

Project Idea Note

Name of the project: Beihe II Small Hydropower Project

Summary Box

<p>Sector</p> <p>Renewable Energy <input checked="" type="checkbox"/> Energy Efficiency <input type="checkbox"/></p> <p>Power <input type="checkbox"/> Fuel Switching <input type="checkbox"/></p> <p>Transport <input type="checkbox"/> Agriculture <input type="checkbox"/></p> <p>Chemical Industry <input type="checkbox"/> Waste Management <input type="checkbox"/></p> <p>Other (please specify)</p>	<p>GHG abated</p> <p>CO₂ <input checked="" type="checkbox"/> CH₄ <input type="checkbox"/> N₂O <input type="checkbox"/> HFCs <input type="checkbox"/></p> <p>PFCs <input type="checkbox"/> SF₆ <input type="checkbox"/></p>
<p>Finance</p> <p>Project Cost: 66,150,000 CNY</p> <p>Private Equity: 40%</p> <p>Debt: 50%</p> <p>Government grant: 0%</p> <p>CDM finance(approx.): 10%</p> <p>CER price: n/a</p>	<p>Status of project</p> <p>Commissioned <input type="checkbox"/> Yet to be commissioned <input type="checkbox"/></p> <p>PIN <input checked="" type="checkbox"/> PDD <input type="checkbox"/></p>

PIN Prepared: Dec 20, 2006

Index:

A. Project description, type, location and schedule

1. Type of project
2. Location of the Project
3. Project timeline
4. Objective of the project
5. Project goals and technical specifications
6. Project developer
7. Project proponent

B. Baseline emissions and projected environmental and social benefits

1. Assumed baseline emissions
2. Primary national and local environmental benefits
3. Environmental guidelines
4. Socio-economic impacts

C. Finance

1. Project cost estimate
2. Sources of finance
- 3-6. CER info

7. Review of project parameters

A. Project description, type, location and schedule

Project Title: Beihe II Small Hydropower Project	
1. Type of the project	
Greenhouse gases targeted	CO ₂
Sector	Renewable Energy
Bundling option considered	Yes
2. Location of the project	
Town, County, City, Province	Dongkeng Town, Jingning She Minority Group Autonomous County, Lishui City, Zhejiang Province
Brief description of the location of the project site	Jingning county is a mountainous region, with mountains occupying an area of about 2,808,000 mu, accounting for 96% of the area with 68.7% forest coverage. Annual water resources is about 2.226 billion m ³ or 13300 m ³ per capita, which is 5.5 times more than provincial level and 4.8 times more than the national level. The developable small hydropower capacity is 180,000 kW with an annual output of 480 mil kWh.
3. Project timeline	
i. Earliest project start date	October 2006
ii. Expected first year of CER delivery	N/A
iii. Crediting period	10 years
iv. Project Lifetime	40 years
v. Current status of the project	The Feasibility Study was carried out by Zhejiang Design Institution of Water Conservancy & Hydroelectric Power and was approved by the Zhejiang Province Lishui City Planning Commission.
vi. Current status of the acceptance by the Environment Protection Bureau of Zhejiang province and Water Resources Bureau of Zhejiang Province	Letter of Approval is available.
4. Main project objectives	<p>Beihe II SHP will increase the ratio of clean energy within the Zhejiang province energy mix and contribute to the reduction of reliance on antiquated and highly polluting thermal plants. While the province has a relatively diverse energy mix including hydro, wind, energy from waste disposal, and nuclear, the bulk of the electricity is generated by coal and to a lesser extent by oil.</p> <p>The plant also compliments the goal of poverty reduction and rural electrification. Local individuals from minority or disadvantaged backgrounds hold 20% of the private shares. The plant will also help more locals to gain access to electricity and contribute to forest protection, as locals are encouraged to switch from firewood to electric power for heating and cooking.</p>
5. Detailed project goals and technical specifications	The project is focused on increasing clean energy for the Zhejiang Province and the reduction on of reliance on coal-fired plants while also providing electricity and environmental protection to the immediate vicinity of the project.

	<p>As a Stage II station on the Beixi River of Jingning County, it will improve efficiency in harnessing the available water resource. The Stage I station, a widely successful project (in terms of environmental, social, and energy benefits) that is being emulated in other parts of the county, is further upstream of the Beixi river, thus creating a cascade style environment and improving nominal output of the Stage II plant.</p> <p>The Stage II station would be located in Dongkeng Town in Jingning She Minority Group Autonomous County. The plant has an installed capacity of 8 megawatts (2 X 4000kW vertical mixed-flow turbines), design head of 44.25 meters, and mean average discharge of 7.06 m³/s.</p> <p>The dam to be constructed for the Stage II plant will be a steel reinforced cement structure with a maximum dam height of 35.4 meters and a crest of 89.93 meters. With a construction period of 18 months, the most important feature of this station is its regulation capacity at 280,000 m³.</p> <p>While Jingning County has one of the most abundant water resources across the country, the lack of stations with regulatory capacity has been a setback for meeting electricity demand with hydropower during the low water period. Stage II's features will contribute to stabilizing the availability of electricity during low water periods.</p> <p>Total installed capacity of the entire project equates to 8,000kW. The station has on-site generators (x2 with a rated output of 8000 kW and nominal voltage of 6300) and a transformer. The electricity is then transmitted at 110 kV via loop line to the Beihe Powerhouse 4 km away.</p> <p>From here, it is transmitted to the Lishui City grid for sales to the Zhejiang Provincial grid with allocations for the county grid as well, both according to demand and generation ability based on water levels.</p> <p>This will help increase the ratio of renewables within the Zhejiang province energy mix, which currently relies heavily on coal. Of the total annual output of 109.1 billion kWh, coal currently accounts for 70 billion kWh (64.2%) with nuclear energy at 14.9 bill. kWh (13.7%), diesel-fired (13.1 bill. kWh, 12.01%), hydro (8.3 bill. kWh, 7.6%), and others such as very small amounts of wind and power from waste disposal making up the rest of the 2.49%.</p> <p>The annual output of the station is 21.2 million kWh with an annual operating time of 2650 hours at an efficiency of 95%. 19.14 million kWh will be supplied to the city grid at an average price of 0.425 yuan/kwh, generating an annual electricity sale of 8.13 million yuan.</p>
--	---

6. Project developer	
Name of project developer / Seller	Jingning County Baihe II Station Hydropower Co. Ltd
Name of the contact	
Organizational category	Private enterprise
Basic information on developer activities and structure	The Jingning County Baihe II Station Hydropower Co. Ltd was setup to construct and maintain the Beihe II station. It follows the national policy of decentralized, private ownership of SHP's in which the local population is an active participant in all phases of project development. This includes labour for construction, maintenance, and shareholders. The villagers of the project site will be share holders of Baihe II project. 700 people will benefit from the project directly.
Address	Hexi Town, Jingning County, Zhejiang Province, P.R.China
Telephone / fax	
E-mail and web address, if any	
7. Project Proponent	
Name of project proponent	International Center on Small Hydropower (IC-SHP) (Secretariat of IN-SHP)
Name of contact regarding this particular project	Hu Xiaobo(Linda_hic@163.com)
Organizational category	NGO
Function in the project	Technical Advisor, Intermediary
Main activities	IC-SHP has been organizing actively various small hydropower projects (training, consultancy, international SHP technology and equipment exchange, all over the world over its 10 years of experience in the sector. The government of China recently asked IC-SHP to evaluate projects under its national programs such as "Send electricity to villages" and "Replace firewood with electricity".
Address	Nanshan Road 136, PO Box 202, Hangzhou 310002, P.R. China
Telephone / fax	Tel: +86 571 870 23380 / Fax: +86 571 87023353
E-mail and web address, if any	http://www.inshp.org

B. Baseline emissions and projected environmental and social benefits

1. Assumed baseline emissions	
i. Estimate of Greenhouse Gas reduction for the crediting period proposed (in metric tons of CO ₂ -equivalent)	<p>Annual: 16,536.96 tCO₂</p> <p>Start of March 2008 - end of February 2013 (5 years): 82,684.8 tCO₂-equivalent</p> <p>Start of March 2008- end of February 2018 (10years):</p>

	165,369.6 tCO ₂ -equivalent																												
ii. Baseline scenario	<p>Coal is still the fuel of choice in this region as it is cheap and plentiful nationwide. However, transportation costs are considerably higher for rural areas and environmental costs are even higher. To reduce the reliance on coal, the province is committed to more environmentally sound energy technology. Beihe II is thus essential, for its success will promote the emulation of like projects, increasing renewable energy sources for the province’s urban centers and rural population.</p> <p>As the purpose of this project is to generate electricity to a grid with a renewable energy source, baseline methodology <i>I.D.b</i> from Appendix 2 of <i>Simplified Procedures for Small-Scale Projects</i> (UNFCCC) has been applied. The emission factor was calculated using total emissions of CO₂ divided by annual output from the province (see below for figures). Plant efficiency figures were provided by the government and the <i>Zhejiang Province Energy Efficiency Whitepaper</i>. Carbon Emission Factors were derived from the <i>Revised 1996 IPCC Guidelines</i>.</p> <table border="1" data-bbox="646 931 1412 1227"> <thead> <tr> <th>Type</th> <th>Installed Capacity</th> <th>Annual Output</th> <th>Efficiency</th> </tr> </thead> <tbody> <tr> <td><i>Coal</i></td> <td>11.33 mil kW</td> <td>70 bil kWh</td> <td>Coal: 32%</td> </tr> <tr> <td><i>Oil</i></td> <td>3.99 mil kW</td> <td>13.1 bil kWh</td> <td>Diesel: 35.6%</td> </tr> <tr> <td><i>Hydropower</i></td> <td>4.17 mil kW</td> <td>8.3 bil kWh</td> <td>CEF</td> </tr> <tr> <td><i>Nuclear</i></td> <td>2.406 mil kW</td> <td>14.9 bil kWh</td> <td>Coal: 25.8</td> </tr> <tr> <td><i>Other</i></td> <td>1.8 mil kW</td> <td>2.8 bil kWh</td> <td>Diesel: 20.2</td> </tr> <tr> <td>Total:</td> <td>23.82 mil kW</td> <td>109.2 bil kWh</td> <td></td> </tr> </tbody> </table> <p>While a comprehensive method for including the CO₂ reduction and added carbon sink of protected forest areas is not available (mostly due to a lack of exact statistical data), the project will not only add to the nation-wide reduction of emissions, but also contribute to safeguarding forests and reducing reliance on traditional biofuel.</p>	Type	Installed Capacity	Annual Output	Efficiency	<i>Coal</i>	11.33 mil kW	70 bil kWh	Coal: 32%	<i>Oil</i>	3.99 mil kW	13.1 bil kWh	Diesel: 35.6%	<i>Hydropower</i>	4.17 mil kW	8.3 bil kWh	CEF	<i>Nuclear</i>	2.406 mil kW	14.9 bil kWh	Coal: 25.8	<i>Other</i>	1.8 mil kW	2.8 bil kWh	Diesel: 20.2	Total:	23.82 mil kW	109.2 bil kWh	
Type	Installed Capacity	Annual Output	Efficiency																										
<i>Coal</i>	11.33 mil kW	70 bil kWh	Coal: 32%																										
<i>Oil</i>	3.99 mil kW	13.1 bil kWh	Diesel: 35.6%																										
<i>Hydropower</i>	4.17 mil kW	8.3 bil kWh	CEF																										
<i>Nuclear</i>	2.406 mil kW	14.9 bil kWh	Coal: 25.8																										
<i>Other</i>	1.8 mil kW	2.8 bil kWh	Diesel: 20.2																										
Total:	23.82 mil kW	109.2 bil kWh																											
2. Primary national and local environmental benefits	<p><i>National Benefits</i></p> <ul style="list-style-type: none"> - The station will aid the reduction of CO₂ emissions and dependence on coal powered thermal plants, which still makes up the majority of the provincial energy source. - While the project does not provide a drastic change to the current provincial energy mix, it is an important addition, especially in the long-term. Successes of such smaller scale projects are essential in encouraging an emulation of many more such projects. This will eventually help supply a significant portion of the provincial energy with minimal damage to the environment and maximum benefit for the rural population. - Currently, Zhejiang Province does not have enough energy to meet its demands - The electricity shortage in 2006 in summer reached 4 million kwh. Promotion of 																												

	<p>renewable energy sources are thus more important to offset this demand, lessen transmission losses, and offset the need to create emissions producing thermal plants.</p> <p><i>Local Benefits</i></p> <ul style="list-style-type: none"> - Local CO₂ emissions should also be reduced in a complementary process of decreasing the use of fuelwood for heating and cooking, thereby protecting area forests, another natural carbon sink. - The plant aids the county to actively participate in a programme to replace fuelwood with electricity. So far, 179,000 peasants in Jingning have access to clean energy. - Through such clean energy projects, the county hopes to maintain and increase the current public forest area, which is currently 10.5 m² per capita. Between 1992 and 2003, the forest cover has increased from 66.7% to 79.1% and 100% of the water supply has been approved of its quality. - Protecting the forest will also safeguard against floods, erosion and reduction of water retention by the forest floor, which typically consists of a thin layer of topsoil. - Jingning is home to many protected species of birds and plants. Their natural habitat will be safeguarded by forest protection and the reduction of human activity in forest areas for fuelwood gathering purposes. <p><i>Submerged Areas:</i> This includes woods (1.334 km²), paddies (0.053 km²), dry fields (0.047 km²), and permanent occupied land (0.80 km²) for a total of 2.234 km². Compensation has been set aside in the budget (Section C.1.ii) for submerged private property. Environmental studies have also been conducted and approved by official entities (see Sections A.7.vi and B.3) to determine that the flooding is negligible and sustainable over the long-term.</p>
<p>3. Environmental Guidelines</p>	<p>Every small hydropower project in China is required to satisfy an Environmental Impact Study that will be approved/disapproved by the provincial government.</p> <p>There are also several regulations and laws that the project must comply with:</p> <p>General Environmental Legal Documents to be complied:</p> <ol style="list-style-type: none"> (1) Environmental Protection Law of P.R.C (Dec.1989) (2) Law of Water and Soil Conservation of P.R.C (June, 1991) (3) Regulations on Handling Waste Water of P.R.C (May.1997) (4) Regulations of Environmental Protection for Construction Projects (5) Regulations of Water Pollution Prevention of P.R.C (Mar.2000) (6) Environmental Protection Design Standard of Construction Projects <p>Technical Regulations:</p>

	<ol style="list-style-type: none"> (1) Technical Regulations of Water and Soil Conservation Program for Development and Construction Project, (SL204-98) (2) Regulations for Comprehensive Administration on Water and Soil Conservation (GB/T16453.1 ~ 16453.1-1996) (3) Outdoor Drainage Design Standard (GBJ14-87) (4) Surface Water Resources Quality Standard (GHZBI-1991) (5) Surface Water Environment Quality Standard (SL63-94) (6) Comprehensive Drainage Standard of Waste Water (GB8978-1996) (7) Water Quality Standard for Farmland Irrigation (GB5084-85) (8) Noise Standard in Urban Areas (GB3096-93) (9) Noise Limitation in Construction Area (GB12523-90) (10) Air Quality Standard (GB3095-1996) (11) Comprehensive Standard for Air Pollutant Emission (GB16297-1996) (12) Regulations of Primary Design Report for Hydroelectric Projects (DL5021-93) <p>The Designated National Authority does place or impose additional environmental requirements or regulations on SHP CDM projects.</p>
<p>4. Socio-economic impacts Projected social and economic contributions from implementation</p>	<ul style="list-style-type: none"> o The local disadvantaged and minorities (individuals or groups) are all qualified to purchase shares, thus allowing the local communities direct access to a portion of the profits from electricity sales. Among the 100,000 people of She and Han origin, 10,000 people are already shareholders of various SHP projects. The project will also increase local tax revenue from electricity sales. o All labour needed for the construction of the station (529 construction personnel, 180,400 labour days) is from the local population, providing additional employment and income for the short-term. o In the long-term, part of the crew for the maintenance of the plant will be staffed by qualified individuals from the local population. o Increased access to electricity in the local community, providing opportunities for new alternative cottage industries and added efficiency for existing ones. o Positive contribution to education and gender empowerment can effectively arise from greater access to energy including added health benefits arising from the reduction of fuelwood emissions from heating and cooking purposes.

C. Finance

<p>1. Project cost estimate</p>	<p>(Exchange rate used: 1 USD = 7.7 CNY)</p>
<p>i. Total project cost (including loan interest and active capital)</p>	<p>66,150,000 CNY</p>

ii. Breakdown of costs:		<u>Percentage of Total Cost:</u>
- <i>Equipment & Machinery</i>	11,380,000CNY	17.2%
- <i>Construction Engineering Fee</i>	26,900,000 CNY	40.7%
- <i>Other expenses</i>	23,880,150 CNY	36.1%
- <i>Compensation for submerged private property</i>	2,070,000 CNY	3.10%
- <i>Interest on loan</i>	1,930,000 CNY	2.90%
iii. Incase of power projects		
<i>Sale of power (million units)</i>	Effective electricity generation 21,200 MWh/year. Electricity sold to the grid: 19,140 MWh/year.	
<i>Revenue from sale of power</i>	<p>> Net revenue: 19,140 MWh/year × 0.425 CNY/kWh = 8.13 million CNY/year (1,055,844USD/year)</p>	
2. Sources of finance		
i. Equity	Although the final amount of equity capital is still to be determined, shareholders' equity contributions are expected to be 31.8% of the total funds required of which 20% of the shareholders are local disadvantaged and minority individuals and groups.	
ii. Loan	45.5% of the project cost will be met by loans from the Commercial Bank (Zhejiang Branch) to be paid back over a maximum of 14.95 years, and 22.7% of the project cost applies for CDM fund	
iii. Grant	N/A	
3. Sources of CER buyers	N/A	
4. Indicative CER Price (USD / CER)	N/A	
5. Proposed CER crediting period	10 years	
6. Total CER's generated	16,536.96 tCO ₂ /year	
7. Review of project parameters	<p>Installed capacity: 8MW; Average annual output: 21.2GWh; Effective amount of electricity: 20.14GWh; Electricity provided to the Lishui City grid: 19.14GWh;</p> <p>Total Investment in plant: 66,150,000 CNY; Investment per kW and kWh: 9,590 CNY and 3.12 CNY;</p> <p>Electricity Sales Price: 0.425 CNY /kWh;</p> <p>FIRR: 7.01%; Payback period 14.95 years from the initiation of the project based on a 40-year operation period.</p>	