



**中国建筑科学研究院有限公司**  
**China Academy of Building Research**

# China – Developments in the world's largest market

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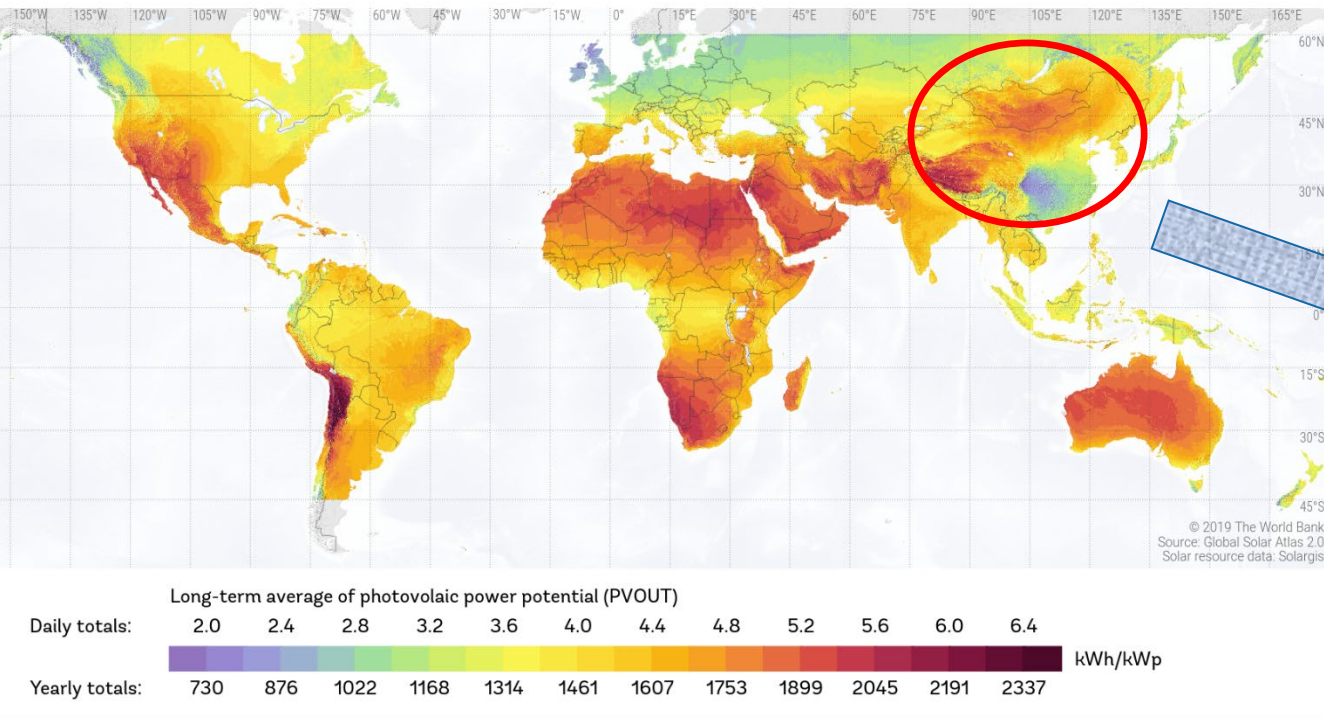
**June 21, 2022 China**

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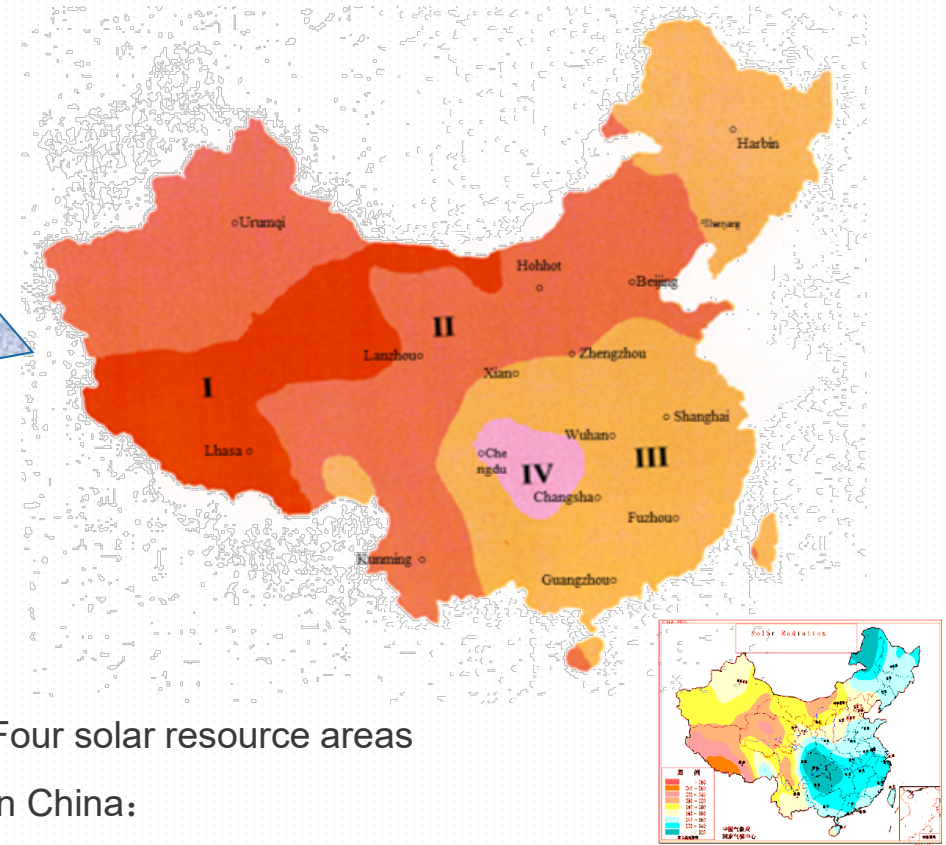
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# Background



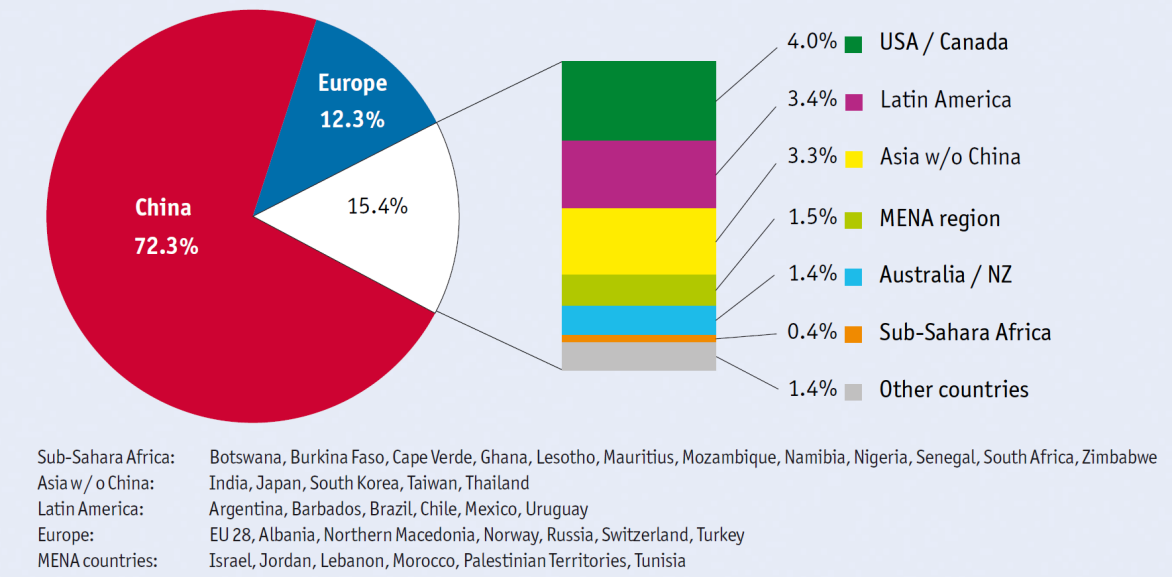
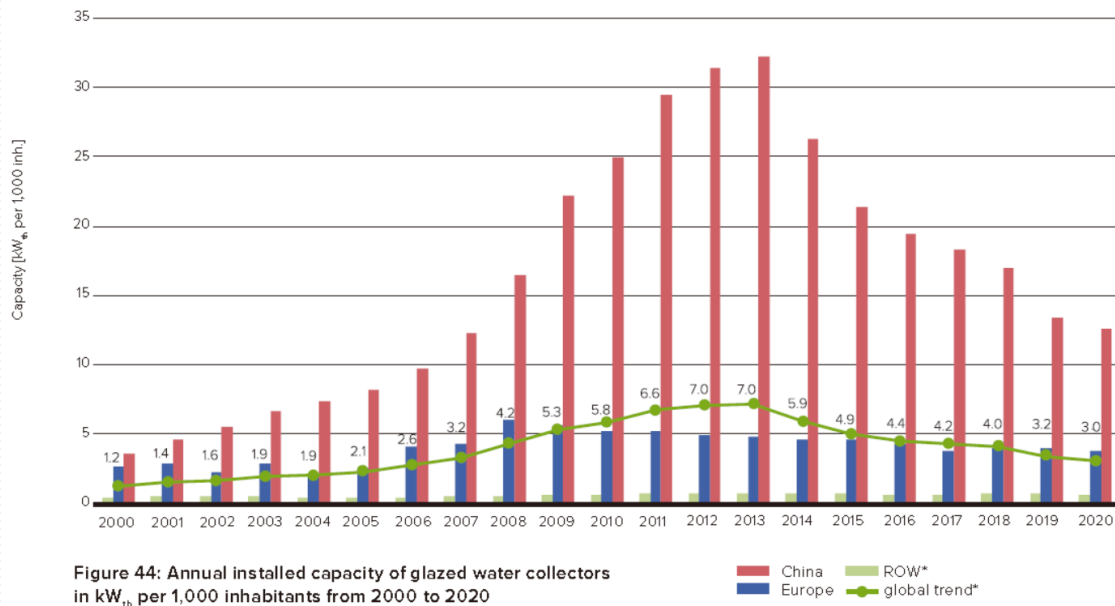
\* Data map comes from Solargis



# Background

- **China Solar Energy Society was founded in 1979 and it was approved to rename China Renewable Energy Society in 2006.**
- **China has been the largest market of the total capacity in operation since 2005, which accounted for 72.3% of the world's total installed capacity in 2021.**

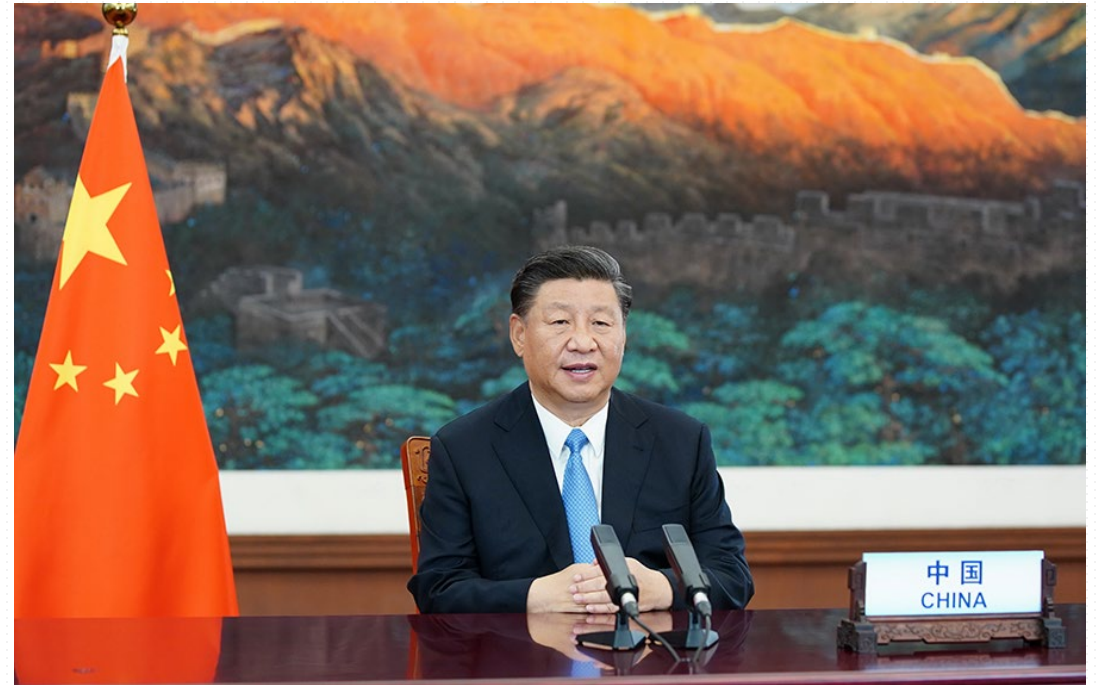
Annual installed capacity of glazed water collectors 2000 - 2020



Sub-Saharan Africa: Botswana, Burkina Faso, Cape Verde, Ghana, Lesotho, Mauritius, Mozambique, Namibia, Nigeria, Senegal, South Africa, Zimbabwe  
 Asia w/o China: India, Japan, South Korea, Taiwan, Thailand  
 Latin America: Argentina, Barbados, Brazil, Chile, Mexico, Uruguay  
 Europe: EU 28, Albania, Northern Macedonia, Norway, Russia, Switzerland, Turkey  
 MENA countries: Israel, Jordan, Lebanon, Morocco, Palestinian Territories, Tunisia

# Background

- **Dealing with climate change and reducing greenhouse gas emissions are common challenges faced by all countries in the world**
- **The goal of carbon peaking by 2030 and carbon neutrality by 2060 was proposed in 2020**
- September 22, 2020, the aims of "carbon peaking by 2030 and carbon neutrality by 2060" were proposed by the president of China at the 75th United Nations General Assembly
- Increasing the application of **renewable energy** is the important way to achieve the goals



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# Developments status

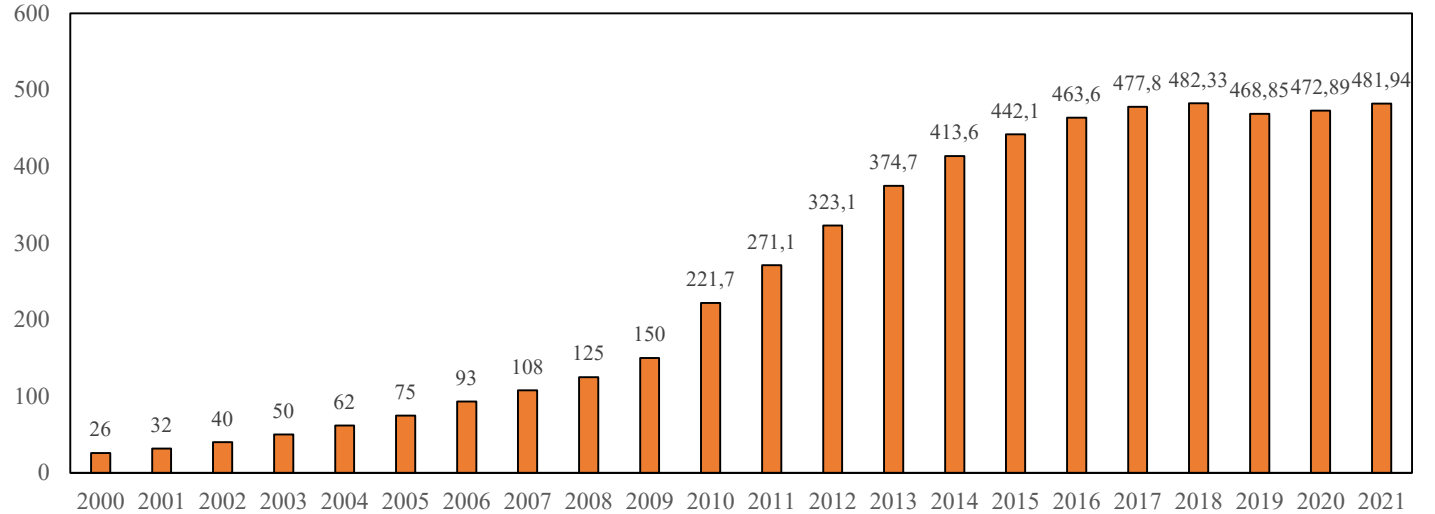
➤ **481.94 million m<sup>2</sup> solar collectors are being operated in China by the end of 2021**

➤ In 2021, newly installed of solar collectors is 27.05 million m<sup>2</sup>

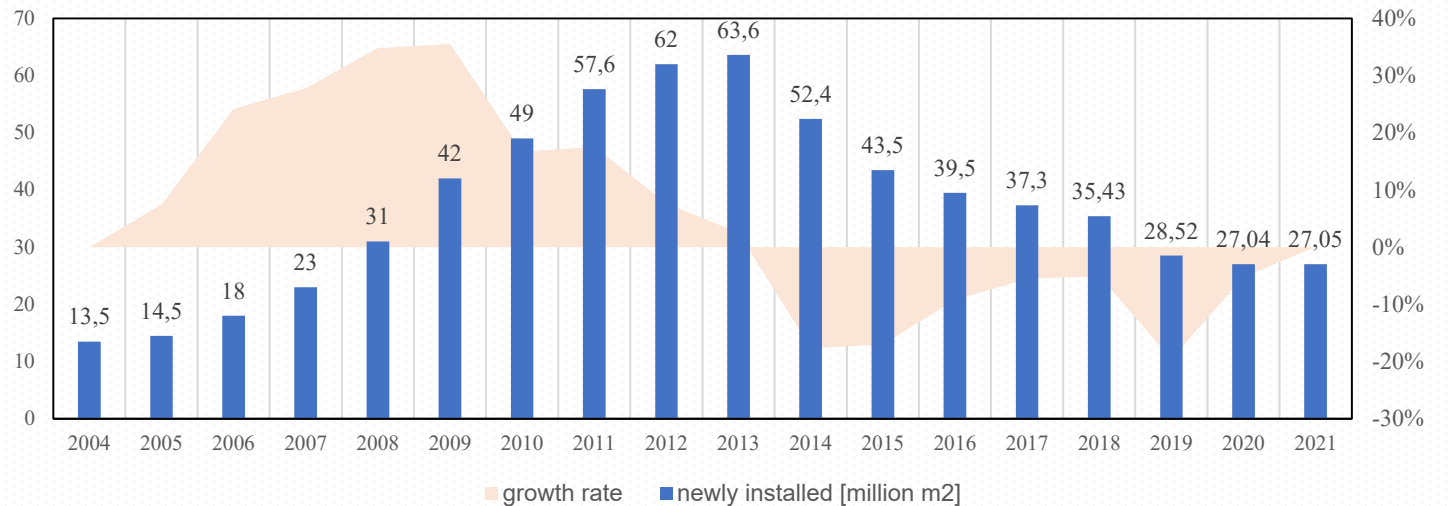
➤ From 2014 to 2020, the newly installation of solar thermal have continued to decline

➤ While the growth rate is **positive** in 2021

solar thermal capacity in operation [million m<sup>2</sup>]



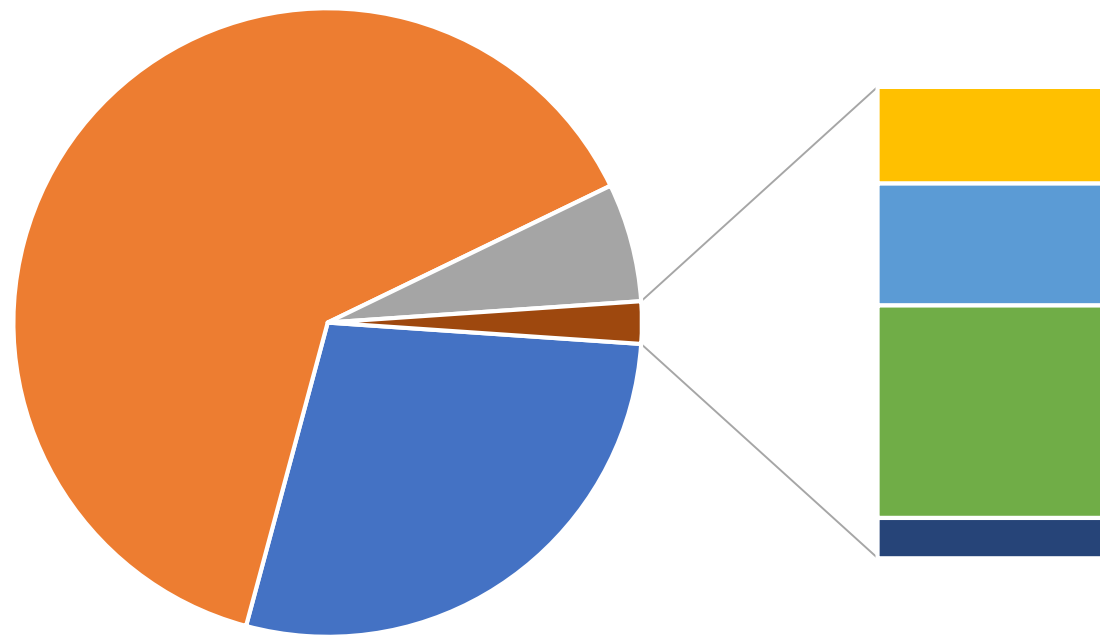
Newly installed capacity[million m<sup>2</sup>]



# Developments status

## ➤ The type of application in 2021

- Domestic solar hot water systems are still the major application, which accounted for about 91.7% of installations in 2021
- The number of solar heating combi-systems for single/multiple family has increased by 21% compared with 2020



- Domestic hot water systems for single family houses
- Domestic hot water systems for multiple family houses
- Solar combi systems for single family houses
- Solar combi systems for multiple family houses
- Solar district heating systems
- Solar process heat applications
- Solar air conditioning and cooling

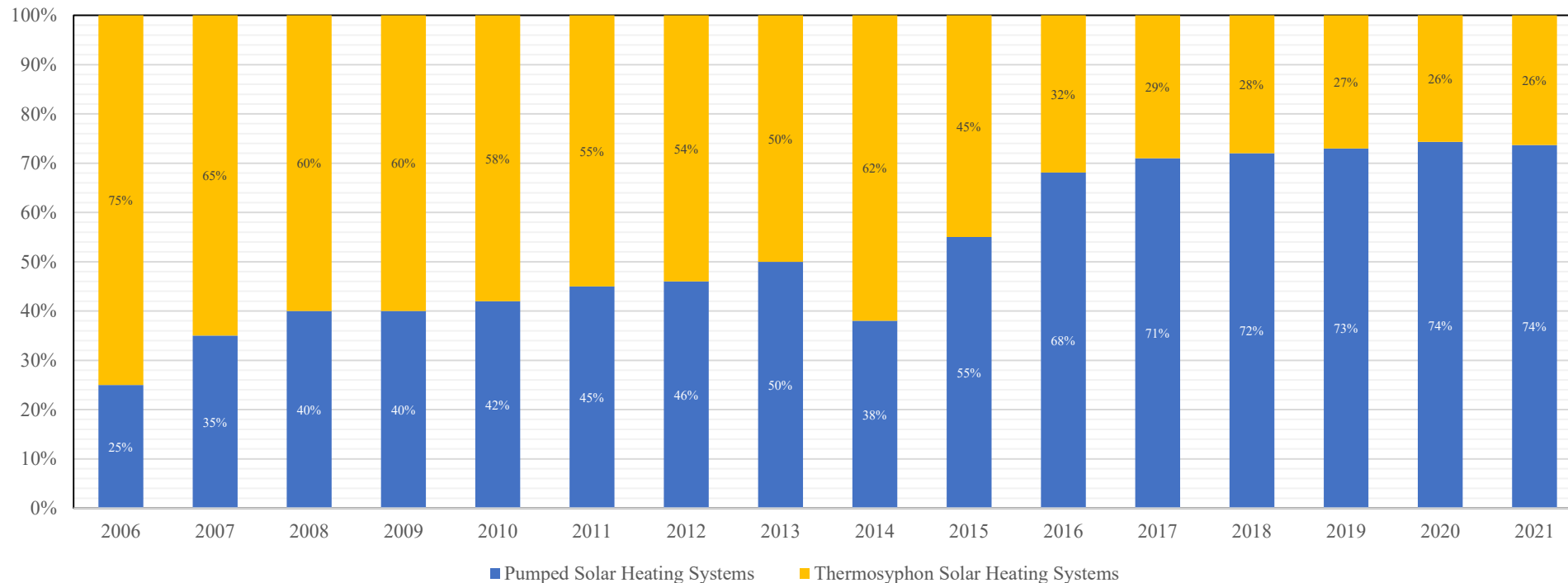


# Developments status

## ➤ The type of application

- The share of pumped systems has been increasing for several years, which increased from about 25% in 2006 to **74%** in 2021

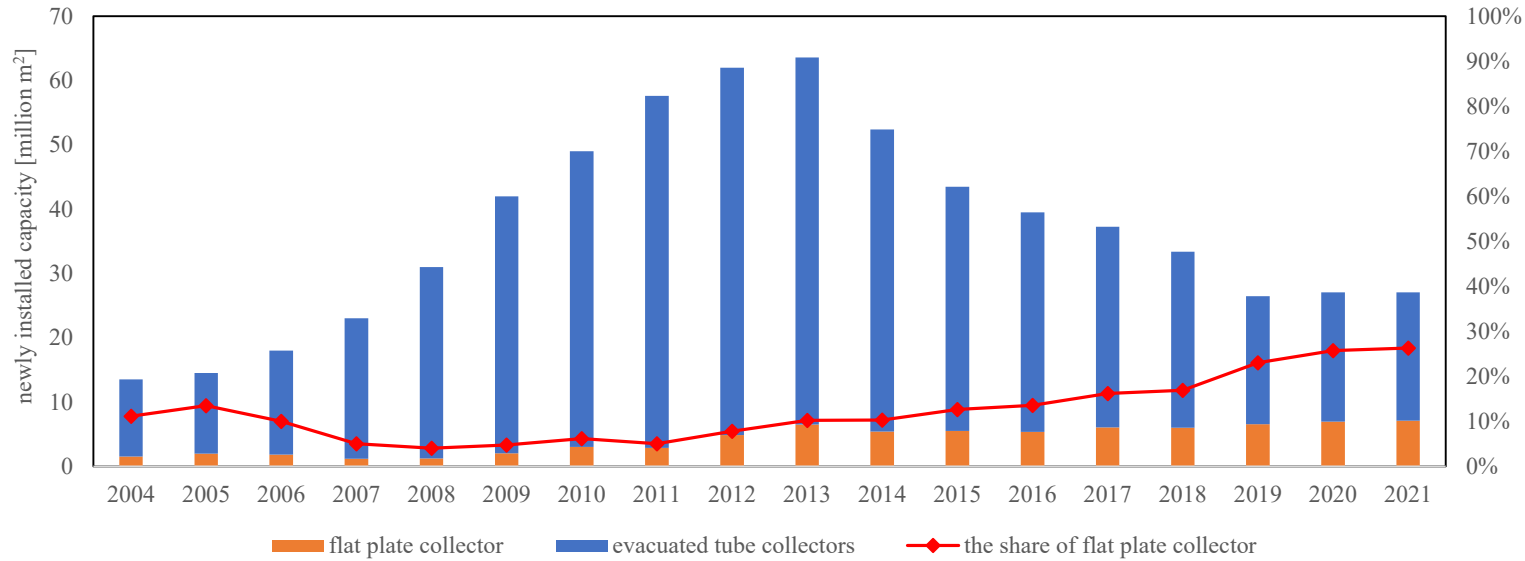

Distribution by type of solar thermal collector for the total installed water collector capacity in operation



# Developments status

## ➤ The type of collectors

- Despite the newly installation of solar thermal was decline, the share of flat plate collectors was increased from about 4.76 % in 2009 to **26.24%** in 2021
- The share of evacuated tube collectors was shrunk by 0.68% in 2021 compared to 2020, while the share of flat plate was increased by 2.2%

**Sales**  
19.95 million  
m<sup>2</sup>

-0.68%

Vacuum tube collectors



**Sales**  
7.11  
million m<sup>2</sup>

2.2%

Flat plate collectors



**Sales**  
13.12  
thousand m<sup>2</sup>

Air collectors

# Demonstration projects

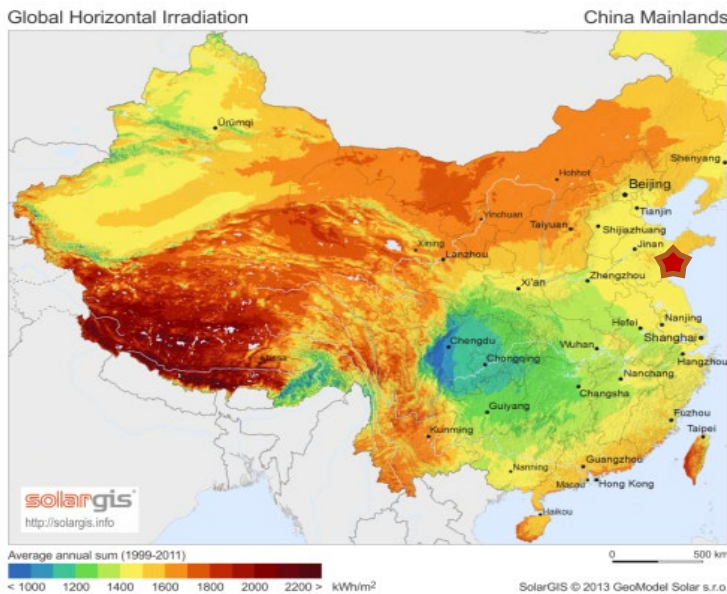
## ➤ Domestic hot water systems

- Domestic hot water systems for multiple family has been used in high-rise building

Qingdao (Shandong Province)

19 residential buildings

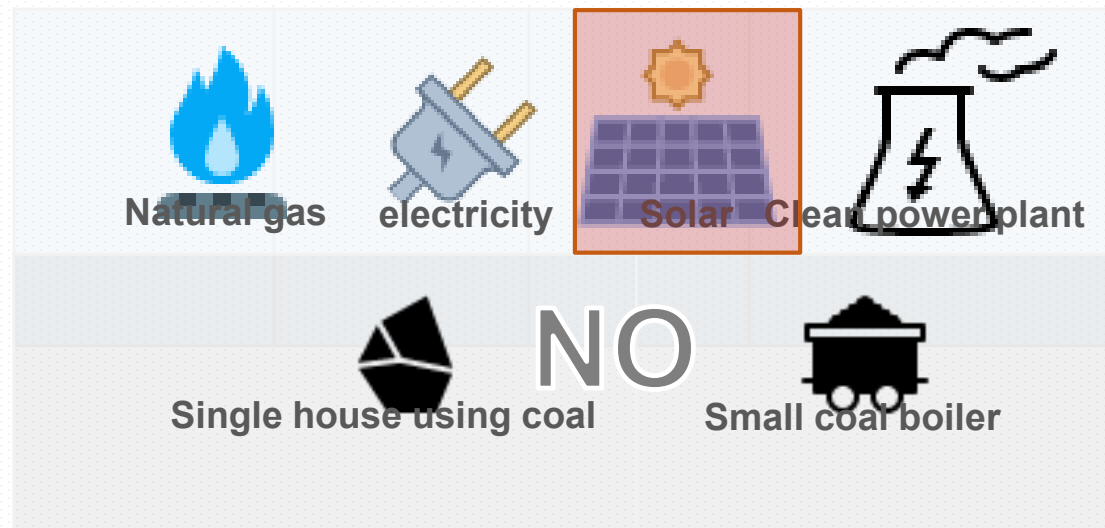
- 60 L storage tank in each family
- 1780 m<sup>2</sup> FP collectors
- finished



# Demonstration projects

## ➤ Clean heating

- Clean heating pilot work is placed on since 2017 in north China, clean energy will be the substitutes for coal, so to promote a faster developing for solar space heating
- Solar heating systems has the characteristics of clean, pollution-free and sustainable
- Which is suitable for rural area where rich solar resource



# Demonstration projects

## ➤ Solar space heating

- Guyuan County (Ningxia Province)
- solar assisted water source heat pump and air source heat pump system
- Building area 3054 m<sup>2</sup>
- FP collectors
- solar fraction: 68%



# Demonstration projects

## ➤ Solar district heating

### ➤ Saga (Tibet)

➤ Total building area 81,000 m<sup>2</sup>

- large size of flat plate collector area: 18000 m<sup>2</sup>
- water storage pool is 4500 m<sup>3</sup>



# Demonstration projects

## ➤ Solar district heating

➤ Zhongba (Tibet): The highest elevation in the world and the largest area in Asia

✓ **Solar fraction: 100%**

✓ **Average Collector efficiency: 50.3%**

- Flat plate collector area: 32175 m<sup>2</sup>/22.5 MW<sub>th</sub>
- water storage pool is 15,000 m<sup>3</sup>



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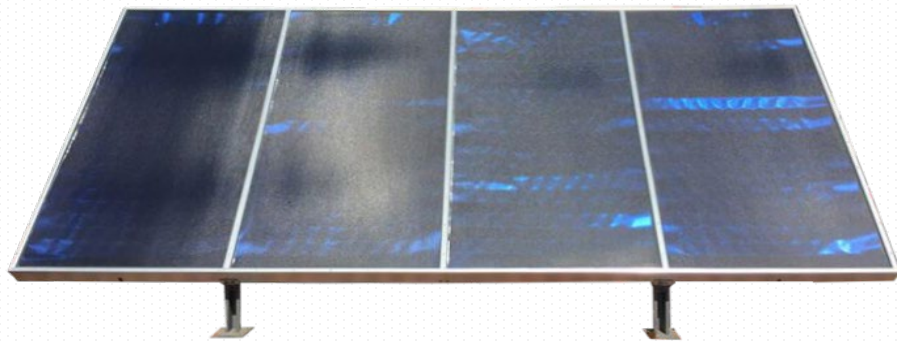




# Trends

## ➤ High efficiency of collector

- In the context of clean heating and carbon neutrality, flat-plate collectors have great potential for application
- Development direction: higher working temperature and higher efficiency



### 四项太阳能行业国家标准通过预审审查

太阳能应用研究 5月27日



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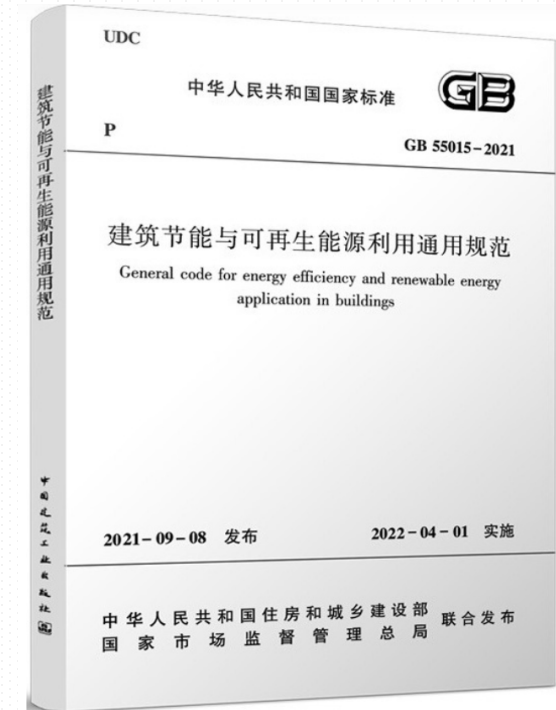
2021年5月26日,由中国建筑科学研究院有限公司、中国标准化研究院、国家太阳能热水器质量监督检验中心(北京)等单位主导起草的四项太阳能行业国家标准预审会在北京召开。

本次评审内容包括修订国家标准《太阳能集热器性能试验方法》GB/T 4271、《平板型太阳能集热器》GB/T 6424、《真空管型太阳能集热器》GB/T 17581,以及制订国家标准《真空太阳集热管性能试验方法》。

# Trends

## ➤ Solar combi-system

- The national standard: *General code for energy efficiency and renewable application in buildings* came into operation in 2022
- The solar systems (solar thermal system and/or PV system) should be installed in new buildings
- Preparation of a NWIP based on the Chinese proposal on test methods for system performance of solar combi-systems(ISO/TC 180/SC 4/AHG 1)



# Trends

## ➤ District heating

*cow-dung*



Rich solar source  
lack of fossil energy



Geothermal Energy



Solar Energy



Power (Heat pump)

# Trends

## ➤ Solar heating systems

- To extend solar district heating projects in the west areas where there is rich solar resource and small population for a large area
- To promote developing of solar heating-combi systems and PVT systems in single/multiple family houses

## ➤ Solar thermal process

- Solar drying etc. agriculture production
- Solar hot water for textile and dyeing process etc. industrial production
- Sea water desalinization

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# conclusion

- Solar thermal is still the key solution for the tremendous demand for domestic hot water and/or space heating without excessive fossil energy consumption,
- High performance solar collector, solar combi-system and PVT system will be the key technologies in the future.
- With the progress of carbon neutrality, the newly installed capacity of solar collectors in 2021 is slight increased with 2020, but many difficulties should be overcome in future.
- Comparing with photovoltaic or heat pump system, the complication and high initial cost will be a main barrier for the promotion of solar thermal technology.



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**THANK YOU FOR YOUR ATTENTION**

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