Green Economic Practices of TGP

Science & Technology and Environmental Protection Department
CTGPC
Basic information of the case
Basic information of the case

- the essential backbone engineering project for rectifying and developing the Yangtze River
- feasibility was studied vigorously for almost a century
- represents the highest level of China’s existing technology development and integrated management expertise
Basic information of the case
Basic information of the case

2003 1997

1997 2003

2006 2008
Green economy characteristic-benefits of TGP

- **Social benefits** - flood control and disaster reduction

  Flood control standard of the Jingjiang section arises from preventing 10-year flood to 100-year flood
Since 2004, TGP carried out as a flood control project.

In 2010, TGP reservoir operated to control flood for seven times, cutting about 26.43 billion m³ in total. During the process, the highest reservoir water level at the dam is about 161.02 m el.

On 20 Feb., 2010, in the process of controlling the 70000m³/s flood peak, the max flood peak cutting volume is 30000 m³/s, cutting about 7.6 billion m³.
Funding for the resettlement of residents relocated for the TGP, dedicated domestic air programs for the affected areas, and the facilitation of navigation along the Yangtze River have created opportunities for transforming the mode of economic growth in the reservoir area and for lifting local residents out of poverty and improving their living standards.

### Green economy characteristic-benefits of TGP

#### Social benefits-poverty reduction

<table>
<thead>
<tr>
<th></th>
<th>1996</th>
<th>2005</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Countrywide (¥)</strong></td>
<td>5846</td>
<td>14185</td>
<td>25605</td>
</tr>
<tr>
<td><strong>TG reservoir region(¥)</strong></td>
<td>3723</td>
<td>10038</td>
<td>19518</td>
</tr>
<tr>
<td><strong>Ratio(%)</strong></td>
<td>63.7</td>
<td>70.8</td>
<td>76.2</td>
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</tbody>
</table>
### Green economy characteristic-benefits of TGP

#### Social benefits-poverty reduction

Before and after resettlement of three gorges reservoir area of economic index comparison table

<table>
<thead>
<tr>
<th>Item</th>
<th>unit</th>
<th>Hubei area</th>
<th>Chongqing area</th>
<th>1992</th>
<th>2007</th>
<th>average annual growth rate</th>
<th>1997</th>
<th>2007</th>
<th>average annual growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP total</td>
<td>100 million RMB</td>
<td>19.63</td>
<td>139.48</td>
<td>13.97</td>
<td>208.22</td>
<td>702.70</td>
<td>12.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per capita</td>
<td>RMB</td>
<td>1179.58</td>
<td>8841.62</td>
<td>14.37</td>
<td>2528.52</td>
<td>8006.50</td>
<td>12.22</td>
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<tr>
<td>Local financial revenue total</td>
<td>100 million RMB</td>
<td>1.77</td>
<td>20.65</td>
<td>17.80</td>
<td>14.11</td>
<td>52.48</td>
<td>14.03</td>
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<tr>
<td>Local financial revenue Per capita</td>
<td>RMB</td>
<td>166.40</td>
<td>1309.21</td>
<td>14.74</td>
<td>171.38</td>
<td>597.91</td>
<td>13.31</td>
<td></td>
<td></td>
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<tr>
<td>Year end deposit balance of urban and rural residents total</td>
<td>100 million RMB</td>
<td>5.62</td>
<td>100.74</td>
<td>21.22</td>
<td>92.93</td>
<td>558.47</td>
<td>19.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year end deposit balance of urban and rural residents Per capita</td>
<td>RMB</td>
<td>337.84</td>
<td>6386.15</td>
<td>21.65</td>
<td>1128.54</td>
<td>6363.16</td>
<td>18.88</td>
<td></td>
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<tr>
<td>Urban per capita disposable income</td>
<td>RMB/capita</td>
<td>1557</td>
<td>8963</td>
<td>12.38</td>
<td>3609</td>
<td>10114</td>
<td>10.85</td>
<td></td>
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<tr>
<td>Rural income</td>
<td>RMB/capita</td>
<td>531</td>
<td>3115</td>
<td>12.52</td>
<td>1357</td>
<td>3027</td>
<td>8.35</td>
<td></td>
<td></td>
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<tr>
<td>Urban housing area</td>
<td>m²/capita</td>
<td>26.66</td>
<td>39.08</td>
<td>17.75</td>
<td>28.9</td>
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<tr>
<td>Rural housing area</td>
<td>m²/capita</td>
<td>37.21</td>
<td>47.54</td>
<td>27.25</td>
<td>34.38</td>
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</table>
Green economy characteristic-benefits of TGP

➢ Social benefits-water supply

From 2006 to 2010, the reservoir supply water above 1500 million m³ in total, the main effect of water supply operation is to improve the water quality and navigation condition, provide industry, agriculture and other ecological water demand for downstream.
Since the first unit generates electricity on 10 July, 2003, to the last day of 2010, TG hydropower station has generated about 450 TWH, equivalent to one-tenth of China's total power production in 2009,
TGP strongly facilitated navigation along the Yangtze River and the development of the regional economy.

After the impounding of TG reservoir, the navigation condition from Yichang to Chongqing is improved, the energy consumption per km reduce about 46%. And in dry season, the reservoir will supply flow to downstream, which will improve the navigation condition of downstream. From 16 June, 2003 to 31 Dec, 2010, the amount of cargo through TG site is above 44 million tons, which is more than two times of the total amount of cargo through the ship lock of Gezhouba dam in 22 years before the impoundment of TG reservoir.
In China’s National Climate Change Programme, the hydropower is thought as an important countermeasure to develop China’s energy structure to clean and low carbon energy, and is expected to reduce GHG emissions about 50% of the total reduce amount. Since the first unit generates electricity on 10 July, 2003, to the last day of 2010, TG hydropower station has generated about 450 TWH, equivalent to reduction GHG emission about 370 million tons.
Green economy characteristic-benefits of TGP

- Environment benefits-promote ecological conservation

- 中华鲟

- 荷叶铁线蕨

- 中华鲟
The relevance of the challenge and objectives
The relevance of the challenge and objectives

- Budget: ¥900.9 billion (static investment), ¥2039 billion (dynamic investment).

<table>
<thead>
<tr>
<th>Diversified financing channel</th>
<th>Fist phase (93-97)</th>
<th>Second phase (98-03)</th>
<th>Third phase (04-09)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Financing</td>
<td>TGP construction fund</td>
<td></td>
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<td></td>
<td>Gezhouba power plant power generation returns</td>
<td></td>
<td></td>
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<td></td>
<td>TG power plant generating revenue and equity financing</td>
<td></td>
<td></td>
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<tr>
<td>Debt Financing</td>
<td>The state development bank loans</td>
<td></td>
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<tr>
<td></td>
<td>corporate bonds</td>
<td></td>
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<tr>
<td></td>
<td>i foreign investment</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Local commercial bank loans</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The relevance of the challenge and objectives

- Resettlement

- 1,200,000 persons
- 632 km²
- 1629 companies
- 6530 villages
- 356 countries
- 20 counties (cities)
- 175m persons
The relevance of the challenge and objectives

Main resettlement way

- On-site resettlement
- Out-site resettlement
The relevance of the challenge and objectives

➢ Technology
The relevance of the challenge and objectives

- Technology
  
  The introduction of large-scale hydropower unit digestion, absorption and innovation

- Technical Route
  
  The combination of technology and trade, technology transfer, joint design, cooperative production

- Three musts
  
  - Bidder must joint with Chinese manufacturing enterprises design and manufacture.
  - Must report to China enterprise comprehensive core technology transfer, training the Chinese technical personnel.
  - China's manufacturing enterprise is not lower than the share 25% of the contract price, the last 2 sets of the 14 left units must be made mainly by China manufacturing enterprise
The relevance of the challenge and objectives

- How to management the project hugest hydropower plant, largest number of resettlement and largest volume of work in the world?
The relevance of the challenge and objectives

- Project management system - Project legal person responsibility system

Bidding Invitation
Contract System

Supervision System

From planning economics to market economics
The relevance of the challenge and objectives

- **Invest management** - One mode: “static control, dynamic management”

### Static control
- **Pivotal Proj.**
  - Responsible by CTGPC
- **Resettlement Proj.**
  - Coordinate by TGP office
  - Responsible by Chongqing GOV.
  - Responsible by Hubei Gov.

### Dynamic Management
- **Escalation**
  - Paid by nation
- **Financing cost**
  - Paid by nation, optimized by owner
The relevance of the challenge and objectives

- Project quality management-"4+1" five level quality management system

- TGP Quality inspection group on behalf of gov
  - Quality management office of TGP
  - Sub-project management team
  - Quality control by supervisors
  - Quality control by contractors
The relevance of the challenge and objectives

Safety management

➢ Safety management Policies

- Human being first, keep all staff safety and healthy
- Focus on prevention from process risks during construction
- Enhancing supervision according to safety related laws and regulations
- Improving continuously to build first class enterprise in the globe
The relevance of the challenge and objectives

- Environmental protection and ecological conservation - EIA

Overall environment

Natural environment

- Local climate
- Water quality
- Water temperature
- Environmental geology
- Terrestrial plants
- Terrestrial animals
- Aquatic life
- Sedimentation and scouring
- Waterlogging in plain and lake areas of middle reaches
- Estuarine ecosystem

Social environment

- Inundation and resettlement
- Public health
- Natural landscape
- Cultural relics and historic sites
- Project construction
- Flood control
- Power generation
- Navigation
- Reservoir flood control
- Species and habitats
- Soil erosion etc.
- Solid waste
- Impact analysis of dam-breaking
- Environmental problems
The relevance of the challenge and objectives

Environmental protection and ecological conservation

- Aquatic ecology conservation-science base
Researches on rare species conservation

A series researches about Chinese sturgeon, Acipenser dabryanus, Chinese river dolphin, Paddlefish, Neophocaena phocaenoides asiaeorientalis Pilleri and Myxocyprinus asiaticus Bleeker,etc.

Researches on reservoir operation considering the demand of the downstream aquatic system

Research on the demand of "four major Chinese carps " to the operation of TGP

Research on the change trend and countermeasures of Chinese river dolphin and Neophocaena phocaenoides asiaeorientalis Pilleri after the impounding of TG reservoir.

The primary research on the impact on relation of Yangtze river and Dongting and Poyang lake and the environment of these two lake from the impounding of TG reservoir
Environmental protection and ecological conservation

- Aquatic ecology conservation - Breeding and releasing
The ecological and environmental monitoring system of TGP

Environmental protection and ecological conservation

The relevance of the challenge and objectives
## The goals of hydropower development

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals of conventional</td>
<td>194,000MW</td>
<td>260,000MW</td>
<td>350,000MW</td>
</tr>
<tr>
<td>hydropower projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New capacity</td>
<td></td>
<td>66,000MW</td>
<td>90,000MW</td>
</tr>
<tr>
<td>Goals of pumped storage</td>
<td>17,000MW</td>
<td>30,000MW</td>
<td>70,000MW</td>
</tr>
<tr>
<td>stations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New capacity</td>
<td></td>
<td>13,000MW</td>
<td>40,000MW</td>
</tr>
<tr>
<td>Goals of hydropower projects</td>
<td>211,000MW</td>
<td>290,000MW</td>
<td>420,000MW</td>
</tr>
<tr>
<td>New capacity</td>
<td></td>
<td>79,000MW</td>
<td>130,000MW</td>
</tr>
</tbody>
</table>

During the twelfth five-year period, hydropower projects with a total capacity of 140,000MW will be launched into construction, including pumped storage projects with a capacity of 40,000MW; hydropower projects with a total installed capacity of 80,000MW will be newly added.
Scaling up
Aside from fully harnessing hydro-energy resources, the TGP has also made painstaking endeavors to eliminate poverty, reverse ecological damage, preserve biodiversity, and reduce gashouse gas emissions, scoring remarkable achievements. It has explored paths to eco-friendly utilization of water resources for the green economy as well.
Thank you very much for your attention!