Financial Analysis and Modeling

Financial analysis and modeling is an important part in the evaluation of a proposed project. A financial model is developed to analyze the financial performance of a project given a set of input data and assumptions. The financial analysis and modeling exercise assess the investment costs, operating revenues generated and costs incurred by the project. To achieve this, a computer financial model using the MS-Excel software was developed. The financial analysis also evaluates the return on investment made by the investors to implement the project over the entire lifetime of the project. Figure 1 below shows the process flow chart of the financial analysis and modeling.

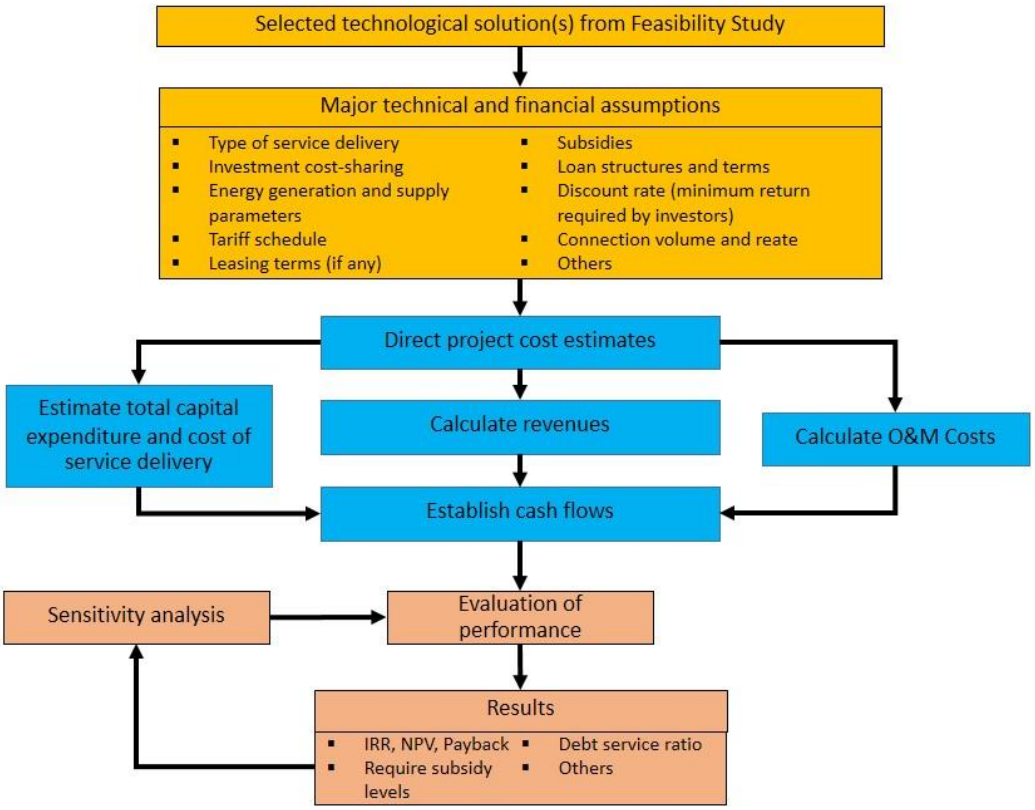

Figure 1: The process flow chart of the financial analysis and modeling

The Financial Model consist of different worksheets. Each worksheet have a different function and theme.

Inputs and assumptions. In this worksheet, inputs on both technological and financial parameters will be entered. Basic technical calculations and assumptions will be included for each technology considered. Information on the electricity tariff and revenue structure will also be included.

Costs data. Information on the costing will include capital investment costs, operation and maintenance costs and financial costs. The major costs will be further broken down into detailed items as far as possible. The costs data consider both the local and US dollar currencies, whenever practicable.

Operation. The Operation worksheet will calculate the electricity generation coming from the installed power generation plant, the losses incurred, the consumption of users to be served

considering their peak and off-peak electricity consumption, and the net electricity export to the grid, where appropriate.

Cash flow. The projected cash flow of the project is the main basis for the analysis of the life-cycle performance of the project. If financing is made on a project finance basis, the banks will look into the cash flow as the main source of debt service (i.e., repayment of principal and interests) for the loans extended to the project. The performance of the project for both operational and financing cash flows will be determined. Its debt service performance will also be determined.

Results and summary. This worksheet will give a summary of the assumptions used in the analysis and the corresponding results. The results presented includes life-cycle performance such as the Internal Rate of Return (IRR) for both the project and the equity, the Net Present Value (NPV) and payback period, as well as least-cost analysis result for the technology chosen. The sheet can be printed in one page and is designed to give an overview of the project analyzed.

Sensitivity analysis. As most of the figures considered in the analysis of a base case will come from assumptions and estimates, the actual figures such as costs and revenues may vary. Thus, it is important to anticipate any uncertainty by considering the effect of different scenarios in the performance of the project. Sensitivity analyses on some parameters will be conducted to determine which parameters, when changed affect the performance of the project significantly.

Example of A financial modeling of a 5 MW Solar Farm Power Plant.

POWER PLANT ASSUMPTIONS	Unit	Value	Notes
Plant Performance			
Power Plant Capacity	kWp	5,108	[6]
Average Annual Solar Radiation	kWh/m^2	1,959.1	[6]
Technical Availability	%	82.885%	[6]
Electricity Export to Grid	kWh/yr	8,293,924	[7]
Degradation (annual attenuation)	%/yr	0.4%	[6]
Electricity Price			
Electricity Selling price	USD/kWh	0.25	[6]

OPERATION & MAINTENANCE	Unit	Value	Notes
Annual O & M Costs	USD	96,076	[8]
Land Rental	USD	25,000	[9]
Insurance (Operation)	USD	24,019	[10]

GENERAL AND ECONOMIC DATA	Unit	Value	Notes
Project Life	yr	20	[6]
Depreciation Policy		Straight Line	
Tax Holiday	yr	5	[6]
Corporate Tax Rate		12.5%	[6]
Currency Used	USD	US Dollar	
Annual Expense Escalations	%	8.38%	[6]

LOAN	Unit	Value	Notes
Loan Amount	USD	7,237,227	

Grace Period	Yr	0.0	[6]
Loan Repayment Period	Yr	8.0	[6]
Loan Rate	%	5%	[6]

CAPITAL INVESTMENT	Unit	Value	Notes
Specific EPC Investment Costs	USD/kW	1,881	[1]
Sub-Total	**USD**	**9,607,631**	
Land	USD	0	[2]
Development Costs and consultant fee	USD	153,232	[3]
Insurance	USD	24,019	[4]
Interest During Construction (IDC)	USD	361,861	
Other Financing Chargers	USD	192,153	[5]
TOTAL	**THB**	**10,338,896**	

CAPITAL INVESTMENT: Sources of Funds			Unit	Value	Notes
Capital Equity	30%	Investment	THB	3,101,669	[6]
Loan	70%	Investment	THB	7,237,227	[6]
TOTAL			**THB**	**10,338,896**	

FINANCIAL RESULTS		Unit	Value	Notes
Pre-Tax Project IRR		%	16.74%	
Net Present Value (NPV) @	12%	USD	2,676,915	
Equity IRR		%	25.69%	
Payback Period		yr	6.55	

SENSITIVITY CASE: PIRR vs Electricity Price							
	0.1	0.15	0.2	0.25	0.3	0.35	0.4
PIRR	-0.67%	6.52%	11.96%	16.74%	21.20%	25.49%	29.69%

SENSITIVITY CASE: PIRR vs Investment Cost							
	-15%	-10%	-5%	0	5%	10%	15%
PIRR	20.58%	19.18%	17.90%	16.74%	15.66%	14.67%	13.75%

Assumptions:
[1] Assumed specific investment cost
[2] No Capital cost for Land as it will be rented.
[3] Development cost and consultant fee is estimated at 30 USD per MW
[4] Insurance during construction estimated at 0.25% of EPC Costs
[5] Other financing fee is estimated at 2% of EPC Costs
[6] Assumption given by Expert
[7] Calculated
[8] O&M Cost is estimated at 1% of EPC Costs, based on the technology supplier (highest in the range of 0.2%-1%)
[9] Rental for 20 years is 1.0 mUSD
[10] Operational insurance is estimated at 2% of EPC Costs