

# 中国建筑能源使用情况

从西方看中国

## Energy Use in Chinese Buildings: Views of an Outsider Looking In

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# 中国能源研究室 China Energy Group



成立于1988年  
重点研究终端能源效率  
Founded in 1988

**Focused on End-Use Energy Efficiency**



进行能源研究，实施相关项目 与超过50家的中国机构合作

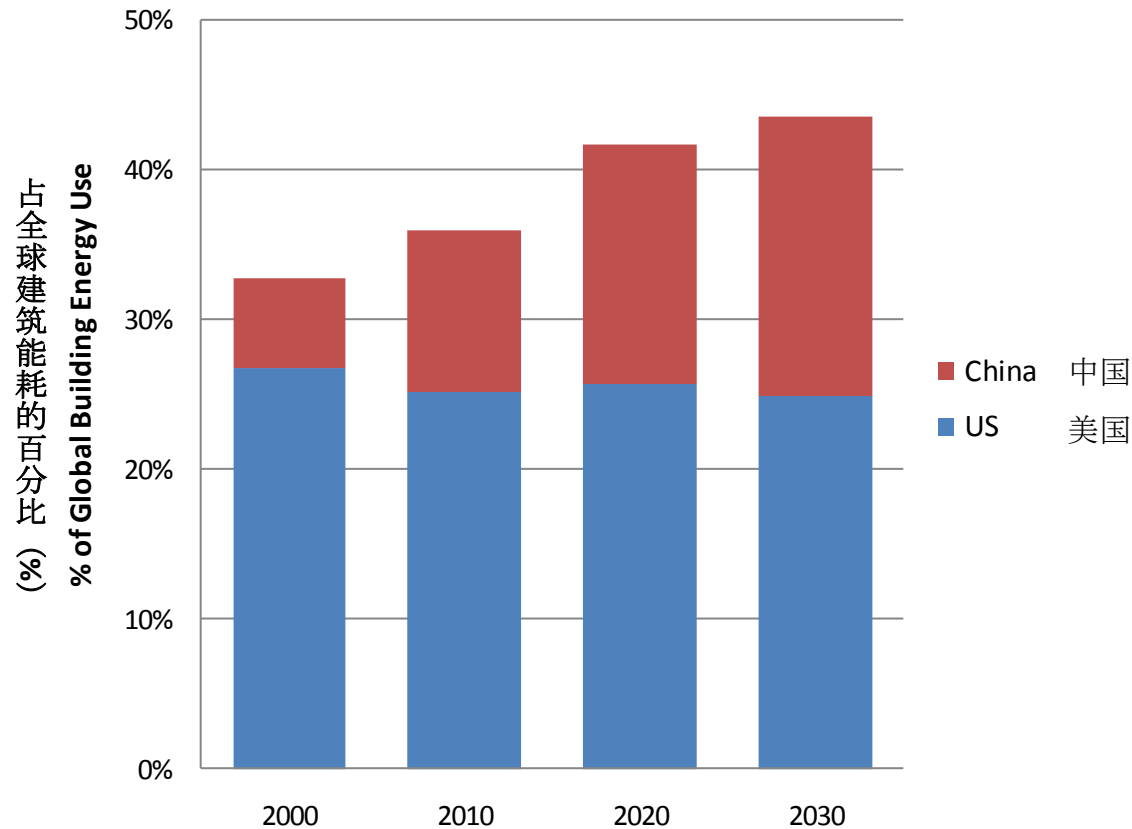
Conducts Research, Implements Projects  
Collaborations with ~50 Institutions in China

# 建筑能耗

## Energy Use in Buildings

- 中国和美国两国的人口占全世界人口的20%（显而易见的是，大多数人口在中国）  
China and the United States together have 20% of the world's population (obviously mostly in China)
- 中美两国目前占全世界建筑能耗的33%。  
The two countries presently account for 33% of the world's building energy use.
- 预计在未来十年内将增长到40%，并持续增长。  
This is expected to grow to over 40% in ten years and continue increasing thereafter.

- 美国和中国两国的建筑总能耗及增长  
U.S. and China building energy use



Source: China End-Use Energy Model; Stephane de la Rue du Can and Lynn Price, "Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions", Energy Policy 36 (2008) 1386–1403; IEA, World Energy Outlook 2009; EIA, State Energy Data 2005: Consumption, February 2008, Tables 8-12, p. 18-22 for 1980-2005; and EIA, Annual Energy Outlook 2008, Mar. 2008, Table A2, p. 117-119 for 2006-2030 and Table A17, p. 143-144 for non-marketed renewable energy.

# 舒适条件和能源消耗

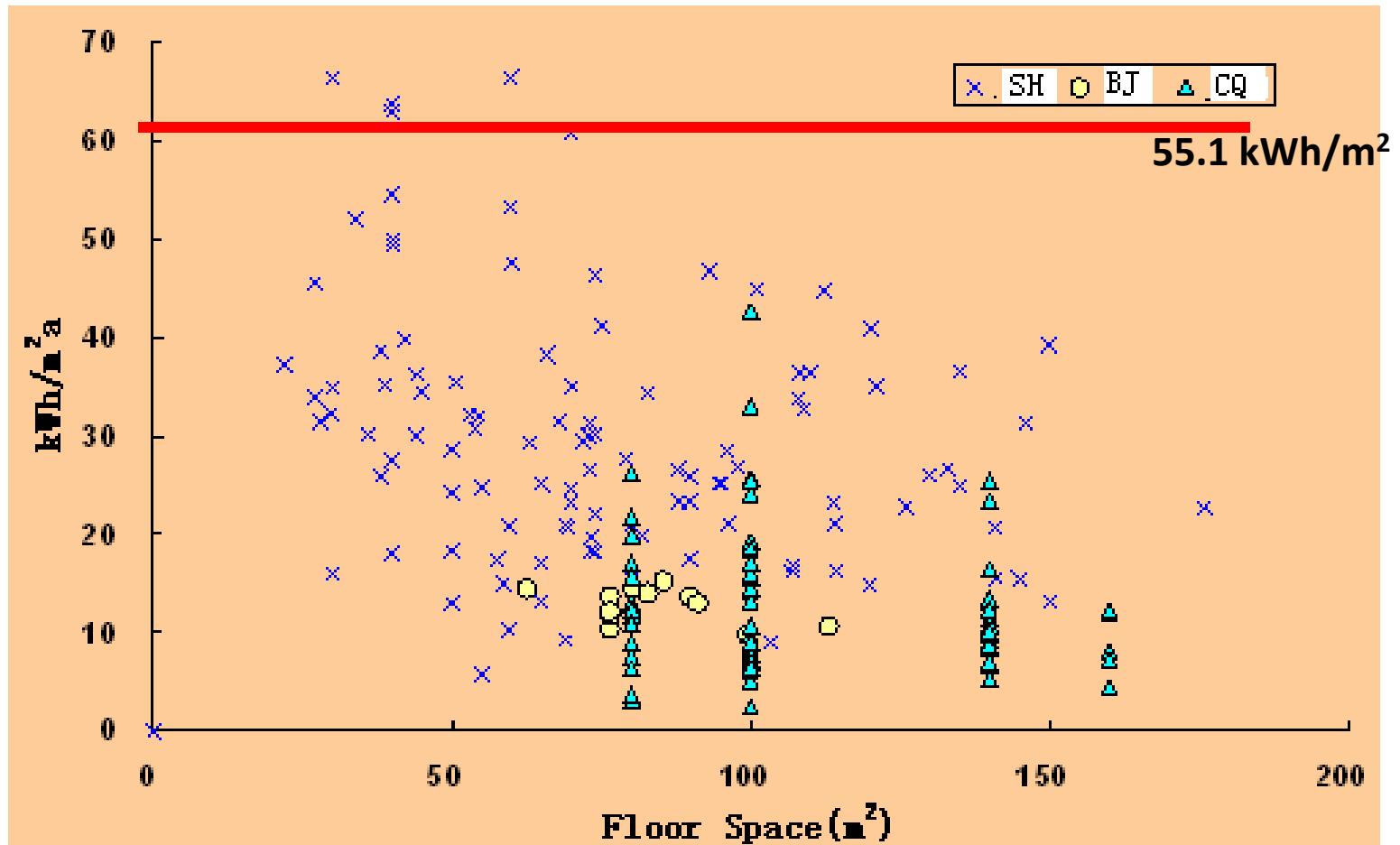
## Comfort Conditions and Energy Use



有证据表明，按照西方的标准，中国建筑的舒适条件非常低。

There is evidence to suggest that the comfort conditions in China's buildings are very low by western standards.

# 上海、北京、重庆的居民住宅的总电量 Overall Electricity Use in Res. Bldg. In Shanghai, Beijing & Chongqing

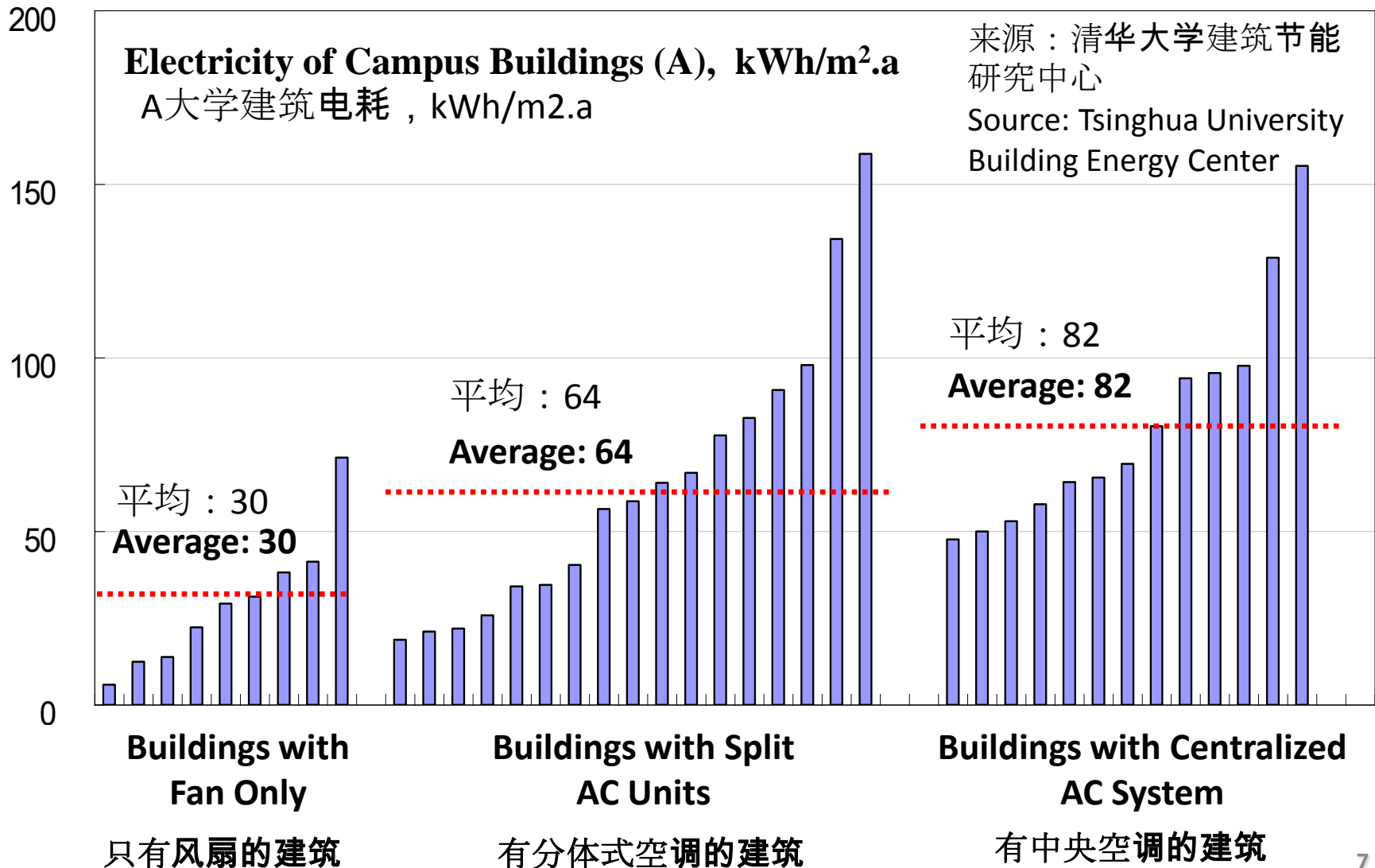


来源：清华大学建筑节能研究中心  
Source: Tsinghua University Building Energy Research Center

# 对北京大学的观察显示

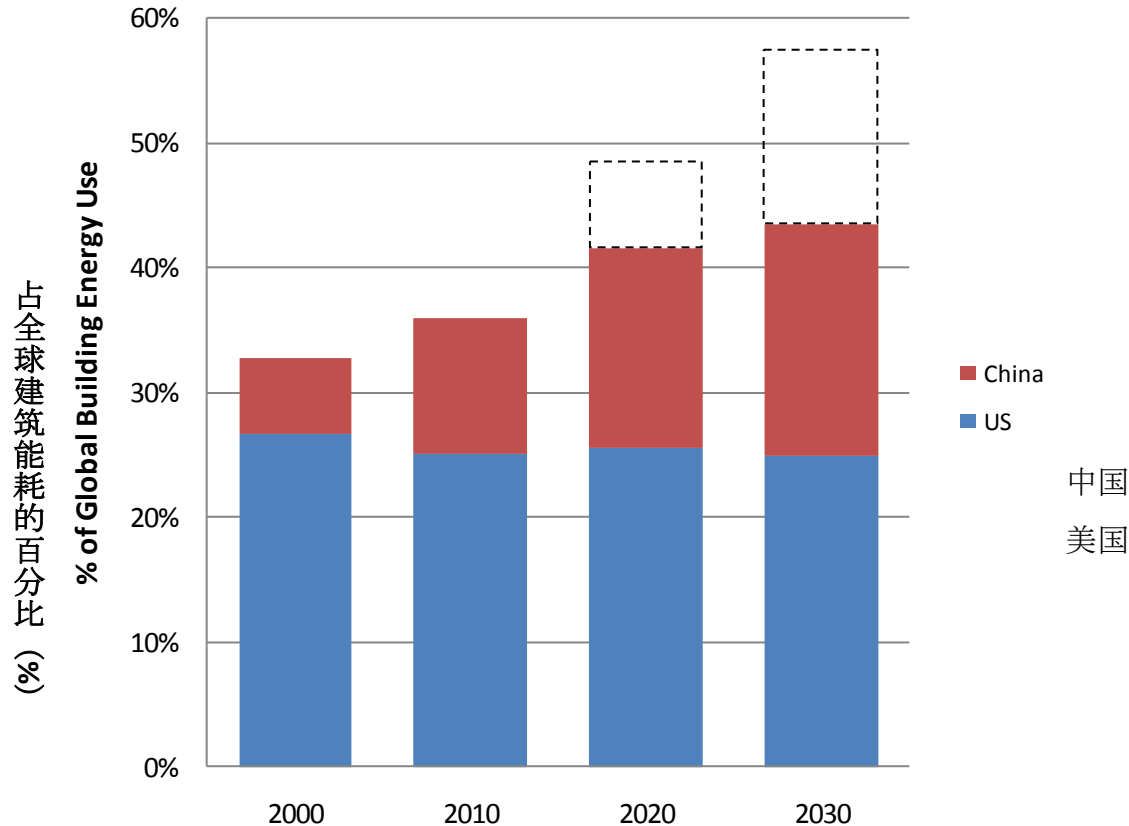


## Observations on a Campus in Beijing



# 如果中国居民用户开始采用西方的舒适条件

## If Chinese occupants begin to adopt western comfort conditions



Source: China End-Use Energy Model; Stephane de la Rue du Can and Lynn Price, "Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions", Energy Policy 36 (2008) 1386–1403; IEA, World Energy Outlook 2009; EIA, State Energy Data 2005: Consumption, February 2008, Tables 8-12, p. 18-22 for 1980-2005; and EIA, Annual Energy Outlook 2008, Mar. 2008, Table A2, p. 117-119 for 2006-2030 and Table A17, p. 143-144 for non-marketed renewable energy. Dotted lines are estimates.



# 中国北方地区的采暖

## Heating in N. China

- 中国北方建筑消耗了65%的居民建筑煤耗。  
Buildings in northern China consume 65% of total residential coal use.
- 除了最近的新建建筑，很多建筑气密性较低，且没有隔热性能。  
These buildings are leaky and have had little insulation until recent new buildings.
- 不幸的是，因为这些建筑的采暖能耗很低，节能改造的能效措施有非常长的投资回收期：典型回收期在 15-20年！！  
Unfortunately, retrofit of energy efficiency measures have very long payback times because of the low heating energy in these buildings: typically 15 – 20 years!!

# 中国北方地区的采暖

## Heating in N. China



- 劳伦斯伯克利国家实验室与唐山市与北京昌平区进行合作，目前正在研究通过进行既有建筑的节能改造来降低中国北方地区的采暖能耗。  
LBNL in collaboration with Tangshan municipality and Xongping district of Beijing is performing research on retrofits to reduce heating energy in N. China.
- 由于传统节能措施有较长的投资回收期，我们正在寻找高效的、低成本的节能措施。  
Because of long paybacks of traditional conservation measures, we are seeking effective, low-cost measures.
- 我们正在探索这样的节能措施，如以下两种：  
We are exploring two such measure:
  - 降低空气渗透 Reducing air infiltration
  - 安装低价的采暖控制 Installing inexpensive heat controllers
- 测量工作将于2011年3月完成  
Measurements will be completed by March 2011.

# 结论

## Conclusions



- 中美的建筑能耗总合正走向世界建筑能耗的50%。

**China and the United States together are heading toward 50% of world's building energy use**

- 典型的中国建筑采暖去冷少，因为居住用户能接受这样的舒适条件，而这样的条件按照西方的标准是很低的。

**Typical Chinese buildings use little heat and cool air because occupants are satisfied with comfort conditions that are very low by western standards.**

- 提高舒适条件可能产生的能耗的增加，但如果同时又有能源效率的提高，从而降低能耗，就能够避免建筑能耗“失去控制”。

**If for every increase in energy use from improved comfort there is an equal decrease in energy use from energy efficiency, “out of control” building energy use can be averted**

- 从中国北方采暖学到的重要一课：建筑必须变得更加高效节能，因为对舒适度的需求将增加。

**There is an important lesson here for heating in N. China: buildings must become much more energy efficient as demand for comfort increases**

**感谢您的关注**

**Thank you for your attention**

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