ANNEX 4

FINANCIAL ANALYSIS OF PROJECTS

ANNEX 4.1

FINANCIAL MODELING METHODOLOGY

ANNEX 4.1

FINANCIAL EVALUATION METHODOLOGY

A4.1 Objectives of Financial Modeling

The financial performance of a project is paramount if it is to be a candidate for private financing and it is assumed in the Power System Development Plan (PSDP) that concessional lending cannot be relied on. Technical and economic evaluation using EVALS software gives a measure of the quality of a project site in economic terms but a financial analysis is needed to provide the cash flow projections and performance measures of interest to parties to an IPP project.

Financial modeling has been carried out on all shortlisted projects. It has been assumed that all export projects will be financed privately, and all projects for domestic supply could financed either by the public or private sectors. Financial modeling will therefore be conducted thus:

- **Export:** Projects are modeled using the HPO model to determine, firstly, whether they have the financial characteristics to achieve hurdle rates of return and debt coverage under assumed export tariffs and, secondly, what revenue benefits accrue to GOL/EdL in the form of tax, royalty and dividend cash flows.

- **Domestic:** Financial modeling of domestic projects (i.e. those identified by the SEXSI analyses as being part of least-cost system expansion) is undertaken at two levels to serve different purposes:

  (i) Firstly, projects will be simulated as privately financed investments using the HPO model to determine the wholesale tariff needed to achieve hurdle rates of return;

  (ii) Secondly, projects will be treated as EdL investments and their cash flows entered into the EdL Financial Model to test the affordability of the preferred PSDP system expansion scenario. The borrowing rates will be the on-lending rates assumed in the EdL model. This

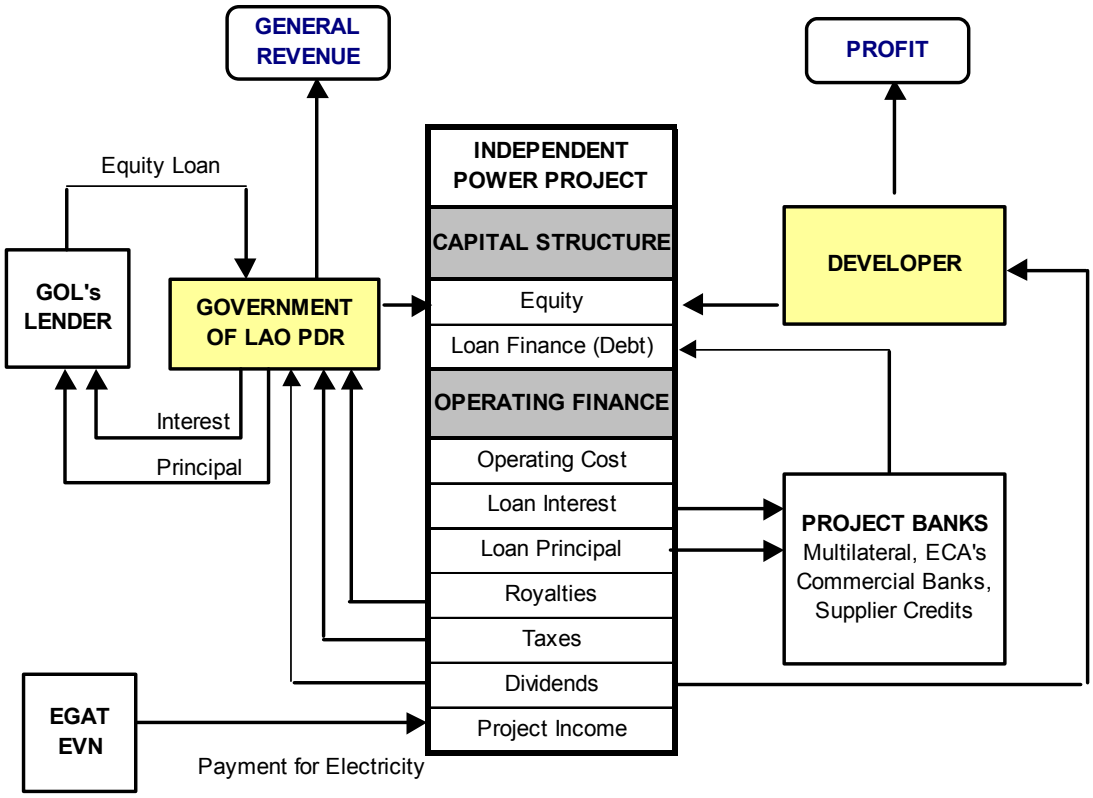
Some adaptation of the HPO Model was necessary to mold it to the specific purposes of the exercise.

A4.2 HPO Financial Model

The HPO Model is a spreadsheet-based model tailored specifically to simulate the flow of money between participating parties to an IPP hydropower project in Lao PDR. These parties include the sponsor, power purchaser, lenders and GOL. The model provides an indication of the attractiveness and financeability of the project, and calculates the cash flow benefits accruing to the parties in nominal (current) values.

The HPO Model comprises cash flow statement, profit and loss statement, balance sheet, sources and uses of funds sheet, and loan disbursement and debt service schedules. The movement of money is shown diagrammatically in Figure A4.1.

Figure A4.1
HPO Financial Model : Schematic Diagram



Features of the model include:

1. Built-in flexibility allowing the evaluation of projects with widely varying data inputs and contractual terms and conditions. Input parameters can be tailored to the specific project circumstances and in this respect the model can accommodate:

   - Different tariff formats including escalating and levelized structures;
   - Financing packages made up of multiple loans from different financing institutions.
   - Tariff differentiation for project output sold into multiple markets and multiple tariff categories (primary and secondary, export and local supply, pre-commissioning).
   - Different equity arrangements, debt/equity ratios, concession periods, inflation rates, interest rates, debtor and creditor assumptions,

repayment profiling, depreciation methods, royalties, taxation rates and holidays, wheeling charges, dividend policy, etc.

2. Aggregation of project net benefits and calculation of project performance measures including gross earnings, EBIT, net profit, project rate of return, return on equity, debt service ratios, etc.

3. Extension of the model to incorporate non-project issues such as cash flows relating to the raising and servicing of loans for developer's equity.

4. Identification and aggregation of GOL benefits, including taxes, royalties, dividends, post-transfer receipts, local power supply and other quantifiable benefits.

The HPO Model can be used to test the sensitivity of project performance to plausible adverse outcomes in key parameters and inputs. In this way, it can be used to quantify and manage risks and allow a financially robust project to be developed. Sensitivity testing can be used to:

- Examine the effect on project benefits of alternative financing packages;
- Determine optimum equity participation;
- Make judgments about acceptable price risks that can be accepted in the turnkey contract;
- Formulate strategies and targets for tariff, concession and financing negotiations;
- For hydropower projects, evaluate hydrological risk by relating financial outputs such as return on equity and minimum debt service ratio directly to hydrological events of known probability; e.g. effect on project viability of the commencement of a drought sequence coinciding with commercial operation date.

A4.3 Modeling Principles

The financial modeling addresses two separate objectives as outlined in Section A4.1; i.e. (i) deriving cash flows of generation projects included in the Lao power system expansion plan for application in an analysis of the affordability of the plan, and (ii) calculating the cash flow benefits to Lao PDR from projects developed for export.

For both purposes, a set of uniform parameters has been adopted for benchmarking purposes. Unless compelling reasons dictate to the contrary, all projects will be assumed to have the same tariff, concession period, tax and royalty regime, financing terms, GOL equity, etc. Many of the project sites are not covered by any form of sole mandate agreement and for these a common set of assumptions is commonsense. However for others, this is not the case. The structuring of private power projects is highly individual with concession rights, financing, procurement arrangements and power purchase conditions varying widely from project to project. Cash flow projections presented in the Hydropower Development Strategy Study

were based on the rights and privileges applying to each project where a binding concession was in place. For the PSDP the approach is more standardized because the surviving concessions are by and large dormant and there is reasonable doubt about the ability of the present sponsors to implement their projects. There are, however, several projects that are showing every indication of proceeding and these need o be considered individually:

- **Nam Theun 2:** The sponsors of the Nam Theun 2 project have executed a concession agreement with GOL and a PPA with EGAT. The project is a special case in many respects because of its size, World Bank involvement and development approach. Cash flow projections based on standardized conditions would be misleading and they have therefore been based more closely on actual concession conditions and development costs. The modeling of such a complex project is a significant task and the PSDP model is necessarily approximate. A more precise estimate of cash flows may be obtained from the model prepared by Credit Agricole Indosuez in it's role as GOL financial advisor on Nam Theun 2.

- **Theun Hinboun Extension:** The Theun Hinboun Extension project is at an early stage in the development cycle. The project evaluations carried out under this study confirm the attractiveness of several of the Theun Hinboun Extension (including Nam Theun 3) options. However, it is not known yet if the incremental output from a Theun Hinboun Extension option would be exported or sold domestically, whether the existing PPA and license agreements would be extended to cover the incremental project, and what the development sequence will be. It is therefore reasonable at this stage to use the common assumptions, wherever applicable, to preserve comparability between projects.

- **Nam Mo and Xe Kaman 3:** The developers of Nam Mo and Xe Kaman 3 will market the output of their projects in Vietnam. No precedent exists at this stage to indicate EVN's final position and therefore the concession and purchase terms for these projects are a matter of speculation. Based on similarities in the avoided costs in the Vietnamese and Thai systems, the common set of assumptions based on the Thai market are employed as a proxy.

A4.4 Modeling Assumptions

The principal parameters and assumptions used in the standardized modeling are described below:

(i) *Commercial Operation Date*

Projects are evaluated according to the Commercial Operation Date (COD) determined as follows:

- in the case of domestic expansion, by the optimal SEXSI expansion scenario so that cash flows can be inserted into the EdL Financial Model for the affordability analysis;

- in the case of export projects, according to the export program assumed by the Consultant so that cash flows for these projects can be added to give an aggregate revenue stream.

(ii) *Tariff*

A flat tariff structure has been assumed for all projects despite that fact that a number might need front-ending under current market conditions to achieve the debt service coverage necessary to attract lender interest. A flat structure has been adopted for the following reasons:

- Most recent negotiations with EGAT have moved away from front-ended tariffs;
- A front-ended structure is less desirable from GOL's point of view [1] and should only be adopted if it is necessary to facilitate the financing of a project promising attractive long-term benefits.

Projects were modeled using prices determined using avoided costs of the power system to which the power is exported (refer Section 5.8 of Volume A, Main Report). The prices in 2003 values are:

- Exports to Thailand: primary energy = 4.4 ¢/kWh; secondary energy = 2.5 ¢/kWh
- Exports to Vietnam: same as Thailand
- Supply to Lao national grids: at the opportunity cost of foregone sales to the foreign power purchaser, i.e. off-take by EdL will be cost neutral.

These prices are escalated to COD at an underlying rate of inflation assumed to be 2%

(iii) *Loan Conditions*

A sponsor's loans are one of the final uncertainties to be resolved prior to commencing construction. For all Catalogue projects there are no known commitments regarding financing terms. A single interest rate and loan tenor is assumed to represent the weighted average terms for a typical project financing.

- Average tenor of loans = 10 years;
- Average interest rate = 8%.

GOL borrowing for its equity stake is assumed to be at 6% interest with a tenor of 12 years reflecting a concessional component.

[1] A front-ended structure reduces tax take because gross revenue is highest in the early years when tax holidays and low tax rates apply. By the time higher tax rates cut in, the tariff, and hence gross revenue, has dropped.

(iv) *Concession and Modeling Periods*

The concession period is assumed to provide for an operating period of 25 years. This is consistent with the Electricity Law which allows 30 years from the date of the agreement. i.e. a development period of, say, 5 years and 25 years operation.

(v) *Taxes and Royalties*

The level of taxes and royalties are assumed to be:

•	Taxes:	Years 1 to 5	0% of net profit – tax holiday
		Years 6 to 12	5% of net profit
		Years 13 to 25	15% of net profit
•	Royalties:	Years 1 to15	5% of sales revenue
		Years 16 to 25	10% of sales revenue

(vi) *Fees and Charges*

Sponsors vary greatly in the loan fees and development costs that each applies to their projects. Development costs will depend on implementation and financing strategies. If, for instance, a multilateral risk guarantee is sought to facilitate lender support, high standards are expected in respect of studies, public participation, environmental undertakings, etc. and these may add to a sponsor's pre-COD development costs. Development costs incurred by a sponsor under a properly structured competitive EPC bidding process are likely to be considerably lower.

Development costs are assumed to be 1.5% of base EPC cost.

Loan fees are assumed to be 3.5% of the loan amount.

(vii) *Project Costs*

The financial modeling will have a project company perspective as distinct from the country perspective of the EVALS project evaluations and SEXSI system expansion analyses. The most prominent distinction to be drawn between the two is in the treatment of environmental and social costs.

Using the SESAMEE model, all identified project impacts were internalized for the economic analysis but only those with financial implications for the project company are considered in the financial modeling. Examples of environmental and social costs that form part of the financial modeling are:

- any capital works (re-regulation dam, variable level intake, etc.);
- social mitigations during construction paid by the company (e.g. resettlement);
- recurring mitigation costs paid by the company during project operation (e.g. watershed management payments, on-going compensations, etc).

Impacts borne by GOL, other stakeholders or nobody are not included in the project company financial cash flow projections that form the subject of the cash flow modeling.

(viii) *Miscellaneous*

A number of other input assumptions were made about a variety of matters based on present policy, legislative requirements and present custom. These included:

- A Debt : Equity ratio of 70 : 30 is adopted.
- GOL equity holding of 25% of total equity.
- Annual escalation of 2% for construction costs and O&M are used.