

# Comparative Study of the *Potential Renewable Energy Sources* in China and Denmark

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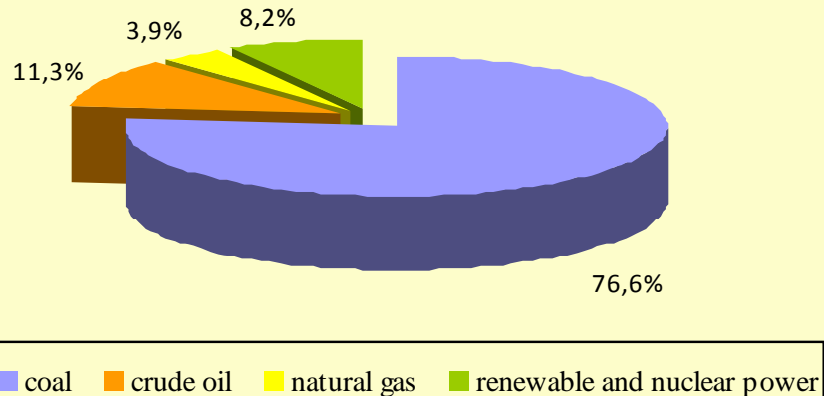
# Key Points

- Why make comparisons
- How to make comparisons
- How about the results
- Suggestion and discussion

# Introduction-why make such comparisons

- Based on PhD project
- Beginning period: figure out what the problem is and where we are

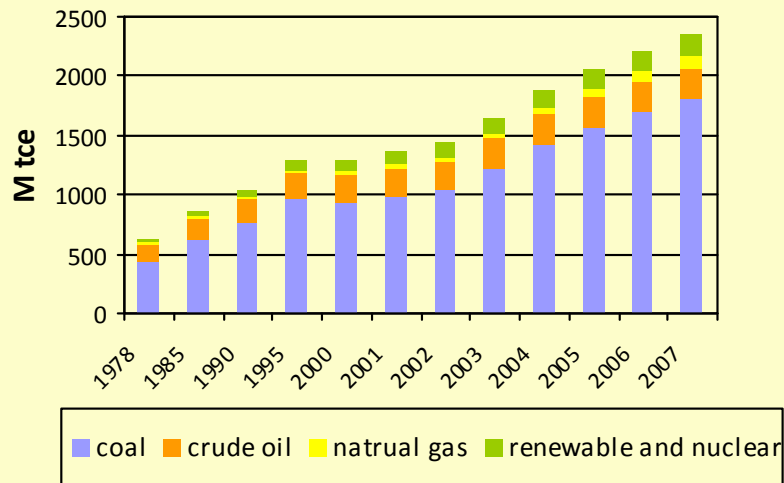
Primary Energy Supply by Resource in 2007



- Coal- dominated energy structure
- Hydro power represented a significant share of renewable energy supply and it accounted about 7.1% of PES

# Introduction

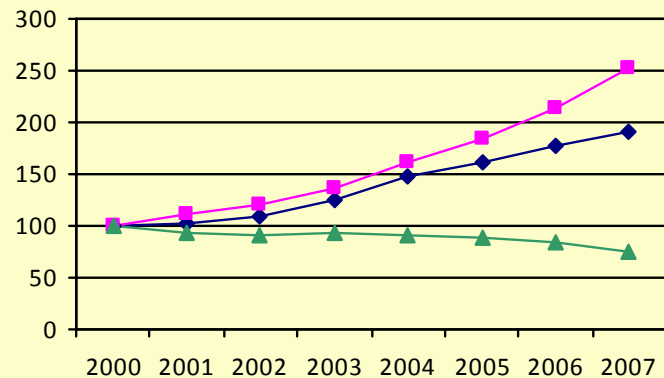
Chinese Primary Energy Supply in 2007



- Share of RE has **increased steadily**, RE began to play a role in the energy structure
- Energy structure which dominated by coal has **changed little**

- Energy intensity **reducing 20%** from the 2005 to 2008
- Energy demands will continue to grow driven by its highly energy intensive economy and strong GDP growth

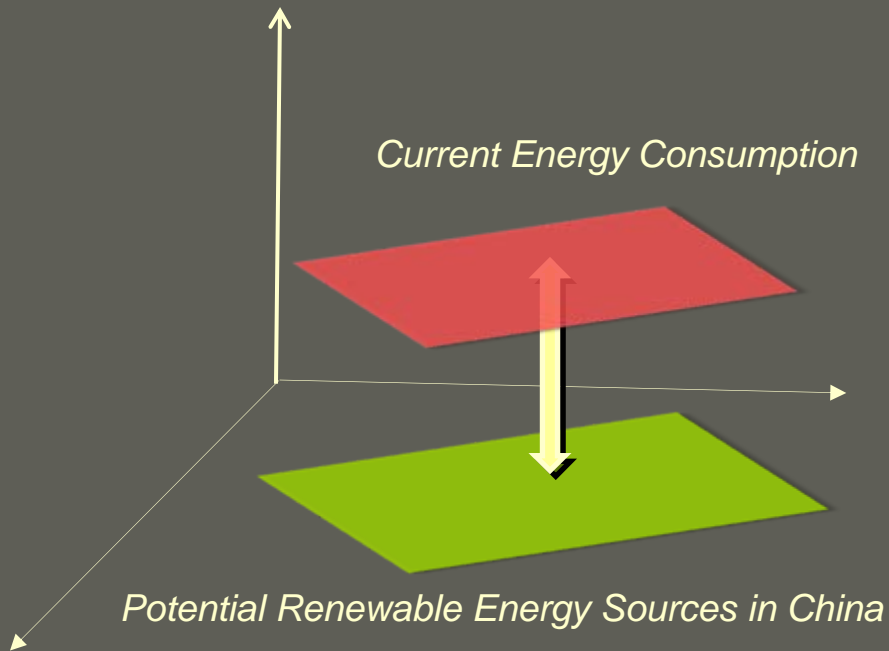
Chinese energy intensity



◆ GDP      ■ GEC      ▲ Intensity

index, year 2000=100

# How to make comparisons



➤ Potential renewable energy sources per capita and per area

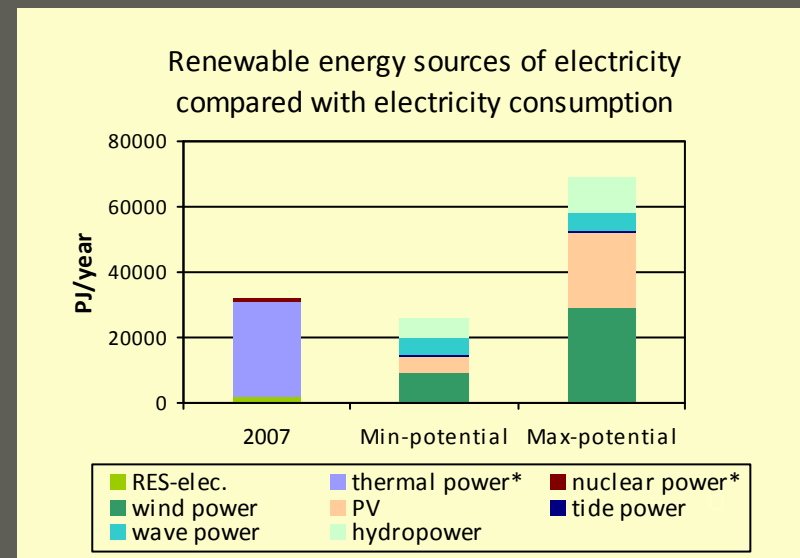
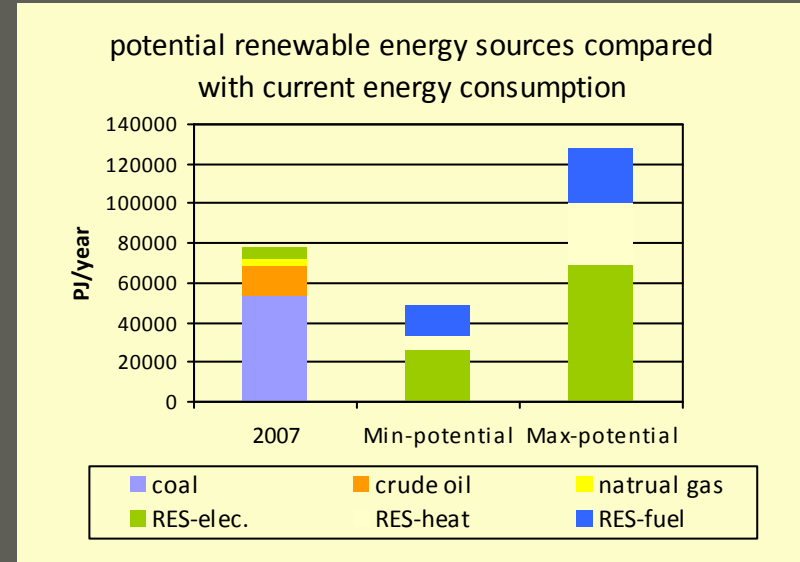
• **CHINA**

**DENMARK**

➤ **energy** demand per capita

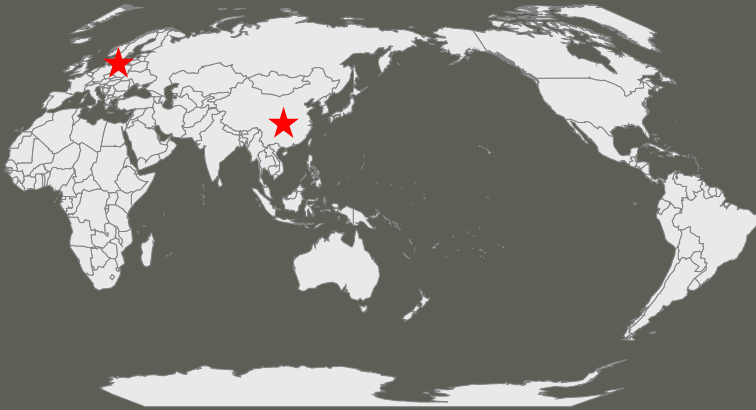
# Results - China Potential Renewable Energy Sources Compared with Energy Consumption

RENEWABLE ENERGY SOURCES	UNIT	POTENTIAL
Wind (onshore)	TWh/yr	2500-8000
Wind (offshore)	TWh/yr	1300-6500
Photo Voltaic	TWh/yr	>200
Tidal energy	TWh/yr	>1500
Wave	TWh/yr	1760-3000
Hydro power	TWh/yr	7260-19200
Total electricity	TWh/yr	
Solar thermal	PJ/yr	6000-30000
Geothermal	PJ/yr	>1000
Total heat	PJ/yr	7000-31000
Straw	PJ/yr	5561-6439
Wood	PJ/yr	4332-5210
Waste (combustible)	PJ/yr	1171-3454
Biogas	PJ/yr	1259-2488
Energy crops	PJ/yr	3659-10479
Total biomass fuel	PJ/yr	15981-28070



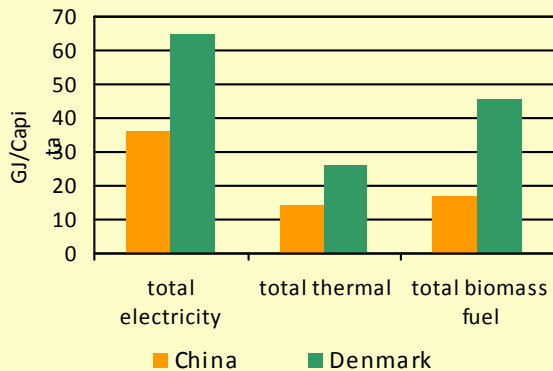
- The minimum potential renewable energy sources is less than the current energy consumption but the maximum is about 50% more than current energy consumption in China.
- The same results appear in the comparison between the potential renewable energy sources of electricity and current electricity consumption.

# Results - Comparison of Potential Renewable Energy Sources in China and Denmark

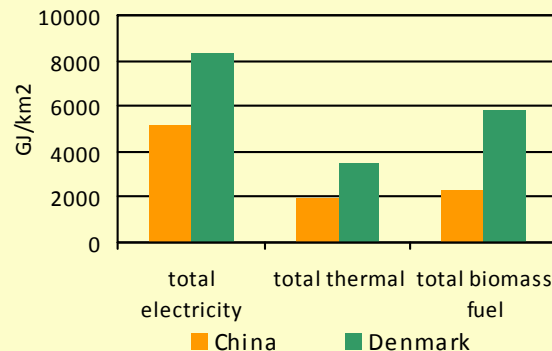


<i>Data for 2006</i>	<i>UNIT</i>	<i>CHINA</i>	<i>DENMARK</i>
Area	km <sup>2</sup>	9598077	43098
Population	million	1321.29	5.48
<b>Population density</b>	<b>person/ km<sup>2</sup></b>	<b>137</b>	<b>127</b>
Renewable energy production			
Biomass	TJ	9442809	84302
Geothermal	TJ	11	491
Solar energy	TJ	142324	435
Hydro power	GWh	435786	23
Wind power	GWh	3868	6108
Installed wind capacity	MW	2593	3135
<b>Installed wind capacity (2008)</b>	<b>MW</b>	<b>12210</b>	<b>3180</b>

Renewable energy sources per capita



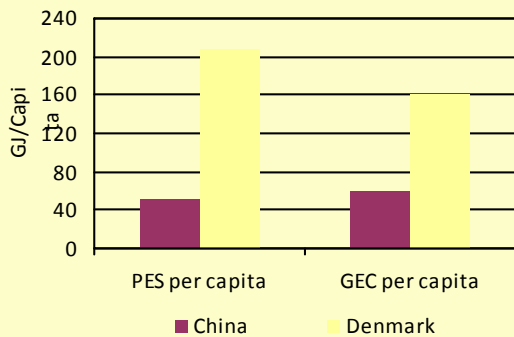
Renewable energy sources per area



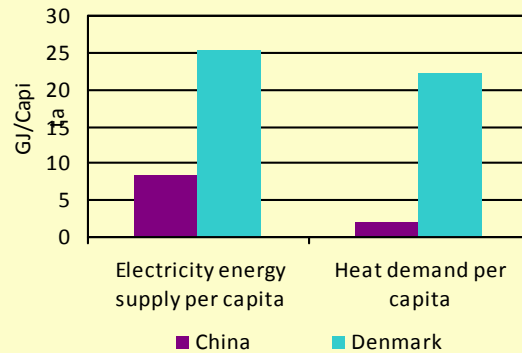
The totally amounts of potential renewable energy sources per capital and per area in Denmark are basically two times as many as in China.

# Results - Comparison of Energy Demand per capita in China and Denmark

PES per capita and GEC per capita



Electricity and Heat demand per capita



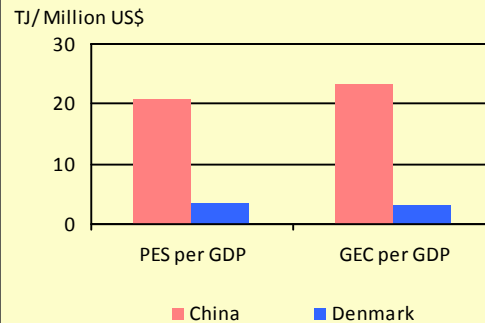
- Energy supply and consumption per capita in China were both distinct less than in Denmark.

- The electricity demand per capita in China was about one third in Denmark.
- Heat demand per capita in China was only about one tenth in Denmark.

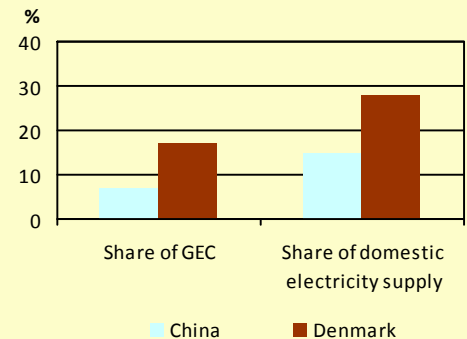
- One GDP units in China cost more energy consumption than in Denmark. Gross energy consumption per GDP in China was about seven times as much as in Denmark

- the shares of renewable energy in energy consumption and supply of China were both lower than the shares in Denmark.

Energy intensity



Renewable energy exploitation





# Conclusions and Discussions



- It shows the possibility for renewable energy to afford future energy consumption in China in terms of domestic resources



- China's potential renewable energy sources per capita is about half of in Denmark meanwhile its energy demands per capita are about a quarter in Denmark



- Due to the obvious distance in energy intensity, energy conservation is essential for China to implementing sustainable energy strategy in the future



- Putting forward a forward-looking issue about the perspective of renewable energy systems in China in the long term

# Thanks for your attention!

