The Development of Biomass Heating in China

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- China’s Energy Development Problem
- Biomass Resources
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The situation of Chinese energy consumption

China Energy Consumption by Fuel

Source: State Statistics Bureau

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China is facing with environment problems

1. Carbon Emissions

The total carbon emissions in China is surpass the US’s and EU’s combined. Per capita carbon emissions in China in 7.5 tons, while it is 4.9 tons in the world.

Source: http://www.globalcarbonproject.org
China is facing with environment problems

2. Pollutant Emissions

Coal and Oil are still as important energy in China, and the consumption share is over 84% in total energy consumption. Therefore its energy structure brings seriously environment problems such as haze and etc.
Market conditions for the bio-energy industry in China

2012 total energy consumption in China

- Instead of coal:
  - oil / gas
  - biomass

Source:
China Statistical Yearbook in 2013, compiled by the National Bureau of Statistics of China (NBOS)
The vision of the RHC-platform: Renewable energy sources (RES) will deliver 100% of the European heating and cooling demand by 2040.

Share of RES on heating and cooling demand in Europe in 2014: 17.7%

Source: EHC-platform, Common vision for the RHC-sector, 2011
RDP-Scenario = Full Research, development and policy scenario.
Globle Heating Trend

1. From individual heating to district heating
2. From heat-only to CHP heat production
3. From fossil fuel to biomass
The situation of renewable resources in China

Wind energy and solar energy enrichment region: In the northwest china and Qinghai-Tibet Plateau;
Hydroenergy enrichment region: In the southwest china;
Biomass energy enrichment region: In the east and south area,
Regional advantages: raw material place is nearby product marketing.

(Source: the Chinese Academy of Engineering)
The situation of renewable resources in China

Clean energy resources except solar energy in China is 2148 million tce, biomass is accounted for 54.5%. Biomass resources is 2 times of hydroenergy, or 3.5 times of wind energy.

(Source: the Chinese Academy of Engineering)
Biomass resources of agriculture utilize in Jilin

The crops straw

- Returing to field 4.03%
- Feed 10.5%
- Industrial raw materials 1%
- Open burning 23.2%
- Fuel 61.54%

13.534 Million tons, Amount to 7.16 million tonnes of coal equivalent
45.266 million tons for energy utilization, Amount to 23.688 million tonnes of coal equivalent
31.732 million tons, Amount to 16.528 million tonnes of coal equivalent

Energy efficiency is low, the thermal efficiency is only 15-20%

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Annual output: 15.2 billion cubic meters of biogas. Use 12 million tons (tec) per year.

Use 13.76 million tons (tec). The total installed capacity: 10 million kilowatts, annual power generation 43 billion kilowatts.

Annual output: 2.3 million tons of biofuel ethanol, 0.9 million tons of biodiesel. Use 3.42 million tons (tec) per year.

Use 5 million tons (tec) per year.

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Market conditions for the bio-heating industry in China

- Boilers Amount: 600,000
- Fuel Amount: 500 million tce
- Account for the total energy consumption: 18%
- Account for the total pollutional gases: 50%.
- Market Scale: 400 billion Yuan.

Electric Power Heating

Middle & Small Boiler Heating (lower than 28MW)

Heating market
- Civilian use
- Commercial use
- Industry use

Energy market
- Transportation fuel

Generation market
- Industry use

Market conditions for the bio-heating industry in China

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Heating price of biomass solid fuel compared with conventional fuel

<table>
<thead>
<tr>
<th>Fuel Band</th>
<th>Lower Calorific Value</th>
<th>Price</th>
<th>Boiler Efficiency</th>
<th>Cost Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net Content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature Gas</td>
<td>36 006.48 / (kJ·m⁻³)</td>
<td>3.5yuan/m³</td>
<td>97.21yuan/GJ</td>
<td>0.92</td>
</tr>
<tr>
<td>Fuel Oil M100</td>
<td>41 868.00 / (kJ·kg⁻¹)</td>
<td>4600yuan/t</td>
<td>109.87yuan/GJ</td>
<td>0.88</td>
</tr>
<tr>
<td>Diesel Fuel 0#</td>
<td>50 241.60 / (kJ·kg⁻¹)</td>
<td>8600yuan/t</td>
<td>171.17yuan/GJ</td>
<td>0.92</td>
</tr>
<tr>
<td>Coal</td>
<td>20900.00 / (kJ·kg⁻¹)</td>
<td>700yuan/t</td>
<td>33.5yuan/GJ</td>
<td>0.65</td>
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<tr>
<td>Electricity</td>
<td>3 600.65 / (kJ·kWh⁻¹)</td>
<td>0.7yuan/kWh</td>
<td>194.41yuan/GJ</td>
<td>0.97</td>
</tr>
<tr>
<td>Wood pellets</td>
<td>17162.6 / (kJ·kg⁻¹)</td>
<td>1100yuan/t</td>
<td>64.09yuan/GJ</td>
<td>0.9</td>
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</tbody>
</table>
# Emission Standards of Boiler before 1 July, 2014 (GB13271-2001)

<table>
<thead>
<tr>
<th>Boiler Classification</th>
<th>Zone of Application</th>
<th>Dust Emission (mg/m³)</th>
<th>SO2 Emission (mg/m³)</th>
<th>NOX Emission (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal-fired boiler</td>
<td>air-furnace</td>
<td>A</td>
<td>80</td>
<td>900</td>
</tr>
<tr>
<td></td>
<td>others</td>
<td>A</td>
<td>80</td>
<td>900</td>
</tr>
<tr>
<td>Oil burning boiler</td>
<td>light diesel kerosene</td>
<td>A</td>
<td>80</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>others</td>
<td>A</td>
<td>80</td>
<td>900</td>
</tr>
<tr>
<td>Gas fired boiler</td>
<td>Whole region</td>
<td></td>
<td>50</td>
<td>100</td>
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<td>A</td>
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<td>300</td>
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<td></td>
<td>others</td>
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<td>50</td>
<td>300</td>
</tr>
<tr>
<td>Oil burning boiler</td>
<td>light diesel kerosene</td>
<td>A</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>others</td>
<td>A</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>Gas fired boiler</td>
<td>Whole region</td>
<td></td>
<td>20</td>
<td>50</td>
</tr>
</tbody>
</table>

**Monitoring Report**

Dust : 8.7 mg/Nm³
SO2 : ≤ 5 mg/Nm³
NOX : 191 mg/Nm³

www.chinahrxny.com
The 13th five-year plan for biomass development —— [2016]291

Development goals: using total amount of 58 million tons biomass, and 30 million tons of biomass pellets.

<table>
<thead>
<tr>
<th>Use pattern</th>
<th>Scale</th>
<th>Annual Output</th>
<th>Replacing fossil fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Unit</td>
<td>Amount</td>
</tr>
<tr>
<td>Power generation</td>
<td>15 MKW</td>
<td>90 Billion KW</td>
<td>26.60</td>
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<tr>
<td>Biogas</td>
<td>8</td>
<td>9.60 Billion KW</td>
<td>9.60</td>
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<tr>
<td>Biomass briquette fuel</td>
<td>30 Mt</td>
<td></td>
<td>15.00</td>
</tr>
<tr>
<td>Biology liquid fuel</td>
<td>6 Mt</td>
<td></td>
<td>6.80</td>
</tr>
<tr>
<td>Biofuel ethanol</td>
<td>4 Mt</td>
<td></td>
<td>3.80</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>2 Mt</td>
<td></td>
<td>3.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>58.00</td>
</tr>
</tbody>
</table>
Bio-heating industry in China

- Total production of pellets and briquettes reached 8 million tons in 2015.
- The companies engaged in this industry nearly 1000.
- The bio-heating industry in China is just in its embryonic stages.
Great Resources Co., Ltd

100,000 tons of pellets /year
Business Model 1: BOO

- Resources owner
  - Raw material
  - Site
  - Pellet plant 1
  - Pellet plant 2
  - Pellet plant N
  - Capital
  - Technology
  - Great resources

- Fuel storage
- Fuel delivery
- GR service platform
- Monitoring
- Maintenance

- Energy consumers
  - Energy plant
  - Technicians
  - Great resources

Business Model 2: EPC

- Customers’ demand

- System solutions
- System integration technology
- Engineering construction

- Resource survey
- Market research
- Program development
- System design

- Integration of raw material collection, storage, and transportation
- Pellet production system
- Bio-heating system
- Bioenergy combine

- Pipe network construction
- Pellet production line
- Energy plant construction

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Undertake the largest biomass heating projects in China:
The FAW reconstruction project for coal-fired boiler convert to biomass in 2015 (80t, 6 units)
2 Industry Parks for Heating projects

- Heat Demand: district heating in winter.
- Heating area: 6000000 m²
- Boiler size: 3 × 56MW + 2 × 42MW hot water bio-pellet boiler
- Boiler plant area: 50799 m²
- Pellets demand: 120000~150000 t

Heating project in Bonded Area

- Heat Demand: district heating
- Heating area: 952835 m²
- The total investment: 3.9 billion

Heating project in Vocational Education Park
Case study

长春吉隆坡大酒店
供热面积：42000 锅炉配置：2 × 1.4MW + 2 × 2t

长春亿江南利洋大酒店
供热面积：20000 锅炉配置：2 × 1.4MW

长春环球大酒店
供热面积：21263 锅炉配置：2 × 1.4MW

吉林大学第一附属医院
供热面积：13729 锅炉配置：1 × 1.4MW

长春城建学院
供热面积：188000 锅炉配置：3 × 4.2MW + 1 × 2t

长春交通宾馆
供热面积：15000 锅炉配置：1 × 1.4MW

生物质 heating experts
biomass 供热服务专家
Conclusion

- We have a large amount of biomass resources (as much as $7.37 \times 10^8$ t) for bio-heating.
- The space of biomass heating market as high as 600 billion yuan, especially special energy demand heating market, district heating market & industry heating market will be the main consumer of biomass heating.
- From heat-only to CHP heat production gradually in China.
Thank you!

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