Wood Product Markets in China

Ying GAO
Beijing Forestry University

Tallinn, Estonia
June 3, 2015
Outline

1. BFU Introduction
2. Wood Industry in China
3. Wood-based Panel Industry in China
4. Wood Construction in China
Outline

1. BFU Introduction
2. Wood and Industry in China
3. Wood-based Panel Industry in China
4. Wood Construction in China
In 1952, Beijing Forestry College (BFC) was funded.

In 1985, BFC was renamed as Beijing Forestry University (BFU).

About BFU—history

- Total students: 32,000
- Faculty and staff: 1,800
- Graduate students: 4,600

Sustainable Economical Model – Focus on Forest and Wood Industries
Sustainable Economical Model – Focus on Forest and Wood Industries

15 colleges or schools

College of Materials Science and Technology (CMST)

College of Forestry
College of Biological Science and Technology
College of Landscape Architecture
College of Information Science and Technology
School of Economics & Management
School of Technology
School of Continuing Education
School of Foreign Languages
School of Humanities & Social Sciences
School of Science
College of Arts and Design
College of Environmental Science & Engineering
College of Nature Conservation
College of Science

BFU
About CMST

Majors

- Wood Science and Engineering
- Wood Science and Engineering (Furniture design and manufacture)
- Package Engineering
- Chemical Processing of Forest Products
- Chemical Processing of Forest Products (Pulping and papermaking engineering)

Faculty and Staff

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Professor</th>
<th>Associate professor</th>
<th>Lecturer</th>
<th>Administrative &amp; Technical Staff</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate professor</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecturer</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative &amp; Technical Staff</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Outline

1. BFU Introduction
2. Wood Industry in China
3. Wood-based Panel Industry in China
4. Timber Structure in China
### Forest resources in China

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forest area</strong></td>
<td>2.08 (billion hectares)</td>
</tr>
<tr>
<td><strong>Planted Forest</strong></td>
<td>0.69 (billion hectares)</td>
</tr>
<tr>
<td><strong>Standing forestry stock</strong></td>
<td>164.33 (billion m³)</td>
</tr>
<tr>
<td><strong>Forest stock volume</strong></td>
<td>151.37 (billion m³)</td>
</tr>
<tr>
<td><strong>Forest coverage rate</strong></td>
<td>21.63% (2/3 of the world average level)</td>
</tr>
<tr>
<td><strong>Year increment</strong></td>
<td>6.4 (billion m³)</td>
</tr>
<tr>
<td><strong>Commercial forest</strong></td>
<td>47.59%</td>
</tr>
<tr>
<td><strong>Per capita forest area</strong></td>
<td>less than 1/4 of the world average level</td>
</tr>
<tr>
<td><strong>Per capita forest stock</strong></td>
<td>only about 1/7 of the world average level</td>
</tr>
</tbody>
</table>
Chinese domestic and imported wood (log and sawn timber)

- Chinese domestic wood resources:
  - 2004: 5197.3
  - 2005: 5560.3
  - 2006: 6611.8
  - 2007: 6976.7
  - 2008: 8108.3
  - 2009: 7068.3
  - 2010: 8089.6
  - 2011: 8145.9
  - 2012: 8174.9
  - 2013: 8367.0

- Imported wood resources:
  - 2004: 3476.9
  - 2005: 3784.9
  - 2006: 4076.9
  - 2007: 4630.7
  - 2008: 4206.5
  - 2009: 5523.8
  - 2010: 7288.2
  - 2011: 6709.6
  - 2012: 7916.4
  - 2013: 8174.9

2015--- Commercial deforestation of the key national forests is banned in Jilin and Inner-Mongolia province.
2017--- Commercial deforestation of natural forests will be overall banned in China.

**Large size and high quality wood will more rely on import!**
Import timber—log, sawn timber and chips (2013)

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>Quantity</th>
<th>year-on-year</th>
<th>Price (USD/m³)</th>
<th>year-on-year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2013</td>
<td>2012</td>
<td>2013</td>
<td>2012</td>
</tr>
<tr>
<td>Log</td>
<td>m³</td>
<td>4515.9</td>
<td>3789.3</td>
<td>19.2%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Softwood</td>
<td>m³</td>
<td>3316.4</td>
<td>2668.5</td>
<td>24.3%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Hardwood</td>
<td>m³</td>
<td>1199.6</td>
<td>1120.8</td>
<td>7.0%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Tropical</td>
<td>m³</td>
<td>949.6</td>
<td>877.6</td>
<td>8.2%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Sawn timber</td>
<td>m³</td>
<td>2394.7</td>
<td>2056.6</td>
<td>16.4%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Softwood</td>
<td>m³</td>
<td>1691</td>
<td>1422</td>
<td>18.9%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Hardwood</td>
<td>m³</td>
<td>703.7</td>
<td>634.6</td>
<td>10.9%</td>
<td>8.7%</td>
</tr>
<tr>
<td>Tropical</td>
<td>m³</td>
<td>433.5</td>
<td>379.8</td>
<td>14.1%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Chips</td>
<td>10⁴ tons</td>
<td>914.9</td>
<td>757.9</td>
<td>20.7%</td>
<td>-3.4%</td>
</tr>
</tbody>
</table>

---The imported log timber were **$9.17 billion** (28% ↑) and **$67.82 billion** (24% ↑) in 2013.

**Both of the number hit the historical records!**
The share of imported log softwood, temperate and tropical hardwood

The share of imported log (2013)

- Softwood: 73%
- Hardwood (tropical): 21%
- Hardwood (temperate): 6%

The ratio remains stable for 5 years.

Imported log

<table>
<thead>
<tr>
<th>Year</th>
<th>Softwood</th>
<th>Tropical hardwood</th>
<th>Temperate hardwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1854.2</td>
<td>719.8</td>
<td>383.0</td>
</tr>
<tr>
<td>2009</td>
<td>2029.7</td>
<td>614.3</td>
<td>161.9</td>
</tr>
<tr>
<td>2010</td>
<td>2426.8</td>
<td>818.2</td>
<td>189.7</td>
</tr>
<tr>
<td>2011</td>
<td>3145.0</td>
<td>856.2</td>
<td>231.8</td>
</tr>
<tr>
<td>2012</td>
<td>2668.0</td>
<td>877.6</td>
<td>243.4</td>
</tr>
<tr>
<td>2013</td>
<td>3318.0</td>
<td>949.6</td>
<td>250.0</td>
</tr>
</tbody>
</table>
The share of imported sawn timber soft wood and hard wood

2008 (and before): Mainly hardwood

2009-2010: Softwood (64% ↑)

2011-2012: Softwood (69% ↑)

2013: Softwood--16.91 million m³ (70% ↑)

Sawn timber-- 23.95 million m³

In the future years: Softwood-- About 70% ↑
Domestic Wood Production in China (2001-2012)

Data from: China National Forest Product Industry Association
## Wood Production in China

<table>
<thead>
<tr>
<th>Products</th>
<th>Production Output</th>
<th>Production Value (billion Euro)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Furniture</strong></td>
<td>239 (x10^6 piece)</td>
<td>90.4</td>
<td>In 2012</td>
</tr>
<tr>
<td>Domestic log</td>
<td>84.38 (x10^6 m³)</td>
<td>17.0</td>
<td>In 2013</td>
</tr>
<tr>
<td>Domestic sawn timber</td>
<td>62.98 (x10^6 m³)</td>
<td>17.0</td>
<td>In 2013</td>
</tr>
<tr>
<td>Import log</td>
<td>45.16 (x10^6 m³)</td>
<td>21.0</td>
<td>In 2013</td>
</tr>
<tr>
<td>Import sawn timber</td>
<td>23.94 (x10^6 m³)</td>
<td>13.1</td>
<td>In 2013</td>
</tr>
<tr>
<td><strong>Wood-based panel</strong></td>
<td>256 (x10^6 m³)</td>
<td>70.8</td>
<td>In 2013</td>
</tr>
<tr>
<td>Wooden door</td>
<td>150 (x10^6 set)</td>
<td>13.1</td>
<td>In 2012</td>
</tr>
<tr>
<td>Wooden floor</td>
<td>400 (x10^6 m²)</td>
<td>10.5</td>
<td>In 2013</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>266.2</td>
<td>Not including pulp products</td>
</tr>
</tbody>
</table>

Data from: China National Forest Product Industry Association
Characteristic of wood industry in China

- China is the biggest manufacturing country for **wood-based panel**, **wooden floor and wood furniture** in the world;

- A large number of small enterprises (SMEs) -- more than 499,900 companies in 2012.

- Labor intensive industry
  - direct employment population is **15 million**
  - indirect employment population is **50 million**
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Sustainable Economical Model – Focus on Forest and Wood Industries

Wood-Based Panels Industry in China

Wood-based Panels in China

Data from: China National Forest Product Industry Association
In 2012, total production of wood-based panel in China is around 223 million m³, 54.8% of the world production.

Data from: China National Forest Product Industry Association
Export of Wood-based panels

Chinese Wood-based panel export volume
(Share in the global export volume)
Domestic Demands for Wood-based Panels

  -- 36 million units and 20 billion m² new buildings
  -- 300 billion m² new buildings (in the following 10 years)

- “Building Materials Going to Countryside” and “New Rural Construction”,
  -- Annual demand for timber: 500-600 million m³ (nearly 50% of them rely on import)

- Average annual growth of forest industry from 2001 to 2012 is 22.58% (much higher than that of GDP).

Data from: China National Forest Product Industry Association
Wood-Based Panels in China

**Sustainable Economical Model – Focus on Forest and Wood Industries**

<table>
<thead>
<tr>
<th><strong>Total forest area</strong></th>
<th><strong>2000</strong></th>
<th><strong>2010</strong></th>
<th><strong>2020</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>46.667 million ha²</td>
<td>158.94 million ha²</td>
<td>195.00 million ha²</td>
<td>215.00 million ha²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Forest coverage rate</strong></th>
<th><strong>2000</strong></th>
<th><strong>2010</strong></th>
<th><strong>2020</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>16.55%</td>
<td>20.36%</td>
<td>22.4%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Planted forest</strong></th>
<th><strong>2000</strong></th>
<th><strong>2010</strong></th>
<th><strong>2020</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4%</td>
<td>4.667%</td>
<td>10.00%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Wood-based panels production</strong></th>
<th><strong>2000</strong></th>
<th><strong>2010</strong></th>
<th><strong>2020</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 million m³</td>
<td>20.00 million m³</td>
<td>153.60 million m³</td>
<td>250.00 million m³</td>
</tr>
</tbody>
</table>

Data from: China National Forest Product Industry Association
Sustainable Economical Model – Focus on Forest and Wood Industries

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Construction area in China

- Annual wood construction area—about 3 million m² in China;
- Total construction area—852 million m² (2011);
- Wood Construction = 0.35% of total construction area

Market Share of Wood Construction types (Based on construction area)

Data from: Wood Frame Construction Report in China (April 2014)
Sustainable Economical Model – Focus on Forest and Wood Industries

Data from: Wood Frame Construction Report in China (April 2014)
Barriers in promoting wood construction

- **Special situation of China:** Wood structure is usually adopted to construct **low-rise** buildings, which does not conform to the facts, such as the **big urban population density** of China and the priority of multi-storey and high-rise buildings;
- **Consumer factor:** Lack awareness and low acceptance of wood constructions.
- **Administrative factor:** It's difficult to meet the requirements of design scheme, construction drawings, and completion inspection acceptance as well.

*Data from: Wood Frame Construction Report in China (April 2014)*
• **Technical factor:** the current specification of wood structure is still comparatively lagging behind;

• **Construction quality factor:** the construction quality assurance of wood structure is a difficult problem;

• **Cost Price factor:**

---Lack of professional design organization on wood structure leading to the high unit building area design cost;

---Few qualified construction enterprises and project supervision companies of wood structure leading to the high construction cost.

*Data from: Wood Frame Construction Report in China (April 2014)*
Impacts on the Promotion of Wood Construction

Cost price: 28%
Technical specifications: 28%
Users market: 18%
Administrative factors: 12%
Construction quality: 10%
Other factors: 4%

Data from: Wood Frame Construction Report in China (April 2014)
Major Concerns on wood Construction from consumers

Fire protection: 65%
- Moisture resistance: 40%
- Durability: 35%
- Decay and termite resistance: 35%
- Price: 19%
- Quality of construction and timber: 14%
- Thermal insulation: 9%
- Sturdy: 9%
- Maintenance: 7%
- Sound insulation: 2%
- Comfortability: 2%

Data from: Wood Frame Construction Report in China (April 2014)
**Expected future market size**

In the next 3 years, according to the survey, the annual market size is around ***3.5 million m²***

**Expected annual construction area in future** ($x10^4$ m²/year)

- Villas: 120
- Education and culture: 30
- Social welfare: 60
- Community service: 30
- Landscape constructions: 20
- Scenic resort constructions: 50
- Clubs: 20
- Expressway service district: 10
- Other constructions: 10

*Data from: Wood Frame Construction Report in China (April 2014)*
Expected **wood-concrete hybrid** construction market size is around **500,000 m²/year**

<table>
<thead>
<tr>
<th>Types of Wood-Concrete Hybrid Construction</th>
<th>Expected Market Size (x10^4 m²/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood structural floor system</td>
<td>8</td>
</tr>
<tr>
<td>Non-load-bearing outer wooden structure</td>
<td>6</td>
</tr>
<tr>
<td>Non-load-bearing interior walls wooden skeleton</td>
<td>8</td>
</tr>
<tr>
<td>For new residential wood truss roof sloping roof</td>
<td>5</td>
</tr>
<tr>
<td>Wood truss roof for the old multi-storey residential renovation</td>
<td>6</td>
</tr>
</tbody>
</table>
**Typical projects**

**Domestic Constructor**

**Public buildings**
- Exhibition hall / Guizhou Azalea Exhibition
- Vancouver, the Shanghai world expo pavilion
- the Xiang’E Primary School, Novartis Campus Shanghai
- Nanjing Forest Mall
- Xujiang Bridge,
- Temple / Zhejiang

**Residence buildings**
- Villa in Jiangyin
- Landscape / Nanjing Forest Mall
- Slope roof modification from flat roof / A district in Beijing
- Log house in Suifenhe

**Abroad producer:**
- Canada /
- Japan /
- Finland / Honka/ Honkamaja

In China, wood structure is an emerging industry with the integration of the use of sawn timber (lumber), OSB, plywood, etc.
### Guizhou Azalea Exhibition

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td>3522 m²</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>18.2 m</td>
</tr>
<tr>
<td><strong>Circle diameter of the main hall</strong></td>
<td>53 m</td>
</tr>
<tr>
<td><strong>Area of six deputy hall</strong></td>
<td>18.6 m × 11.8 m</td>
</tr>
<tr>
<td><strong>Structure type</strong></td>
<td>Wood structure</td>
</tr>
<tr>
<td><strong>Plinth</strong></td>
<td>Reinforced concrete</td>
</tr>
<tr>
<td><strong>Dome</strong></td>
<td>Timber structure (Douglas fir)</td>
</tr>
<tr>
<td><strong>Surface</strong></td>
<td>Membrane structure</td>
</tr>
<tr>
<td><strong>Construction site</strong></td>
<td>Bijie City, Guizhou province</td>
</tr>
</tbody>
</table>
Vancouver Pavilion at Shanghai Expo 2010

- **Construction site**: Shanghai
- **Completion date**: April, 2010
- **Total construction area**: 200 m²
- **Structure**: Concrete + Timber

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### The Dujiangyan Xiang’E Primary School

<table>
<thead>
<tr>
<th>Construction site</th>
<th>Dujiangyan, Sichuan province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion date</td>
<td>July, 2009</td>
</tr>
<tr>
<td>Land area</td>
<td>1.63 hm²</td>
</tr>
<tr>
<td>Total construction area</td>
<td>5750 m²</td>
</tr>
</tbody>
</table>
Novartis Campus

Construction site: Shanghai
Completion date: September, 2014
Total construction area: 1200 m²
Structure: Timber

Sustainable Economical Model – Focus on Forest and Wood Industries
Timber Structure in China
Nanjing Forest Mall

Sustainable Economical Model – Focus on Forest and Wood Industries

Timber Structure in China
### Glulam structural arch footbridge, Suzhou

<table>
<thead>
<tr>
<th>Construction site</th>
<th>Suzhou, Jiangsu Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion date</td>
<td>May, 2013</td>
</tr>
<tr>
<td>Total length</td>
<td>120 m</td>
</tr>
<tr>
<td>Main Span</td>
<td>75.7 m</td>
</tr>
</tbody>
</table>

**Timber Structure in China**
<table>
<thead>
<tr>
<th>Construction site</th>
<th>Liuzhou, Guangxi</th>
<th>Hangzhou, Zhengjiang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion date</td>
<td>December, 2011</td>
<td>February, 2010</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Timber</td>
<td>Timber</td>
</tr>
</tbody>
</table>

**Sustainable Economical Model – Focus on Forest and Wood Industries**

**Kaiyuan Temple**

**Xiangji Temple**
Villa in Jiangyin, Jiangsu Province

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Timber Structure in China
Re-roofed apartment buildings with habitable attic, downtown Beijing

On-site construction of new roof on existing apartment building, Beijing
Re-roofed apartment buildings, Xu Hui district, Shanghai

Attic living space, downtown in Beijing

Installing thermal insulation in wood frame attic living space
• China is the biggest producer of wood-based panel, wooden floor and furniture in the world;

• The demand of wooden household products are in steady growth;
  • Annual demand for timber is **500-600 million** m³.
  • nearly **50%** of timber rely on imports.

• There are still some barriers in promoting wood structure in China

• A relative small wood structure market, but growing steadily
  • With a expected market size of **3.5 million** m² per year
  • A wood-concrete hybrid construction market size of **0.5 million** m² per year
Thank you!

Ying GAO
Beijing Forestry University
gaoying@bjfu.edu.cn
+86-10-6233-6957