

2016 Integration of District Heating in a Sustainable Energy System

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A feasibility study on solar district heating in China

Junpeng Huang / Beijing, 18 Oct 2016

Integration of District Heating in a Sustainable Energy System



In 2013, in China, there're

366 thousand people
died earlier due to coal-
burning pollution

Source : Tsinghua University and Health Impact Research Institute (HEI) , Research report on the burden of disease caused by China's coal and other major air pollution

Space heating in China

Lessons from demo solar heating projects

Denmark's experience

Key success factor for SDH

Next steps

Space heating in China

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Huge heating demand in China

- 400 million population
- 16 provinces +
- Hot topic: Southern heating

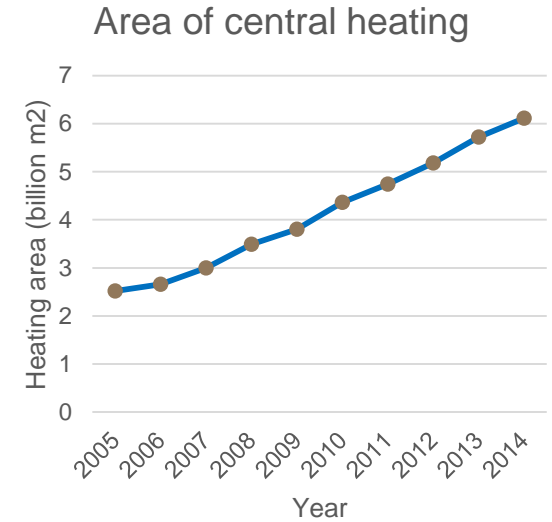
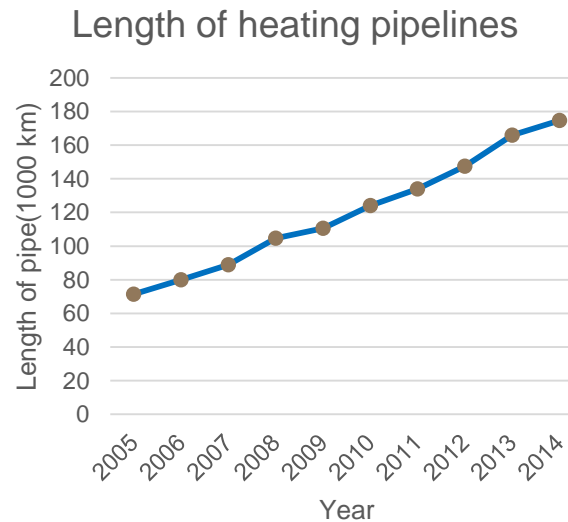
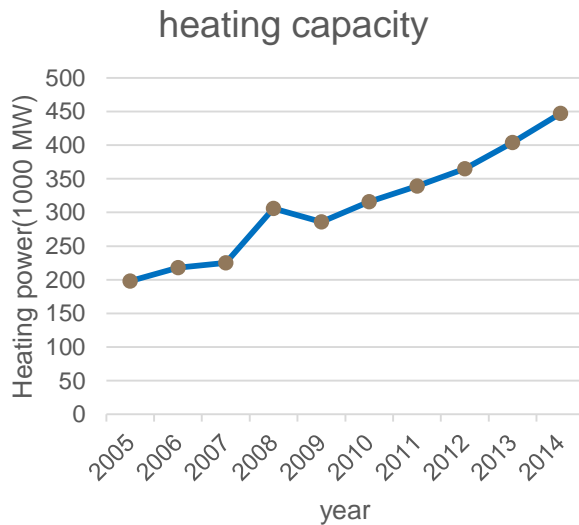


Space heating in China

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Space heating demand increasing rapidly with the urbanization in the past 10 years.

China District heating current situation(By 2014)

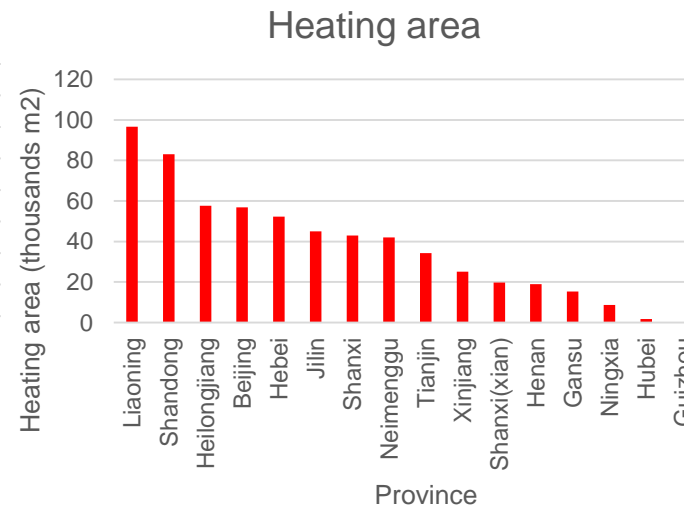
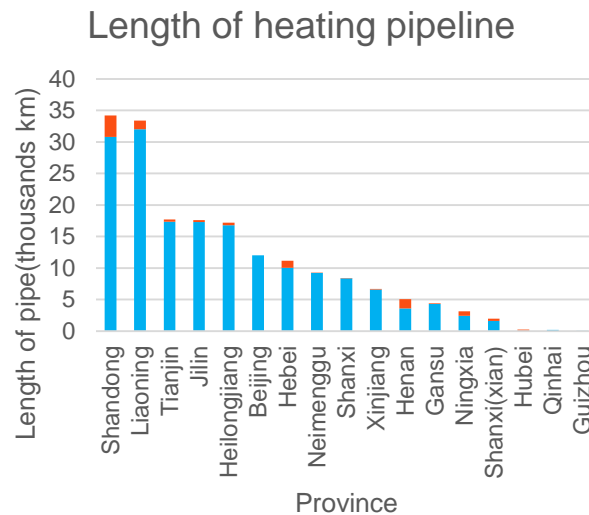
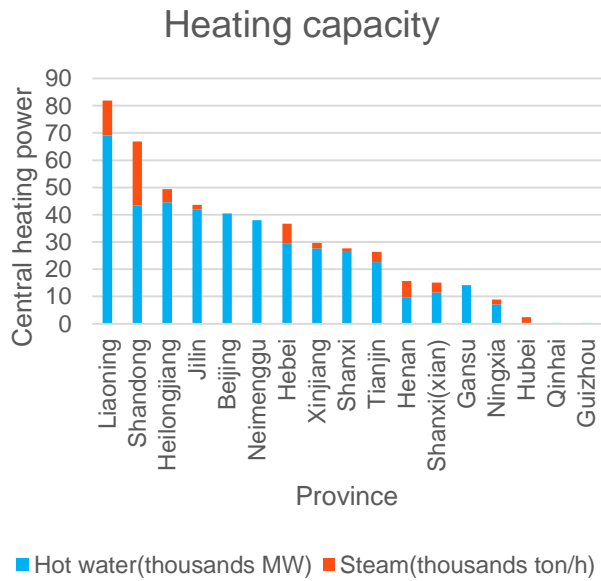


Source : the National Bureau of Statistics

Space heating in China

The three northeastern provinces (Heilongjiang, Liaoning, Jilin), Beijing and Shandong Province are the Top5 areas by the scale of district heating.

Scale of 16 Provinces District heating (By 2014)



■ Hot water(thousands MW) ■ Steam(thousands ton/h)

■ Length of steam pipe(thousands km)

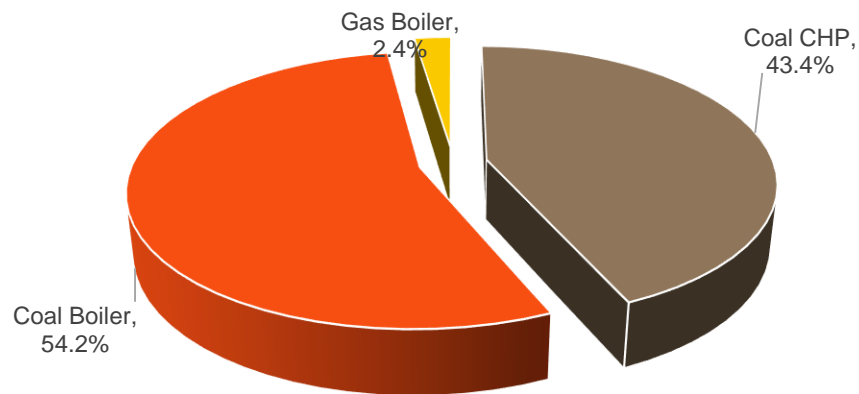
■ Length of hot water pipe(thousands km)

Space heating in China

Coal is the major energy source for space heating in China

- By 2014, coal for district heating: 130 millions ton, 52% of the total building energy consumption

Energy Structure of District Heating in China



Space heating in China

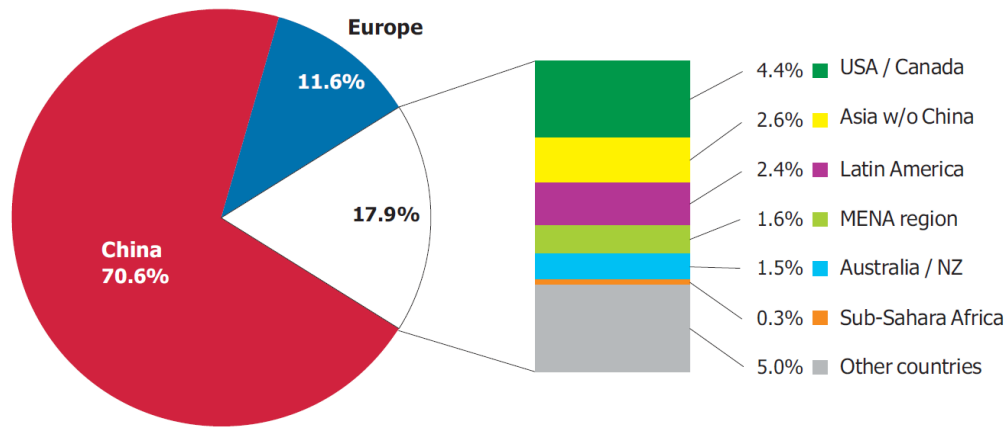
Lessons from demo solar heating projects

Denmark's experience

Key success factor for SDH

Next steps

Lessons from demo solar heating projects

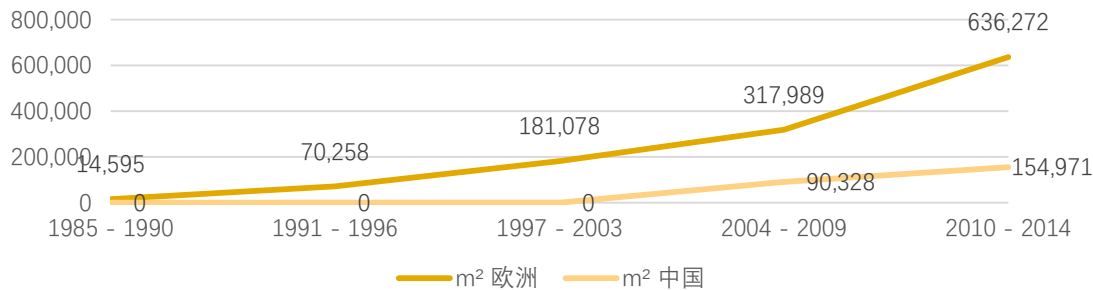


The vast majority of the total capacity in operation was installed in **China** (43.5 million m² in 2015), which accounted for 70.6% of the total installed capacity.

But no more than 0.3% been used for solar heating.

Source: IEA SHC 2015

1985 – 2014 China-EU Collectors installation area for solar heating



Lessons from demo solar heating projects

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Solar heating demo projects in Beijing:

- Still using coal burning stove as primary heating source.



Lessons from demo solar heating projects

Complains from the villagers:

- Overheating in summer, not warm in winter;
- Easy to failure, maintenance is difficult, technical support is not enough; (lack knowledge to maintain the system for villagers)
- Leaking in the pipelines and water tanks;
- Many all glass vacuum tube solar collectors broken in first year.

Praises from the villagers:

- Saving money, from 8 tons coal to 4 tons coal annually.

Major Next steps from the site survey:

1. Flat plate solar collector is better than all glass vacuum tube solar collector.
2. Central installation better than individual installation.
3. Seasonal heat storage is necessary for improving solar fraction and reducing failure rate.

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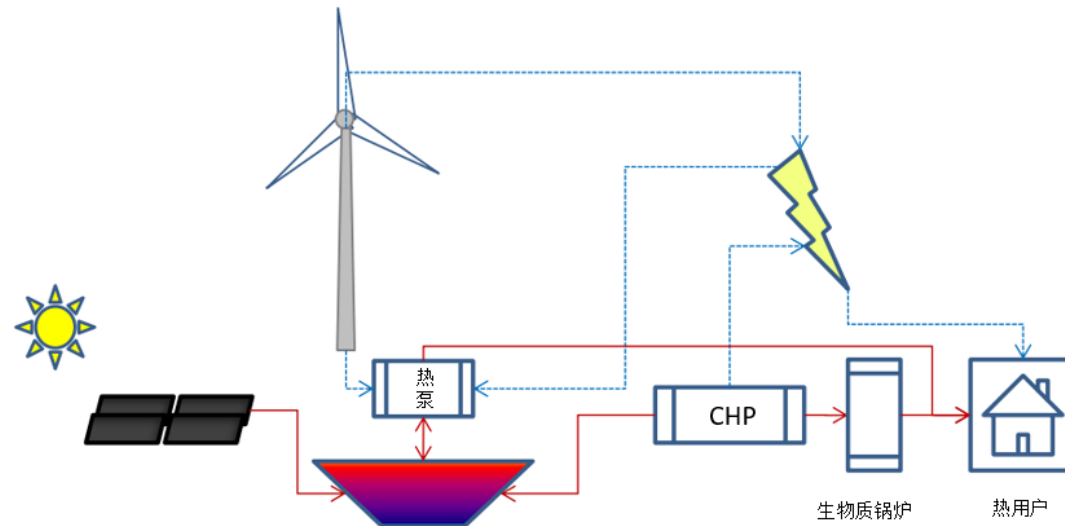
Something difficult to learn:

- Special Danish business model
 - high fossil energy tax
 - low lending rates
 - vast and cheap land
 - collectively owned heating company



Something easy to learn:

- Technologies
 - Seasonal heat storage
 - High efficient large flat plate solar collectors
 - Combined energy system design and operation



Space heating in China

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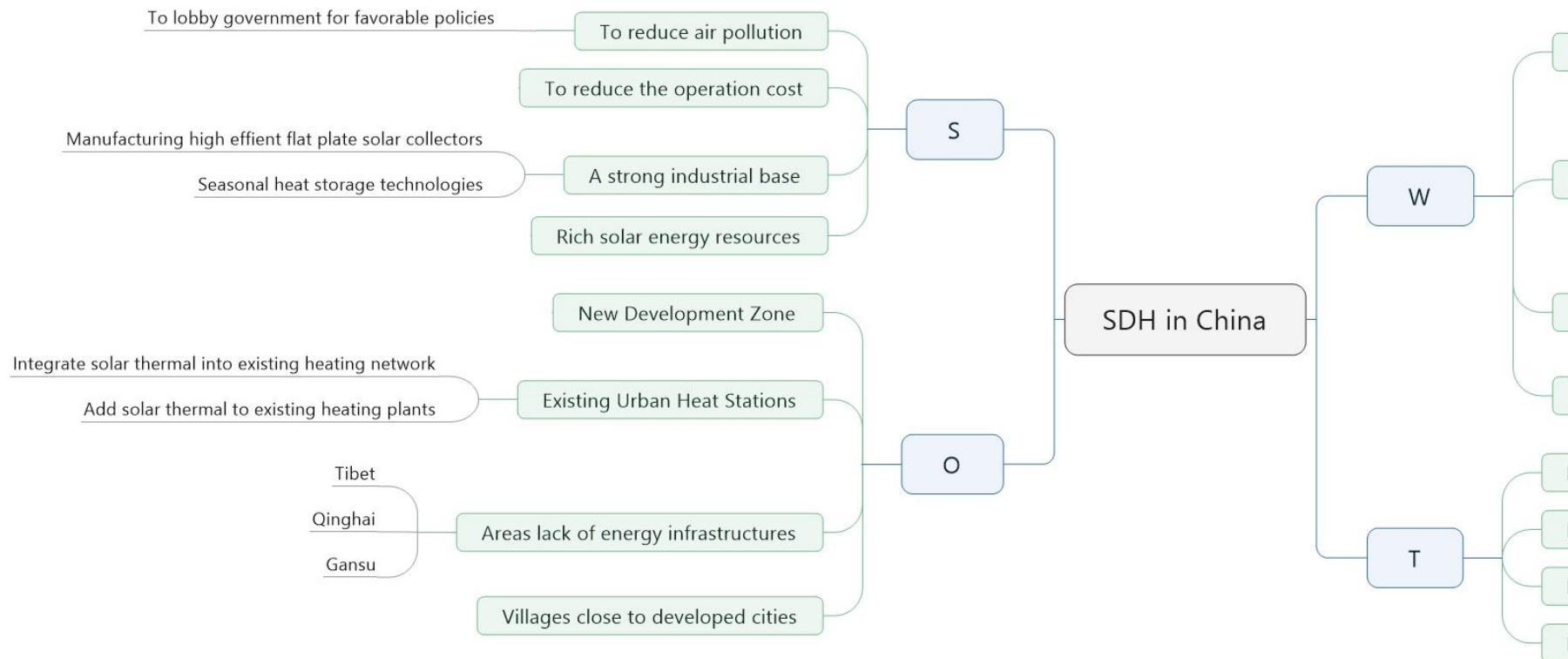
Denmark's experience

Key success factors for SDH

Next steps

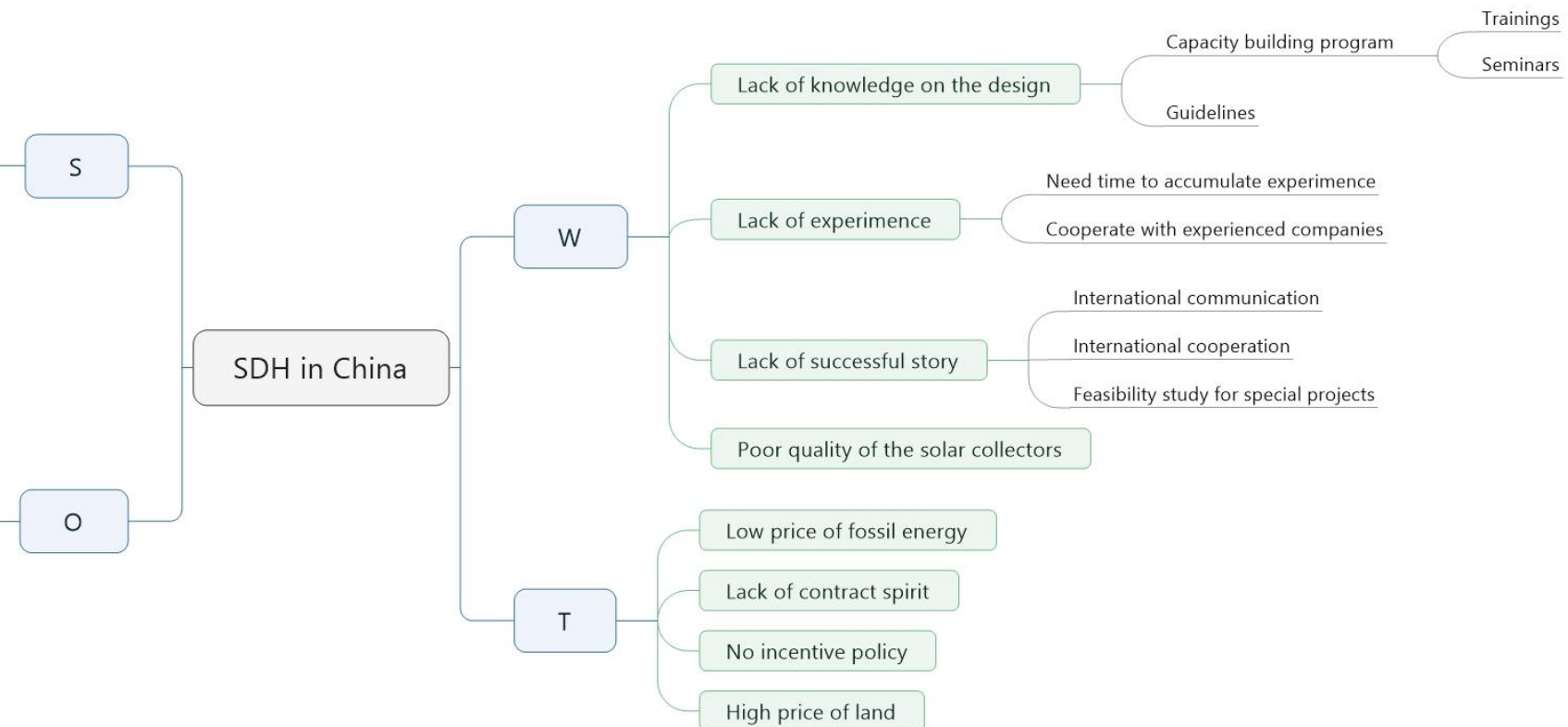
Key success factors for SDH

SWOT analysis for solar thermal industry on the development of SDH in China



Key success factors for SDH

SWOT analysis for solar thermal industry on the development of SDH in China



Key success factors for SDH

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1. Rich solar energy resources

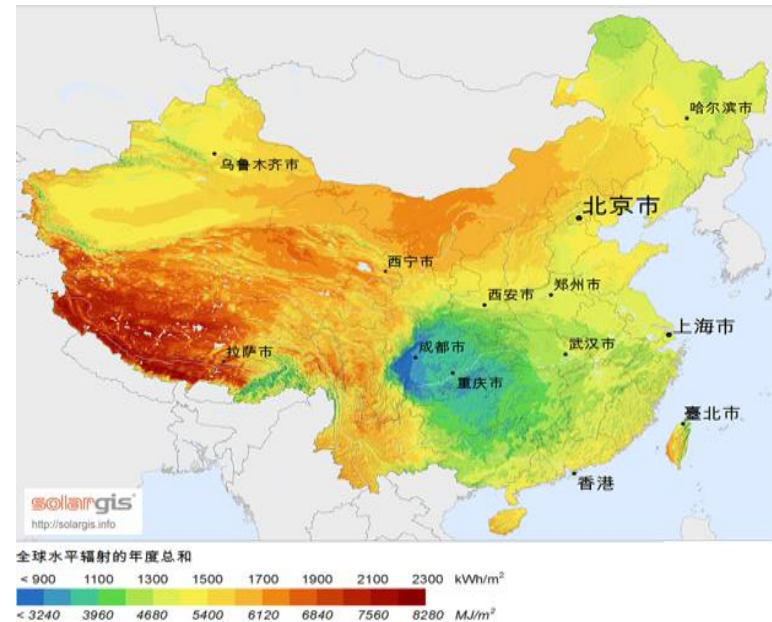


2. Enough installation area



3. Reliable technologies

4. Long term investment



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1. Quantitative research on the market potential of SDH in China
 2. Quantitative research on the pay back time for different SDH solutions
 3. Technical and economic analysis for SDH projects in typical climate zone.
 - A. Theoretical research
 - B. Demo projects



Thank you

For more information please contact
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