

# Project Idea Note

Name of Project: Ma'er Small Hydropower Project

## Summary Box

<p><b>Sector</b></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><b>GHG abated</b></p> <p>CO<sub>2</sub> <input checked="" type="checkbox"/> CH<sub>4</sub> <input type="checkbox"/> N<sub>2</sub>O <input type="checkbox"/> HFC <input type="checkbox"/></p> <p>PFCs <input type="checkbox"/> SF<sub>6</sub> <input type="checkbox"/></p>
<p><b>Finance</b></p> <p>Project Cost: 99,961,800 CNY</p> <p>Private Equity: 30%</p> <p>Debt: 70%</p> <p>Government grant: 0%</p> <p>CDM finance: 0%</p> <p>CER price: n/a</p>	<p><b>Status of project</b></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: March, 2007

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A. Project description, type, location and schedule

<b>Project Title: Beihe II Small Hydropower Project</b>	
<b>1. Type of the project</b>	
Greenhouse gases targeted	CO <sub>2</sub>
Sector	Renewable Energy
Bundling option considered	Yes
<b>2. Location of the project</b>	
Town, County, City, Province	Gudeng Town, Lushui Lisu Minority Autonomous County, Nujiang State, Yunan Province
Brief description of the location of the project site	The station utilizes the water from Makuadi river and Eduoluo river which are both branches of Nujiang river with a distance of 5 km at the joint. The project site is 61 km to the new county seat of Lushui County.
<b>3. Project timeline</b>	
i. Earliest project start date	May 2006
ii. Expected first year of CER delivery	N/A
iii. Crediting period	7 years
iv. Project Lifetime	45 years
v. Current status of the project	The project was started in March 2006, the first unit will put into commission in May of 2008, the second will be completed in August 2008.
vi. Current status of the acceptance by the Environment Protection Bureau of Yunnan province and Water Resources Bureau of Yunnan Province	Letter of Approval is available.
<b>4. Main project objectives</b>	<p>The main purpose of Ma'er hydro project is for electricity generation.</p> <p>The project will mitigate the electricity shortage problem in Nujiang state and play an important role in poverty alleviation in Southwest China.</p>
<b>5. Detailed project goals and technical specifications</b>	<p>The hydropower development in Nujiang state can not meet the local electricity demand. Restricted by several reasons such as geographic location, transportation and bad infrastructures, Lushui county is stricken by poverty. The project is planned to supply electricity to Nujiang state to improve its energy reliability and to bring the "replacing firewood with electricity" program into effect.</p> <p>The Ma'e station is a division run-off-river type station, which would be located in Gudeng Town in Lushui County. The plant has an installed capacity of 24 megawatts (2 X 12000kW impulse turbines), design discharge is 4.66m<sup>3</sup>/s, of which the 1# design discharge is 2.30 m<sup>3</sup>/s and the 2# is 2.90 m<sup>3</sup>/s;</p>

	<p>The two dams to be constructed for Ma'e Station will be a C20 monumented concrete structure with a maximum crest elevation of 1756.81 meters and 1754.80 meters respectively. The 1# dam site is located at Makuadi river and the 2# dam site is located at Eduoluo river. The 1# division system is 6988m long, including 5 sections of tunnel with a total length of 5816m; the 2# division system is 6243m, including 6sections of tunnel with a total length of 1172m. The two units share a main penstock , of which the total length is 1326.606m, inside diameter is 1.2m. The size of the main powerhouse is 49.82m x 15.5m x 24.5m. With a construction period of 24months.</p> <p>The rated output of the two generator is 12000kw, rated frequency is 50HZ, rated voltage is 10.5kv. The two main transformer is type of SF9-12500/110, with rated capacity of 12500kVA.</p> <p>The total installed capacity is 24MW, guaranteed output is 6215kw, average annual generation is 111520Mwh, which will be sold to Nujiang grid through a 110kv line, transmission distance is 20km.</p>
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<b>6. Project developer</b>	
Name of project developer / Seller	Nujiang Zhedian Hydropower Development Co., Ltd
Name of the contact	
Organizational category	Private enterprise
Basic information on developer activities and structure	Nujiang Zhedian Hydropower Development Co., Ltd was set up to construct and maintain the Ma'e 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.
Address	Gudeng Town, Lushui County, Yunnan Province, P.R.China
Telephone / fax	
E-mail and web address, if any	
<b>7. Project Proponent</b>	
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: +86 571 871 32792 / 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 <sub>2</sub> -equivalent)	<p>Annual: <u>76,018.54 tCO<sub>2</sub></u></p> <p>Start of August 2008 - end of July 2015 (7 years): 532,129.81 tCO<sub>2</sub> -equivalent</p>																												
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. Ma'e 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>ACM002</i> has been applied. The emission factor was calculated using total emissions of CO<sub>2</sub> 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 1216 1407 1507"> <thead> <tr> <th>Type</th> <th>Installed Capacity</th> <th>Annual Output</th> <th>Efficiency</th> </tr> </thead> <tbody> <tr> <td>Coal</td> <td>11.33 mil kW</td> <td>70 bil kWh</td> <td>Coal: 32%</td> </tr> <tr> <td>Oil</td> <td>3.99 mil kW</td> <td>13.1 bil kWh</td> <td>Diesel: 35.6%</td> </tr> <tr> <td>Hydropower</td> <td>4.17 mil kW</td> <td>8.3 bil kWh</td> <td>CEF</td> </tr> <tr> <td>Nuclear</td> <td>2.406 mil kW</td> <td>14.9 bil kWh</td> <td>Coal: 25.8</td> </tr> <tr> <td>Other</td> <td>1.8 mil kW</td> <td>2.8 bil kWh</td> <td>Diesel: 20.2</td> </tr> <tr> <td><b>Total:</b></td> <td><b>23.82 mil kW</b></td> <td><b>109.2 bil kWh</b></td> <td></td> </tr> </tbody> </table> <p>While a comprehensive method for including the CO<sub>2</sub> 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	Coal	11.33 mil kW	70 bil kWh	Coal: 32%	Oil	3.99 mil kW	13.1 bil kWh	Diesel: 35.6%	Hydropower	4.17 mil kW	8.3 bil kWh	CEF	Nuclear	2.406 mil kW	14.9 bil kWh	Coal: 25.8	Other	1.8 mil kW	2.8 bil kWh	Diesel: 20.2	<b>Total:</b>	<b>23.82 mil kW</b>	<b>109.2 bil kWh</b>	
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2. Primary national and local environmental benefits	<p><i>National Benefits</i></p> <ul style="list-style-type: none"> <li>- The station will aid the reduction of CO<sub>2</sub> emissions and dependence on coal powered thermal plants, which still makes up the majority of the provincial energy source.</li> <li>- 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</li> </ul>																												

	<p>kind of 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.</p> <ul style="list-style-type: none"> <li>- Currently, Yunnan Province does not have enough energy to meet its demands. Promotion of renewable energy sources are thus more important to offset this demand, lessen transmission losses, and offset the need to create emissions producing thermal plants.</li> </ul> <p><i>Local Benefits</i></p> <ul style="list-style-type: none"> <li>- Local CO<sub>2</sub> emissions should also be reduced in a complementary process of decreasing the use of firewood for heating and cooking, thereby protecting area forests, another natural carbon sink.</li> <li>- The plant aids the county to actively participate in a programme to replace firewood with electricity.</li> <li>- Through such clean energy projects, the county hopes to maintain and increase the current public forest area.</li> <li>- Protecting the forest will also safeguard against debris flow and torrential floods, erosion and reduction of water retention by the forest floor.</li> </ul> <p><i>Submerged Areas:</i> The station is division run-off-river type, the dam is low, so there is no submerged woods or plowland except the river bed. And there is no migration problem, but will have a permanent occupied area of 7.5 hectares and temporary occupation of 20.1 hectares.</p> <p>Environmental studies have also been conducted and approved by official entities.</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"> <li>(1) Environmental Protection Law of P.R.C (Dec.1989)</li> <li>(2) Law of Water and Soil Conservation of P.R.C (June, 1991)</li> <li>(3) Regulations on Handling Waste Water of P.R.C (May.1997)</li> <li>(4) Regulations of Environmental Protection for Construction Projects</li> <li>(5) Regulations of Water Pollution Prevention of P.R.C (Mar.2000)</li> <li>(6) Environmental Protection Design Standard of Construction Projects</li> </ol> <p>Technical Regulations:</p> <ol style="list-style-type: none"> <li>(1) Technical Regulations of Water and Soil Conservation</li> </ol>

	<p>Program for Development and Construction Project, (SL204-98)</p> <p>(2) Regulations for Comprehensive Administration on Water and Soil Conservation (GB/T16453.1 ~ 16453.1-1996)</p> <p>(3) Outdoor Drainage Design Standard (GBJ14-87)</p> <p>(4) Surface Water Resources Quality Standard (GHZBI-1991)</p> <p>(5) Surface Water Environment Quality Standard (SL63-94)</p> <p>(6) Comprehensive Drainage Standard of Waste Water (GB8978-1996)</p> <p>(7) Water Quality Standard for Farmland Irrigation (GB5084-85)</p> <p>(8) Noise Standard in Urban Areas (GB3096-93)</p> <p>(9) Noise limitation in Construction Area (GB12523-90)</p> <p>(10) Air Quality Standard (GB3095-1996)</p> <p>(11) Comprehensive Standard for Air Pollutant Emission (GB16297-1996)</p> <p>(12) Regulations of Primary Design Report for Hydroelectric Projects (DL5021-93)</p>
<p><b>4. Socio-economic impacts</b> Projected social and economic contributions from implementation</p>	<ul style="list-style-type: none"> <li>○ All labour needed for the construction of the station (800 construction personnel at peak construction day) is from the local population, providing additional employment and income for the short-term.</li> <li>○ In the long-term, 34 personnel for the maintenance of the plant will be staffed by qualified individuals from the local population.</li> <li>○ Increased access to electricity in the local community, providing opportunities for new alternative cottage industries and added efficiency for existing ones.</li> <li>○ Positive contribution to education and gender empowerment can effectively arise from greater access to energy including added health benefits arising from the reduction of firewood emissions from heating and cooking purposes.</li> </ul>

**C. Finance**

<p><b>1. Project cost estimate</b></p>	<p>(Exchange rate used: 1 USD = 7.7 CNY)</p>	
<p>i. Total project cost (including loan interest and active capital)</p>	<p><b>99,961,800 CNY</b> <b>(USD 12,982,052 \$)</b></p>	
<p>ii. Breakdown of costs:</p>		<p><u>Percentage of Total Cost:</u></p>
<p>- Equipment &amp; Machinery</p>	<p>28,231,300CNY</p>	<p>28.24%</p>
<p>- Construction Project</p>	<p>49,916,800 CNY</p>	<p>49.94%</p>
<p>-temporary project</p>	<p>9,153,000 CNY</p>	<p>9.16%</p>
<p>-other expenses</p>	<p>6,465,900CNY</p>	<p>6.47%</p>
<p>- Interest on loan</p>	<p>1,506,400 CNY</p>	<p>1.51%</p>
<p>-preparation fee</p>	<p>4,688,400 CNY</p>	<p>4.7%</p>
<p>iii. Incase of power projects</p>		
<p>Sale of power (million units)</p>	<p>Average annual electricity generation 1111,520 MWh/year.</p>	
<p>Revenue from sale of power</p>	<p>Effective electricity sold to grid 97660Mwh.</p>	
	<p>Tariff (not included added tax) 0.1641 CNY/kWh</p>	

## Project Idea Note

<b>2. Sources of finance</b>	
i. Equity	shareholders' equity contributions are expected to be 30% of the total funds required
ii. Loan	70% of the project cost will be met by loans from the bank , payback period is 14 years
iii. Grant	N/A
<b>3. Sources of CER buyers</b>	N/A
<b>4. Indicative CER Price (USD / CER)</b>	N/A
<b>5. Proposed CER crediting period</b>	7 years
<b>6. Total CER's generated</b>	76,018.54 tCO <sub>2</sub> /year
<b>7. Review of project parameters</b>	<p>Installed capacity: 24MW; Average annual output: 111,520MWh;</p> <p>Total Investment in plant: 99,961,800 CNY;</p> <p>Electricity Sales Price: 0.1641 CNY /kWh;</p> <p>FIRR: 6.58%;</p> <p>Operation period: 45 years</p>