage system
- technology

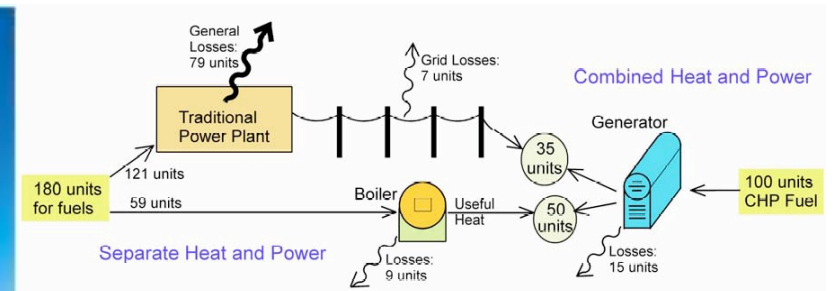
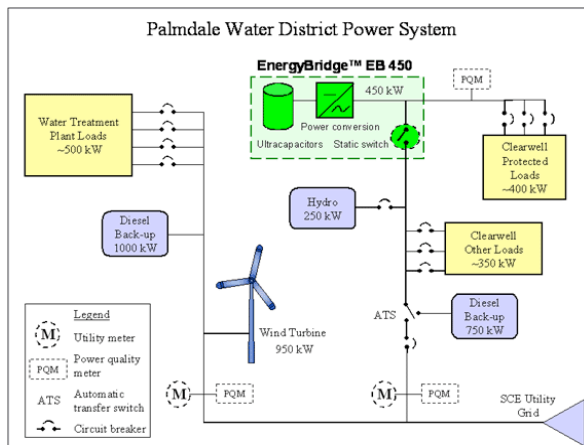
policy and manage system:

- 1) Access mechanism of micro grid:
mode of ownership and business activity;
qualification of ownership.....
- 2) grid-connected management
- 3) grid-connected charging system
- 4) micro-grid on-grid energy policy



technology:

- 1) Research on the interaction between city grid and micro grid: MG transient /steady modeling; mechanism of MG on city grid steady; influence of MG on the voltage, frequency and power-angle of city grid, etc
- 2) Modeling and analysis of power market; performance evaluation of power market; predict of power market, etc



Thank you for your attention

Welcome to Sichuan, China

