

Supported by the European Commission through the E – ASEAN Energy Facility







Dissemination and Training workshop Jakarta March 22-23, 2006

IFRERA

Development of Krong Pa 2 SHP & its

implementation issues



- Background information on Krong Pa 2
- Objectives & benefits of the project
- Eco-social conditions
- Main features of the Krong Pa 2
- Implementation issues

Background information on Krong Pa 2

- Krong Pa 2 hydropower is located in Krong Pa river which is one of tributaries of Ba river.
- Decveloped by Gia Lam Joint Stock company (GJS) – a local private developer



Location of Krong Pa 2

- The site is located in DakRong commune, KBang district, Gia Lai province
- Relatively easy access but surrounded by a dense forestry and few population



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Objectives & benefits of the project

- Supply electricity with annual average electricity production of 24.5 x 10^6 KWh to :
 - Kbang district
 - National network
 - Two nearby remote villages
- The project is expected to contribute to impulse for local economic and social development

Eco-social conditions in the area

- In this area, mainly ethnic minorities of Ba Na, E De, etc live with low density.
- Local life is poor, local inhabitants mainly earn their livings by husbandry and exploitation of forest products. Their life will be improved (by creating jobs, processing agricultural products, etc.) when the hydropower plant comes in.
- The area owns convenient access road to the site. Road No. 669 A.
- Access road to the dams is sloped gently along the riverside and convenient for construction.
- Covered by primary forest but it has no significant impacts on environment → see further on the EIA & SIA by ETC.

Main features of the Krong Pa 2 - Layout



Main features of Krong Pa 2 – Power station

- Install Capacity:
- Firm Capacity:
- Annual production
- Number of units:
- Type of Turbine:
- Max Water Head:
- Design Water Head:
- Turbine Design Discharge:

5.80 MW 0.88 MW 24.5 GWh 2 units Francis 267.96 m 249.90 m 2.80 m3/s

Main features of Krong Pa 2 – Catchments & reservoir

Catchments area:	99	km2
Annual average flow:	2.71	l m3/s
Full Supply Level, FSL:		979.0 m
Minimum Operating Level, MC	OL:	977.5 m
Total storage capacity:	82.38	x 103 m3
Active storage capacity:	61.31	x 103 m3
TUNNEL Length:	2,42	0 m

Main features of Krong Pa 2 – Eco & financial parameters

- Investment cost : 107.55 bil VND (6.8 mil. US\$)
 - Construction 52.72 bil. VND (49%)
 - Equipment 31.10 bil. VND (29%)
 - Other cost 7.62 bil. VND (7%)
 - Contingency 9.14 bil. VND (8.5%)
 - Loan interest 6.97 bil. VND (6.5%)
- Investment cost per KW installed : 1020 \$/kW
- Economic indicator at tariff 600 VND/kWh (3.8 US cents/kWh)
 - NPV = 2.33 m\$
 - IRR = 15.6
 - Discount payback period = 6.4 y.

Conclusions on technical, environmental and economic feasibility

- Technical FS : a good site
- Economical and financial issues : remaining issues are the risks, grants, CDM.
- Local level integration : very good EIA & SIA, very good local community participation
- Implementation package : many issues are to be work out with IFRERA partners

- Under Vietnamese standard, TCXD VN: 285 2002, based on the design parameters as FSL of 979 m, dam height of 9.52, and install capacity of 5.4 MW, the *Krong Pa 2 hydropower project should be project at level III*.
- Based on the previous studies on topographic and geological conditions at project site, two alternatives 1&2 are compared to select the best options for : dam site, FSL, Installed capacity, number of units.
- Krong Pa 2 hydropower project is planned to construct within 2.5 years, 6 months among them will be spent for preparation.

Risk analysis

The following factors are included in our risk analysis:

- Variation in Investment cost
- ➤Variation in hydrological conditions
- Inflation rate and protection
- Other PPA elements : duration of operation life, tariff, discount rate
- Cost of providing social services (electricity) to 2 nearby villages
- ➤Carbon financing

Recommendation on strategies to reduce

- the risks
- There is a considerable risk concerning the hydrological conditions
- If possible the PPA should include a clause on contract's renewal after the first period (20 years is usual practice in Vietnam)
- Tariff adjustments for inflation or the tariff to be denominated in U.S. dollar terms
- It is recommended to pursue the option of selling carbon credits, because this would make a substantial impact on the projects profitability.

Recommendation on strategies to reduce the risks

- If PPA is concluded on nominal VND for very long period (20 year), there is a considerable risk in inflation rate. There are can be four strategies :
 - Indexing the tariff on inflation. Higher percentage of tariff indexing is better, but the most convincing argument would be 50% indexing protection.
 - The PPA tariff must be negotiate much higher than economic tariff of 600 VND/kWh if no indexing.
 - It is anticipated that the end-user tariff will be increased in very near future. It could be an option in that case to index the PPA tariff on end-user tariff to reduce the risk.
 - With the power market, the Krong Pa 2 electricity production could be sold at power market at higher tariff instead of selling to EVN through long term fixed PPA. This strategy will reduce the inflation risk but will increase the risk related with power market functions and price. This strategy consists of negotiating a PPA with an open clause allowing switching to power market tariff when there is an opportunity.

Some drawings & images





CROSS SECTION OF POWER STATION



LAYOUT OF HEADWORKS

