

April 2007
MEKONG UTILITY WATCH
UTILITY PERFORMANCE
Electricity of Vietnam
Buon Kuop Hydropower Project

This briefing paper identifies revenue risks and liabilities associated with the Buon Kuop hydropower project in Daklak province, Vietnam. **Buon Kuop** is **Electricity of Vietnam**'s first of six hydro projects planned for the Srepok river, a large Mekong tributary shared with Cambodia.

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BUON KUOP HYDROPOWER PROJECT

Technical and Financial Features

Installed Capacity	280 MW
Estimated Project Cost	US\$286.5 million
Firm Capacity	68.7 MW
Expected Annual Output	1,485 million kWh/yr
Reservoir Area	5.6 square kilometres
Dead Storage	53 million cubic metres
Daily Storage Capacity	10 million cubic metres
Construction Period	2003 – 2008

Background

The Srepok River is a 400-kilometre tributary of the Mekong River flowing through Vietnam's southern highlands then northeast Cambodia. Its watershed area of approximately 30,000 square kilometres has a population of about one million people, most of who reside within the Vietnamese portion.

Buon Kuop is one of six dams Vietnam's national power utility, Electricity of Vietnam Corporation, plans to build on the upper Srepok to supply the country's southern power network. Four dams are already under construction: Buon Kuop (280 megawatts), Ban Tou Srah (86 MW), Srepok 3 (220 MW) and Drayl Linh New (28 MW). Another two are at the feasibility study stage: Srepok 4 (70 MW) and Duc Xuyen (49 MW).

The number of hours the power plant will run will depend on the load of the southern power network. If peak load is six to eight hours per day then the plant will operate for that period. If peak load is less, the plant may run longer up to 12 hours.

Buon Kuop was recommended as part of Vietnam's National Hydropower Plan Study (1999 to 2005), which was funded by the Swedish International Development Agency (SIDA) and the Norwegian Agency for Development (NORAD), and prepared by Nordic engineering consultants, SWECO.

Environmental Impact Assessment

The Buon Kuop EIA report includes a total budget of US\$7,224,131 for compensation, replacement land, resettlement, and environmental management in Daklak province.

A "significant negative impact" noted in the EIA report is the diversion of the river's flow from behind the dam to the powerhouse, which will dry out the channel below the dam in the dry season. To maintain a minimum flow to downstream waterfalls (Gia Long, Dray Sap, and Trinh Nu), the EIA recommends a daytime release of 5 to 10 cubic metres per second "so that waterfalls can be nice in sightseeing." The environmental flow requirements for downstream Cambodia were not considered.

An estimated 3006 people or 583 affected households will receive a combination of resettlement assistance, replacement land, and/or cash compensation for damaged crops and assets.

Affected people and communities are entitled to cash compensation for any flooded assets including houses, agricultural land, wells, fruit trees, perennial crops (i.e., coffee), tombs, ponds, irrigation infrastructure, and community buildings.

Two-thirds of the 583 affected households are not ethnic minorities; they belong to Vietnam's ethnic majority, known as Kinh or Viet. The Kinh people now makeup the majority of the highland population; many are recent migrants coming from other parts of the country in search of land and better prospects.

The EIA report includes results of a survey of people's expectations for compensation. It concludes that 90 percent of Kinh people prefer cash compensation while only about half of ethnic minority households affected by the dam indicated they want cash; the rest had no preference. Ethnic minority households did, however, specify that they wanted to be resettled as close as possible to their original villages. [Annex 20]

Compensation Principles & Rate-Setting Procedure

Electricity of Vietnam's Power Engineering Consulting Company 2 prepared the compensation plan and budget for approval by Daklak People's Committee. The unit price of compensation for land and assets was calculated based on local regulations in two affected districts.

The compensation plan is based on two guiding principles developed after consultations with local people and authorities:

- cash compensation will be provided to pay villagers directly for new accommodation and re-establishing farming production; and
- resettlement and replacement land should be as near as possible to the old villages and farmland.

The compensation plan is intended to provide resettlers with services and infrastructure required to re-establish their lives and long-term agricultural production. In addition to compensation for land and asset losses, the plan

includes financial, technical, and medical support to guarantee the living standards of resettled households is at least the same as prior to resettlement. The compensation plan must also be accepted by most of the affected people. And local customs and culture must also be ‘maintained.’

Budget for Resettlement, Replacement Land, Compensation and Environmental Management

	TOTAL	115,658	7,224,131
No.	Selected Budget Categories	Amount in Million VND (2002)	Amount in US dollars (2007)
1.	Compensation, Resettlement and Replacement Agricultural Land	110,991.43	6,929,459
1.1	Compensation and Support This includes:	47,853	2,988,380
	Trees & Crops (on 902 hectares)	24,832	
	Land	6,390	
	Constructed Works (wells, ponds, houses, electricity infrastructure)	1,656	
	Household Subsidies ¹	5,348	
1.2	Resettlement for Agriculture and Residence² This includes:	61,476	3,839,130
	Purchase of 154 hectares of replacement land, including 103 hectares from Krong Ana Coffee Company	2,772	172,297
	Compensation for trees owned by Krong Ana Coffee Company	9,663	602,882
	Project construction (electricity, wells, houses, irrigation for 48 households)	22,551	1,406,980

2.	Environmental Management This includes:	25,939	1,618,150
	Reservoir clearing i.e., detection and removal of unexploded bombs	14,914	931,368
	Detection/treatment of chemical poison	2,100	131,143
	Cleaning lake bed	2,414	150,753
	Restore land/forest area used during construction	1,575	98,376
	Planting forest reserve in Buon Kuop watershed – costs shared with government agricultural and rural development authorities	440	27,482
	Disease prevention and labour safety (malaria prevention and treatment for construction workers and local communities)	4,496	280,824

REVENUE RISKS AND LIABILITIES

Revenue risks are factors that threaten to reduce the project’s output or revenue. **Liabilities** refer to costs not assessed or underestimated, for which EVN may ultimately be held responsible.

Revenue Risk #1 Undependable/Low Value Power Output

Because the Buon Kuop reservoir has almost no ability to store water for times when power is most in demand, whatever power it does generate will be of low value compared to that of other producers that can guarantee supply, particularly during peak demand periods. When electricity demand is highest and surplus power is most valuable, the Srepok river flow happens to be at its lowest, which makes Buon Kuop’s output undependable for serving

system loads and therefore of low value. This unreliability means that EVN must either purchase power from other producers or it keep expensive diesel or natural gas-fired combustion turbines on hand – and underused – for times when power from Buon Kuop is unavailable. This drives up EVN’s costs.

Revenue Risk #2 Less Than Expected Power Output Due to Drought or Competing Demands on Buon Kuop Water Supply

EVN estimates Buon Kuop has a firm (guaranteed) capacity – the amount that can be counted on in a drought – of 68.7 MW or 43 percent of the expected average annual output.³ The actual firm capacity may be far less if there is less water available for power production than estimated due to drought and competing demands on the Srepok river flow.

Vietnam routinely experiences severe power shortages in the dry season due to EVN’s over-reliance on large hydro dams that cannot dependably produce power in the dry season. This year, *Vietnam News* reports that EVN expects to lose 600 million kWh of power supply due to low water levels in hydro reservoirs in the northern part of the country.⁴

Originally, the Buon Kuop project included a much larger reservoir upstream, known as Chu Pong Krong but that option was rejected by the central government because it would have displaced about 12,000 people. As is, the Buon Kuop reservoir is small (less than 100 million cubic metres) with no storage capacity to expand irrigation supply in the dry season. Within a 24 hour cycle, water will be stored and then fully released for anywhere from six to 12 hours a day depending on the load. Therefore any water that is extracted or diverted from the reservoir inflow for irrigation or municipal water supplies in Daklak province would reduce power output, especially in the dry season when the river’s natural flow is close to zero.

Annual rainfall and flow volume in the Srepok river has not changed significantly in recent years. Little or no rain falls between December and March; and rainfall in the project area is about half that received on higher terrain. [23/82] What has changed significantly in the past decade is water consumption and demand, with the rapid expansion of thousands of hectares of coffee, rubber, and sugarcane plantations on newly-cleared forest lands. Water supply for irrigation of crops (i.e., coffee, rubber, sugar-cane, fruit trees) typically runs short every dry season when river flow and springs are

depleted. Many small reservoirs and pumping stations have been built to irrigate crops year-round. Wells 75 metres deep in the highlands are not uncommon. Near the river, wells are typically 8 to 10 metres deep and tend to run dry in the dry season. In some places, groundwater pumping for irrigation has caused the water table to drop by three to five metres. The EIA report describes the area's dry season followed by heavy flooding as a "calamity" and a threat to the region's agricultural output. [EIA 51/82]

Under these circumstances, EVN may be faced with competing demands on the Buon Kuop reservoir or diversion projects upstream that would reduce the amount of water available for power production.

Revenue Risk #3 Shortened Reservoir Lifespan Due to Rapid Sedimentation

The Vietnamese portion of the Srepok watershed (18,000 square kilometres) has undergone dramatic changes in land use since 2000. Deforestation and expansion of agricultural plantations have caused major increases in sediment flow in the Srepok.[25/82] The EIA acknowledges that sediment buildup in the reservoir can shorten a dam project's lifespan significantly based on data from Hoa Binh and Tri An reservoirs. It recommends a flushing of the Buon Kuop reservoir every dry season and measures to control erosion and guarantee forest cover in the upper watershed. The cost and effectiveness of such measures are not presented in the EIA report.

Revenue Risk #4 Compensation Costs Underestimated

By law in Vietnam, dissatisfied resettlers have the right to sue for additional compensation and damages in civil courts. Or the central government may decide to preempt legal action (and public protests) by ordering EVN to increase its compensation payout in the event that the original resettlement plans and budget prove inadequate.

Experience with large-scale hydro projects in the region (i.e., Pak Mun, Nam Theun 2, Hoa Binh) suggests that actual resettlement and compensation costs are higher than originally estimated. At Buon Kuop, the risk of resettlement failure is high: the budget indicates that 902 hectares of land currently in production will be lost but only 154 hectares will be purchased as replacement land. This may prove inadequate, in which case people may need additional compensation or request to be resettled elsewhere. The

number of people in need of resettlement after the reservoir is filled may be higher than what was projected in 2002. And there is a risk that compensation funds go missing or are misallocated by local authorities, all of which could increase EVN's costs.

Revenue Risk #5 No Licensing Agreement

No formal licensing agreement exists to establish terms and conditions for Buon Kuop project operations, environmental mitigation measures, and liability for damages to the river system, surrounding resources, and communities.

Without such an agreement, water allocation for power production is not necessarily guaranteed. Amidst competing priorities for water, politicians and local authorities may decide that the needs of individual farmers or state owned plantations supersede those of the dam owner. Or the Vietnamese government could order EVN to shift from a store-and-release type of operation to a more environmentally benign run-of-river mode in order to reduce negative impacts and hazards in downstream Cambodia. The cost in terms of foregone power production (if any) has not been assessed.

License agreements for hydropower projects are now standard practice internationally. The license agreement typically sets out legally enforceable terms and conditions for reservoir operation and water extraction, after a period of negotiation with other water users/rights holders in the river basin. The agreement helps eliminates uncertainty for the dam owner and investors and seeks to balance power production objectives with conflicting or competing water use priorities. A licensing agreement can also limit the dam owners' liability for damages and transfer responsibility for managing compensation and environmental management to other entities.

Liability #1 "Abnormal" Flood Releases

EVN could be subject to claims for compensation or face legal action in the event of damaging flood releases affecting downstream communities either in Vietnam or Cambodia.

Two reports commissioned by EVN establish that the utility is liable for damages caused by abnormal or accidental flood releases from the Buon Kuop dam. The 2002 Buon Kuop EIA states: "In case of abnormal flood

letting out, which harms to farm producing or infrastructure, the owner must compensate.” [78/82] And the 2006 EIA by SWECO states: “Experiences from previous accidents [i.e., downstream of Yali dam along Se San] show that such incidents have devastating short-term and long-term economic and mental effects on people residing on riverside. . . . In case accidental flooding takes place from the Hydropower plant, causing property losses, full compensation in cash and/or kind should be provided.” [109/141] The EIA report does not define the geographical or financial extent of this liability. Nor does it distinguish “abnormal” or “accidental” flood releases from normal operations. The cost of this liability is not included in the project budget.

Liability #2 Flood Damages Upstream

EVN could face legal action or be ordered to compensate people for flood damages made worse by the Buon Kuop reservoir, given that the area upstream of the dam is already prone to damaging floods. No assessment of this potential liability is included in the project budget.

Liability #3 Project Costs Not Assessed

This section describes costs identified in the project EIA but not yet assessed, for which EVN may ultimately be held responsible (in alphabetical order):

- **Environmental Flows**

The EIA notes that the dam owner has agreed to release 5 cubic metres per second to avoid drying out three waterfalls, and that it may be necessary or desirable to increase this to 10 cubic metres per second. The cost to EVN in terms of foregone power production is not included in the EIA report.

- **Fisheries & Fisheries Habitat Losses**

The cost of compensating for lost fishing income and daily protein for families living upstream and downstream in Vietnam is not assessed or included in the project budget.

- **Flow Disruptions/Property/Livelihood Losses in Neighbouring Cambodia**

The 2002 EIA recommends avoiding major flow changes to neighbouring Cambodia's stretch of the Srepok River without further elaboration. The 2006 EIA done by SWECO recommends operating the proposed Srepok 4 dam as a re-regulating dam to reduce expected negative impacts in downstream Cambodia caused by upstream peaking operations (i.e., hazardous daily water fluctuations, water pollution, river bank erosion, and reduced fish stocks and habitat).

SWECO claims that the proposed Srepok 4 dam could be operated as a re-regulating reservoir which would "allow the river flow to be close to the 'normal,' the daily water level fluctuations will be marginal, and the impacts related to such water level fluctuations [i.e., turbidity, erosion due to daily peaking operations, riverbank agriculture] will consequently be marginal as well." [8/141]

SWECO also cautions that a re-regulating dam would do nothing to mitigate negative effects on downstream agriculture and migratory fisheries caused by the delayed flood and the reduction in flood peak. [9/141] EVN could be held liable for the cost of these impacts, in addition to the cost of a re-regulating dam.

- **Public Safety & Flood Warning System**

The EIA notes that in order to keep local citizens safe, current regulations on flood releases must be strictly followed and citizens must be informed to minimize loss of human lives and assets. The EIA recommends a speaker or horn alarm system for warning citizens within 10 kilometres downstream of the dam. The cost of these measures is not included in the project budget.

- **River Bank Erosion**

The EIA notes that water releases from the powerhouse can erode river banks downstream and that this must be assessed to avoid losses to local citizens. Although erosion is not expected to be serious, a plan for controlled releases to minimize erosion is needed. The cost of this plan is not included in the project budget.

BUON KUOP FINANCIERS & CONTRACTORS

ABN-AMRO Dutch multinational bank	In 2003, ABN-AMRO and several other international banks have agreed to help Electricity of Vietnam arrange export credit financing for several hydropower projects, including Buon Kuop.
Bank for Agriculture and Rural Development of Vietnam	Provided US\$136.3 million loan for the project in 2003.
Japan Bank for International Cooperation	Rejected Vietnam’s request for financing due to public concerns about the project’s social and environmental costs raised by citizens groups in Japan and Cambodia.
Sumitomo Corporation (Japan)	Awarded a US\$49.2 million contract to supply two 140 MW turbines and supervise installation (2005).

ENDNOTES

¹ Each project affected person is entitled to US\$181 in addition to compensation for lost assets, crops, etc. This includes a “production and living allowance” of 900,000 VND (US\$56) and a “production subsidy” of 2,000,000 VND (US\$125) to buy fertilizers and seeds. In addition to this, 413 of the 583 affected households receive an additional 3,000,000 VND (US\$187) as an irrigation subsidy for agricultural production. And the 48 households to be resettled receive an additional 1,000,000 VND (US\$62).

² Resettlement for agricultural and residence cost of 61,476 million VND is not completely accounted for in the EIA report; Items shown in Annex 15 add up to 38,426 million VND only.

³ **Firm Capacity** is defined as the amount of capacity that can be used to produce power continuously during the most adverse hydro year on record. Utilities buying power from hydro plants usually pay more for guaranteed (firm) capacity during peak load periods when the utility really needs the power. Buon Kuop’s firm output is calculated as: 68.7 MW x 24 and 365 hours per year = 601,812,000 kWh/year. Therefore the dam’s guaranteed (firm) output is 43 percent of the dam’s expected annual output.

⁴ *Vietnam News Agency*, “State electric company predicts power shortage,” 2 March 2007.

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