



# Solar Power in China

By Zhou Fengqing

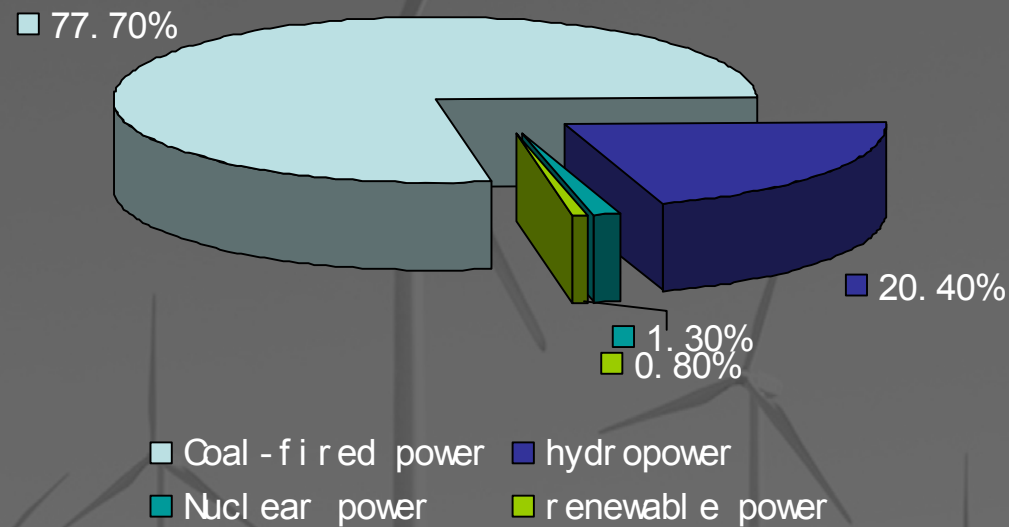
### Overview

- Adjust Chinese power structure
- Feasibility of solar power in China
- Solar energy as national policies
- Legislations of solar energy



## Adjust Chinese Power Structure

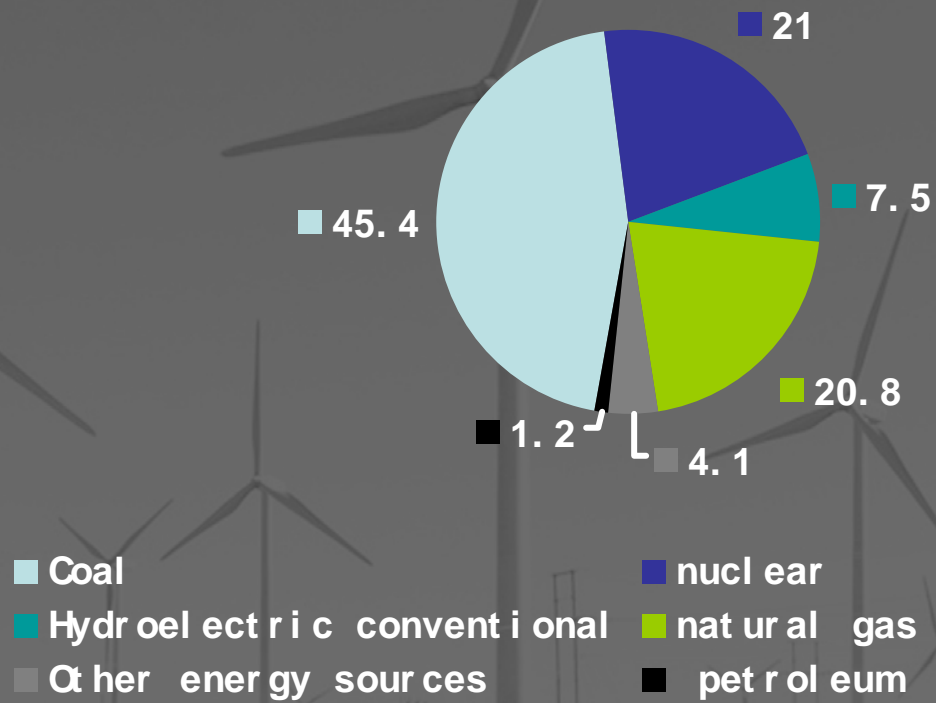
### Chinese electricity sources



Chinese power structure is not reasonable. The coal power has a large proportion in this structure. It has caused environmental pollution problems.

# Adjust Chinese Power Structure

American electricity sources

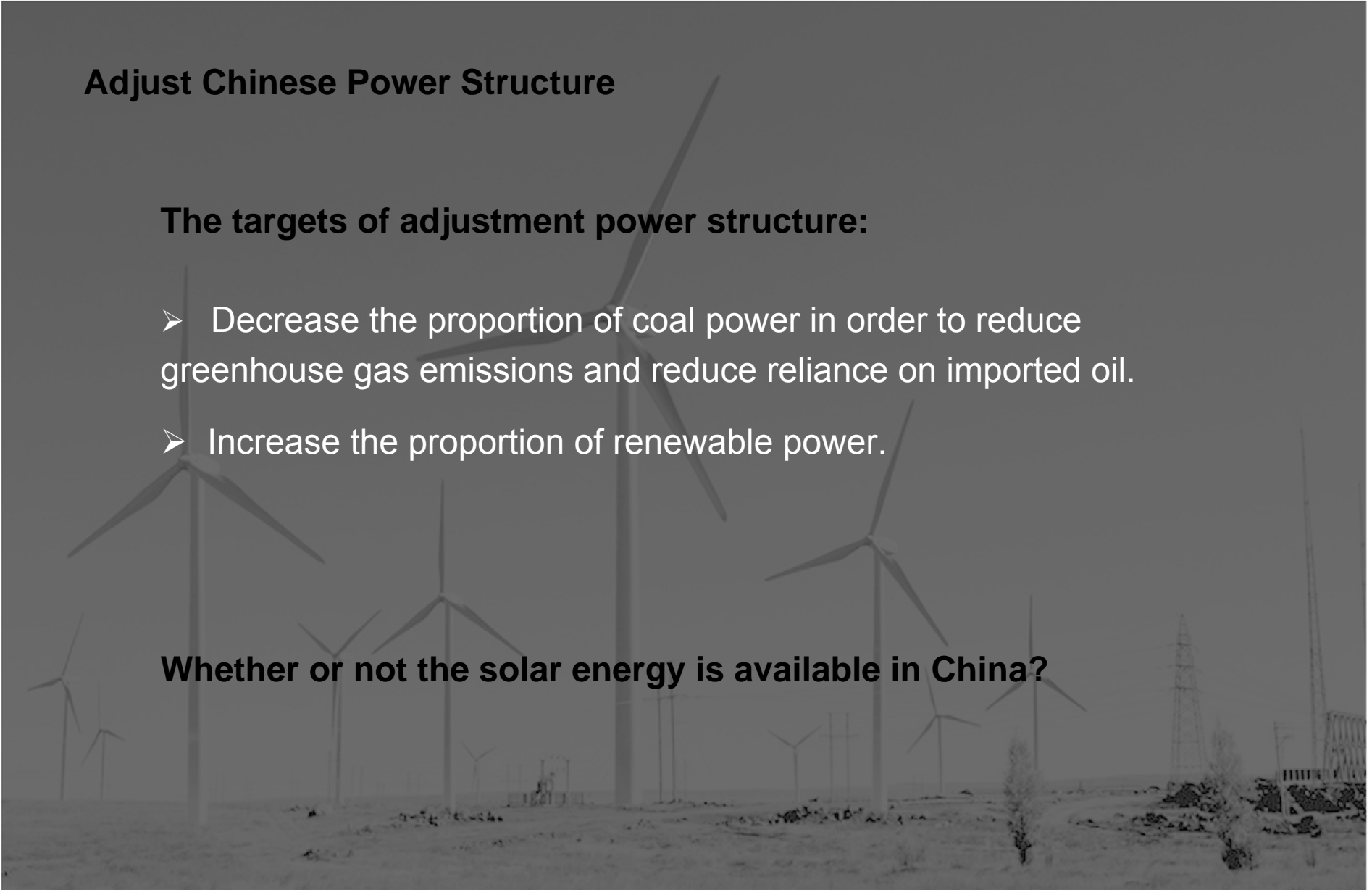


## **Adjust Chinese Power Structure**

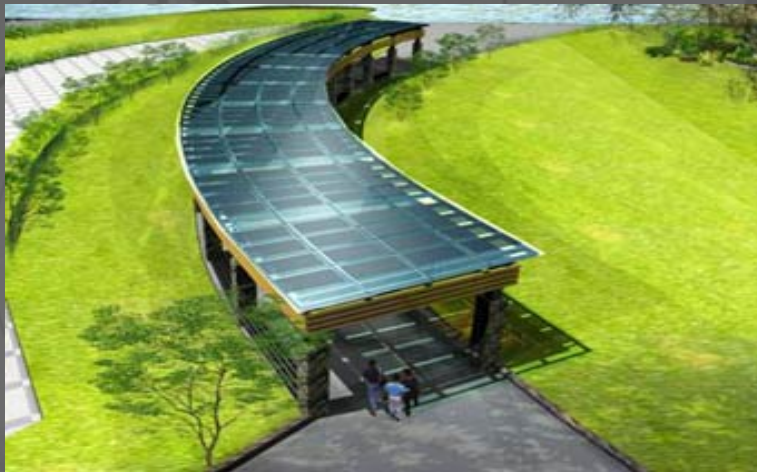
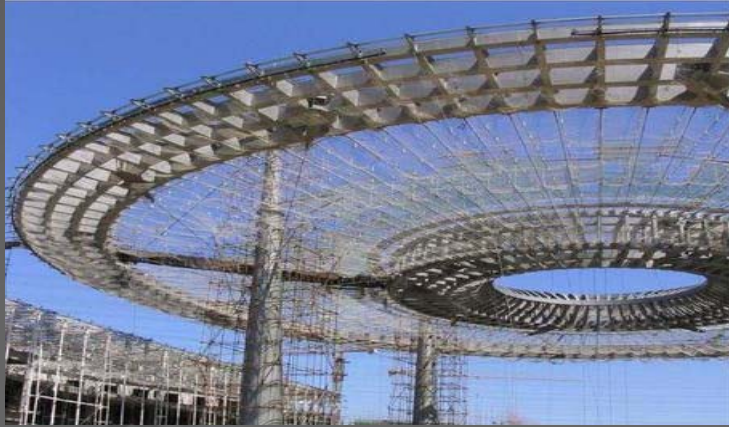
### **The targets of adjustment power structure:**

- Decrease the proportion of coal power in order to reduce greenhouse gas emissions and reduce reliance on imported oil.
- Increase the proportion of renewable power.

**Whether or not the solar energy is available in China?**



Available renewable energy in the world



### Feasibility of solar power in China



### China solar energy resource distribution

- The red area is abundant of solar energy resource in China.
- Qinghai province is the most abundant solar energy resource. The average sunshine is more than 3500 hours per year. That means, there is 300 sunny days in a year.

### Advantages of Solar Power

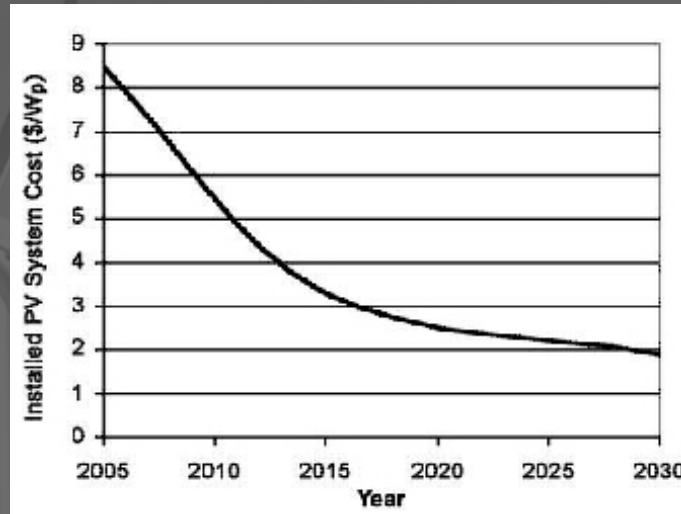
- **Reliable**: As long as the sun continues to shine on Earth, energy from the sun will renew each day. It will not be depleted.
- **Clean**: Solar power is produced without pollution. It is environmentally friendly. There are no emissions or greenhouse effect.
- **Free**: Once the initial investment is made, solar power is free. There are no monthly bills for its use. It will not increase in price.
- **Available**: No one country controls this energy. It is available to everyone worldwide.
- **Quiet**: Production of electricity is a silent process. No noisy generators are required. No turbines spin to produce it.
- **Low operate cost**: Although solar power has the highest capital costs, it has lowest operating costs comparing with coal-fired power, nature gas power, or nuclear power.

### Disadvantages of solar power

- ❑ **Cost**: The solar power installed cost of the equipment was relatively high. The early stage investment is larger. Thus it will restrain the development of solar power.
- ❑ **Intermittency**: Only areas of the world with lots of sunlight are suitable for solar power generation. Especially at night, the equipment could not generate power.
- ❑ **Storage**: For some, the task of storing solar power is a disadvantage. To remain independent of the power grid, it needs battery storage that will provide power during dark hours. Such batteries are readily available, however, and do not consume a huge amount of space.

### How to resolve the disadvantages of solar power?

#### Cost reduction



- With continuous progress of solar technology and the cost reduction of solar power, the price of solar power generation will decline to a level that can compete with that of conventional energy by 2020.
- To resolve the highest initial costs, the government can give tax credits or other incentives.

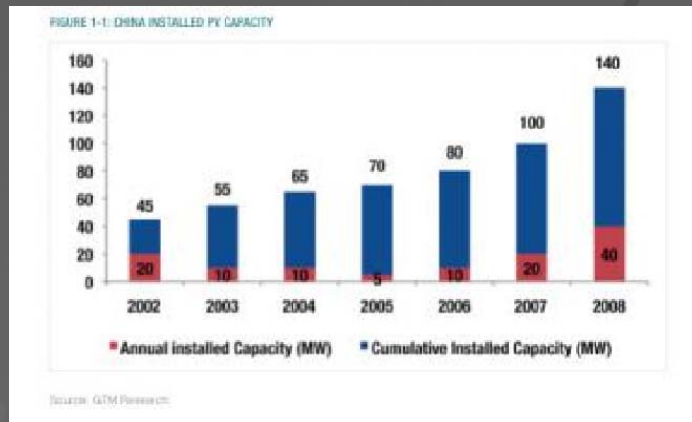
### How to resolve the disadvantages of solar power?

#### ☑ Intermittency:

Wind power and solar power can be complementary. Both wind power and solar power are intermittent energy sources, meaning that all available output must be taken when it is available and either stored for when it can be used, or transported, over transmission lines, to where it can be used.



### China's development status of solar power



- About 50 MW (megawatts) of installed solar capacity was added in 2008, more than double the 20 MW in 2007.
- China solar capacity could jump to 1GW (gigawatts) or more by 2011. According to some studies, the demand in China for new solar modules could be as high as 232 MW each year from now on until 2012.

### Solar energy as national policies

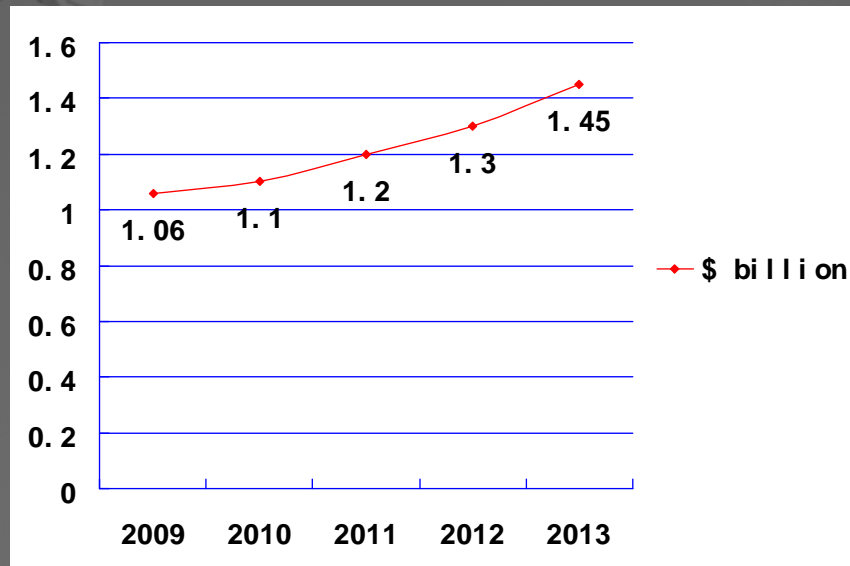
#### Pilot plans

- **The First Program** □ The government would subsidize the costs of installing solar energy systems on building, and proposed offering up to \$3.40 per watt for solar-panel installations that are 50-kilowatt or larger. That amount could pay for 50 percent to 60 percent of a system's installation costs.
- **The Second Program**: is called the Golden Sun Plan, The government will pay for 50 percent of the costs of building grid-connected a solar power projects and up to 70 percent for off-grid projects in remote areas.
- **The Long-Term Development Plan**: The plan sets targets for solar power from 3% by 2010 to 5% by 2020.

### Solar energy as national policies

In 2006, China began imposing a surcharge for renewable energy development. The fund for 2009 is estimated at \$1.06 billion, and it could reach \$1.45 billion in 2013.

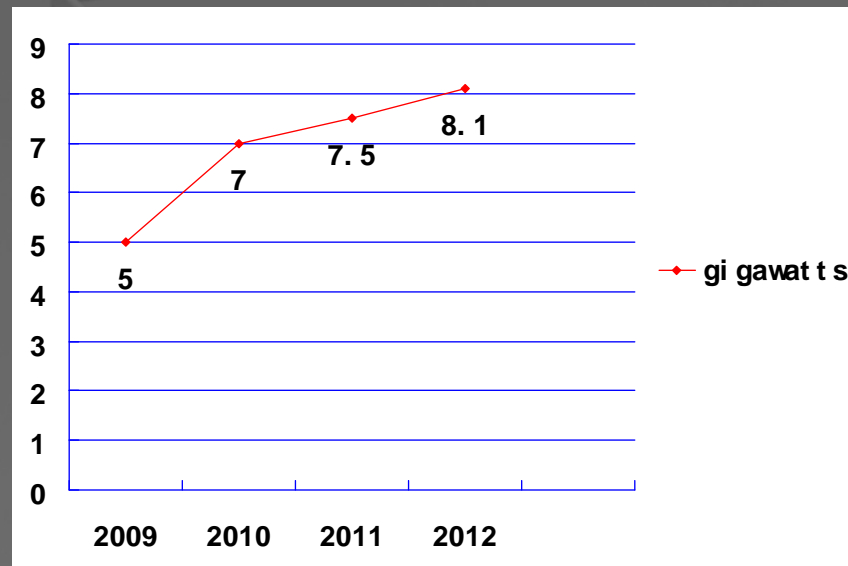
### The fund of solar energy



### Solar energy as national policies

The fund could support 5 gigawatts of solar projects from 2009 to 2013. China should have the capacity to produce about 7 gigawatts of solar cells in 2010 and 8.1 gigawatts in 2012.

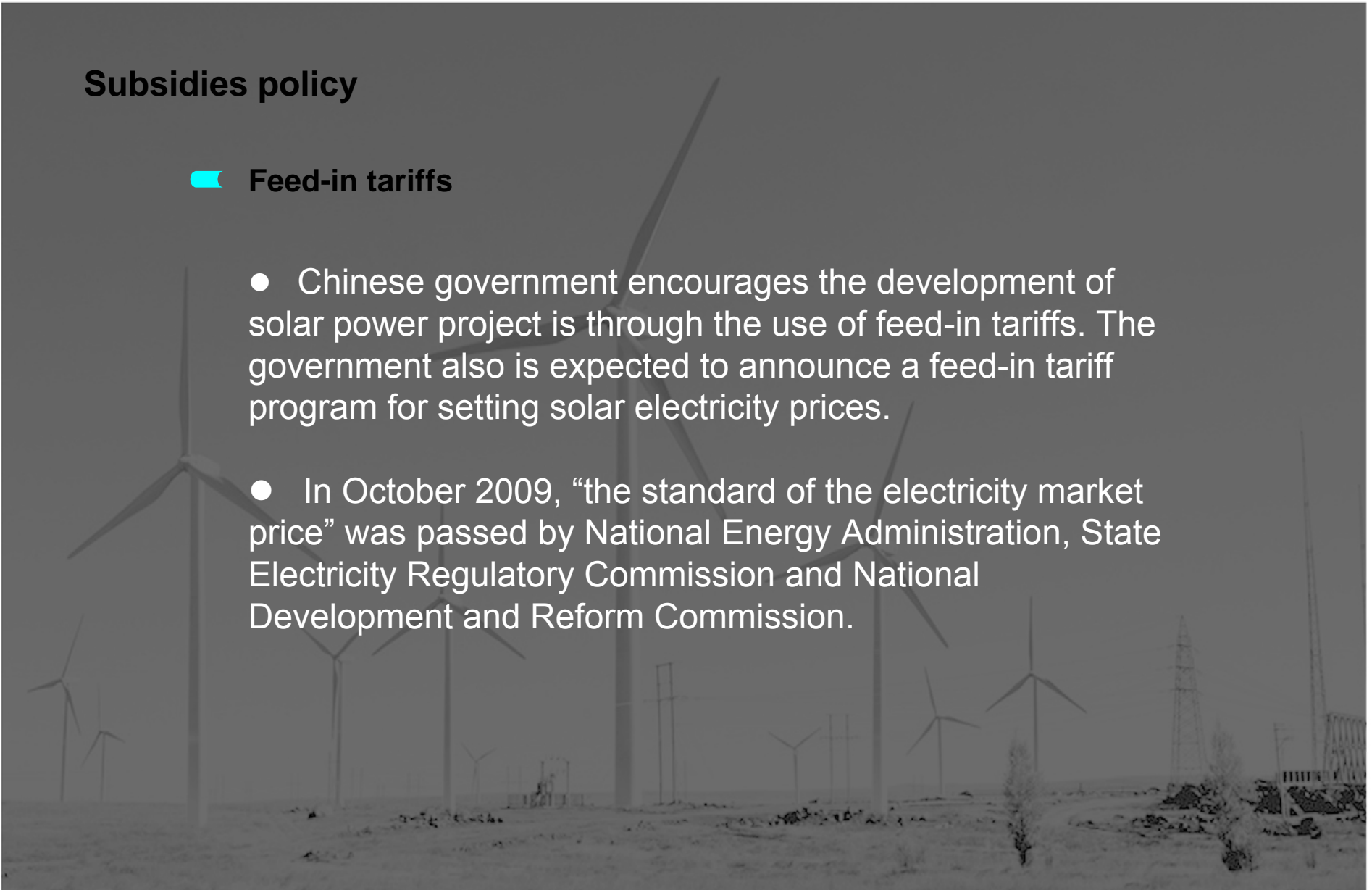
### The plan of solar capacity



### Subsidies policy

#### ■ Feed-in tariffs

- Chinese government encourages the development of solar power project is through the use of feed-in tariffs. The government also is expected to announce a feed-in tariff program for setting solar electricity prices.
- In October 2009, “the standard of the electricity market price” was passed by National Energy Administration, State Electricity Regulatory Commission and National Development and Reform Commission.

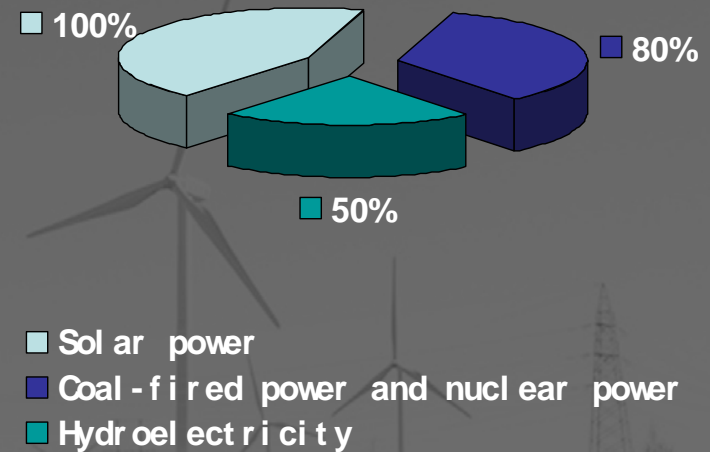


## Subsidies policies

### Feed-in tariffs

- The price of solar power would be higher than what's paid for conventional power in order to promote solar power plant development. The funds of renewable energy will support shortages.

## The price of grid-connected electricity



### Subsidies policy

#### ■ Feed-in tariffs

- In 2009, China has identified 294 solar power projects with total generating capacity of 642 megawatts (MW) in its first pilot program. These projects were expected to cost around 20 billion yuan (\$2.93 billion) and be ready for use in two or three years.
- The government would subsidize 50 percent of investment for solar power projects as well as relevant power transmission and distribution systems that connect to grid networks, 70 percent of cost for independent solar projects in powerless regions.



### Other preferential policies

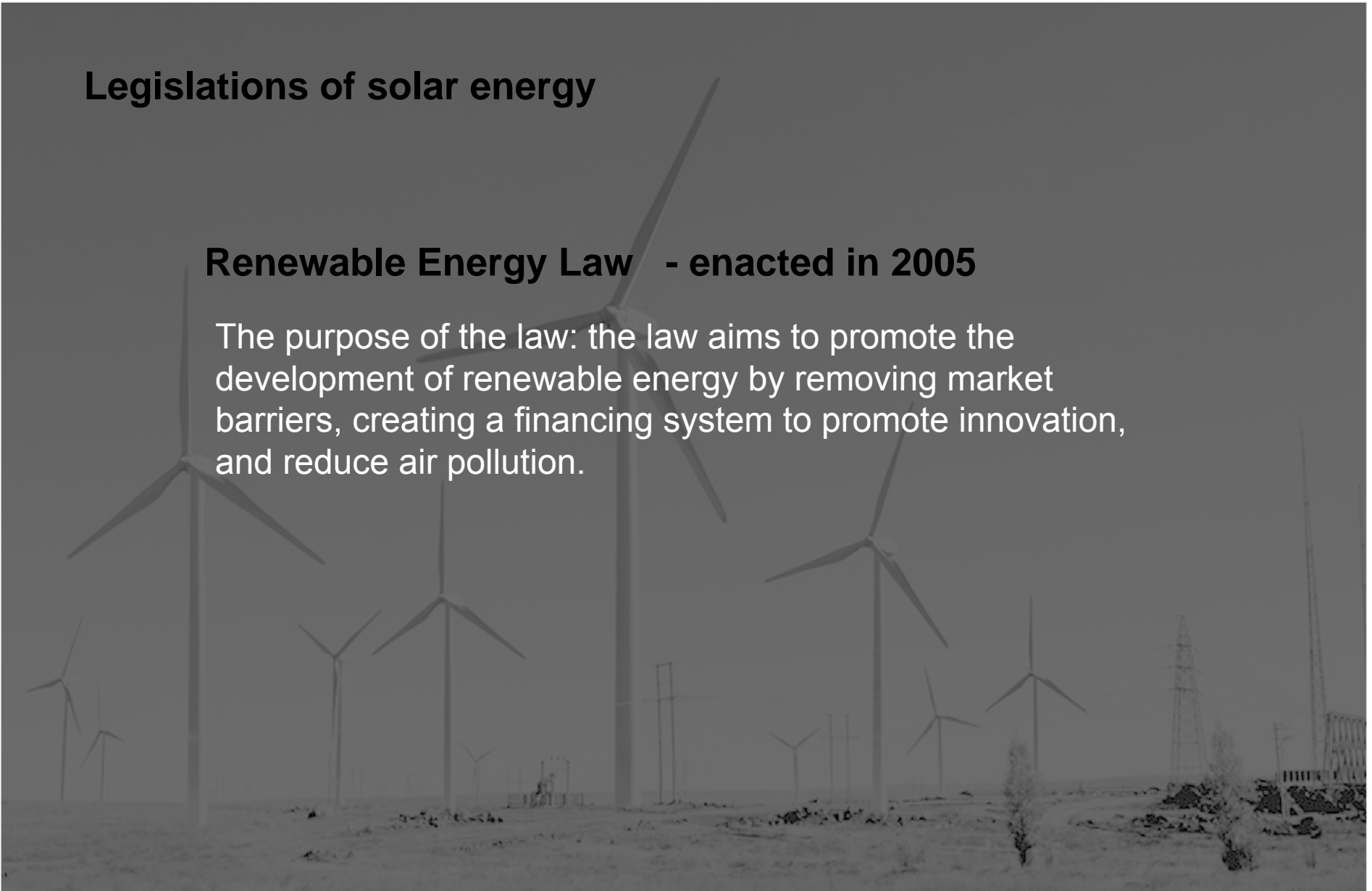
- ❏ Preferential tax treatment is also available: a three year tax exemption plus three years taxation at 50% of the full tax rate.
- ❏ Discount loan: the solar generators will obtain the discount loan from banks.



## **Legislations of solar energy**

### **Renewable Energy Law - enacted in 2005**

The purpose of the law: the law aims to promote the development of renewable energy by removing market barriers, creating a financing system to promote innovation, and reduce air pollution.



### Legislations of solar energy

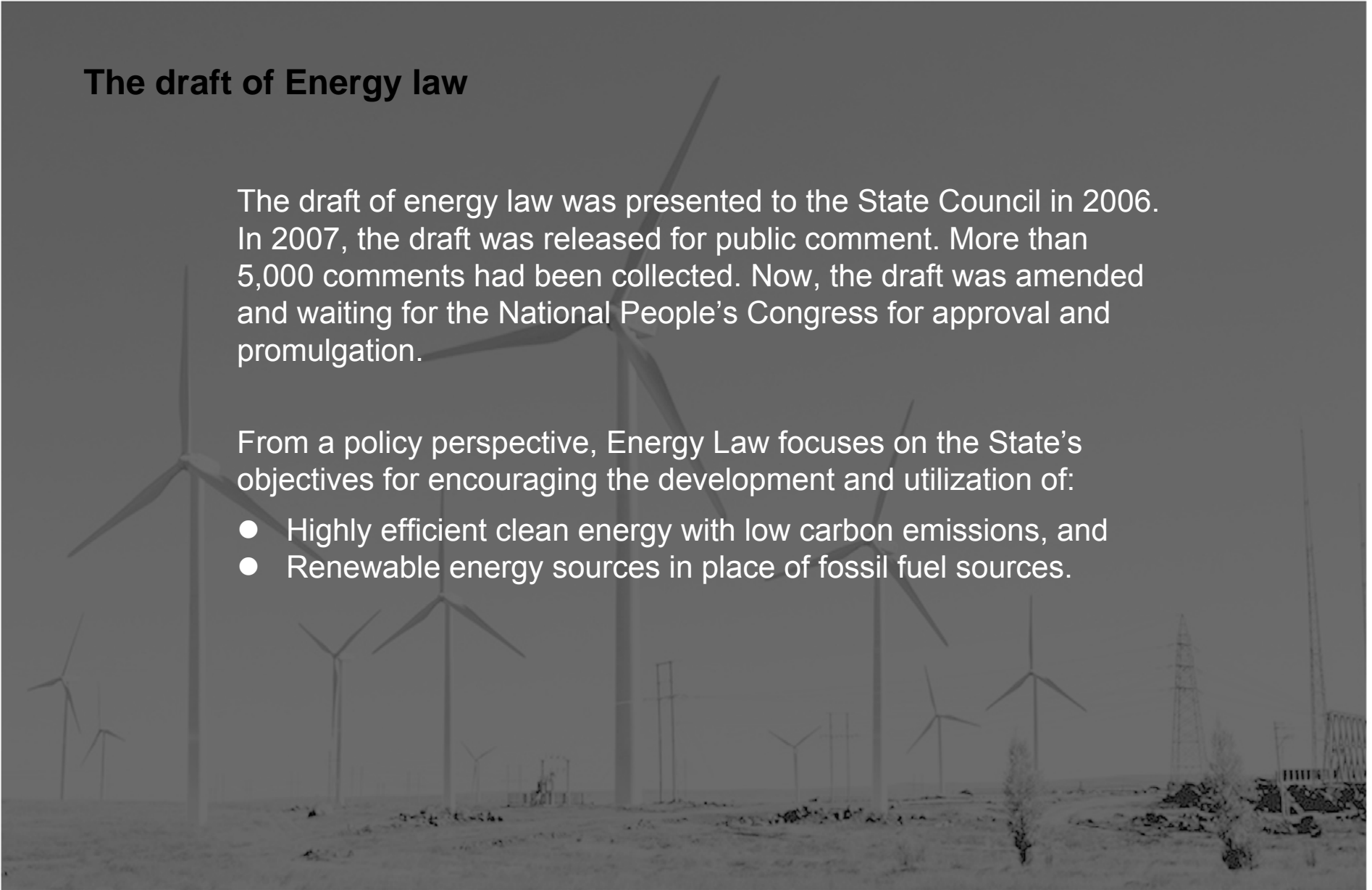
- The government will support grid-connected renewable energy power generation.
- Grid companies will provide for grid connection of renewable energies and purchase electricity generated by renewable sources.
- The tariffs will be funded by a small levy on the price of electricity for domestic customers. The exact level within the above range will be set by each provincial government.
- Grid companies are generally obliged to purchase the full amount of electricity generated from renewable energy projects that are located in the areas covered by their grids and must provide grid-connection services and related technical support.

### The draft of Energy law

The draft of energy law was presented to the State Council in 2006. In 2007, the draft was released for public comment. More than 5,000 comments had been collected. Now, the draft was amended and waiting for the National People's Congress for approval and promulgation.

From a policy perspective, Energy Law focuses on the State's objectives for encouraging the development and utilization of:

- Highly efficient clean energy with low carbon emissions, and
- Renewable energy sources in place of fossil fuel sources.



### Conclusion:

- The feasibility of development solar power could practice in China.
- The government decided to change the unreasonable power structure.
- China has made a commitment to increase significantly its solar power production by enacting the policies and the laws.
- Development of solar power will helpful to reduce greenhouse gas emission and protect the environment.

