

CHAPTER – 12

Cost Estimate

- 12.1** The Project cost is estimated at Rs. 7909.00 Lakhs, details of which are as below:

Sl. No.	Components	Cost in Rs. Lakhs
1	Preliminaries	15.00
2	Land	114.00
3	Civil Works	3094.00
4	E & M works	3105.00
5	Others	369.62
6	Establishment	36.01
7	T & P	105.67
8	Loss on Stock	8.68
9	Less: Receipts & Recoveries	(-)6.85
10	Indirect charges	267.86
11	T-Transmission Lines	800.00
	Total	7908.99
	Say	7909.00

12.02 Basis of Cost Estimate

- 12.2.1** The Project estimates are prepared as per the guidelines contained in the Central Water Commission Publication entitled *Broad Guidelines for the preparation of Project Estimates for Major Irrigation and Multipurpose Projects*. The guidelines contained in the Indian Renewal Energy Development Agency Limited (IREDA) publication

titled *Best Practices Manual on Small Hydro* have also been followed.

12.2.2 The quantities for various components are estimated based on the preliminary designs and drawings. The rates adopted for the different major items are based on the schedule of rates of **Karnataka Power Corporation Limited**, which is the agency for implementation of Power Projects in the State of Karnataka and updated for the current year.

12.03 Civil Engineering Works

The planning and the design of the various components of works have been formulated taking into account the existing site conditions and data collected during survey and investigations. The preliminary design features as considered appropriate have been adopted. These preliminary designs will be reviewed prior to start of construction based on additional field data, test and model studies, if needed. The estimates of quantities of various items of work have been assessed based on the preliminary designs and drawings prepared, making provisions for any variations and unforeseen charges.

12.04 Generating Equipment – Electrical & Mechanical Works

The estimate for the Generating Equipment, Electrical and mechanical works, is based on budgetary quotations received from prominent E & M equipment manufacturers for similar equipment, factoring possible reduction through negotiations.

12.05 Escalation in Cost

It is estimated that with the adoption of the available technology for construction of the various component works, the Project can be completed in a period of 21 months from the date of start of work at site. Therefore, it is appropriate that the estimated cost of the Project as in the current year is updated to the date of completion by adopting suitable rates of average annual escalation of prices, at 5% for civil works and 2% Electrical and Mechanical works. This is taken into account in the details worked out in the financial package.

12.06 Details of Cost Estimates

The provisions made under the various heads of cost estimate, are briefly explained in the following paragraphs.

12.07 Land

A provision of Rs.114.00 Lakhs is provided under item “B” Lands. This provision is made to acquire about 4.94 Hectare of Government and Private land for construction of various components of the scheme, godown, stores, office building required for the construction and operation of the project.

12.8 Civil -Works

The estimates of quantities of various items of work have been assessed based on the preliminary designs and drawings prepared, making provisions for any variations and unforeseen charges. Lump sum provisions, based on the experience of similar projects are made for small items of work. The cost of civil works is estimated at Rs. 3223.00 Lakhs.

12.09 Other Works**a) D – Regulators**

It is proposed to procure and install gates and hoisting devices for the Intake and Draft Tube. The estimated cost of this item of work is Rs. 162.00 Lakhs..

b) G – Bridges

A Provision of Rs.30.00 Lakhs is made towards providing bridges and CD works. Details will be worked out during detailed engineering stage.

c) K – Buildings

A total provision of Rs.50.00 Lakhs under “K” Buildings is made for construction of temporary and permanent buildings. The provisions under ‘K’ buildings are for actual staff employed during construction/ maintenance stage.

d) M – Plantations

A lump sum provision of Rs. 15.00 Lakhs is made, towards cost of works under Arborio-culture in and around colony, power house etc., including planting compensatory afforestation if necessary.

e) Q – Special Tools and Plants

A provision of Rs. 10.00 Lakhs is made under this item, to meet expenditure on purchase of inspection vehicles, small tools and plant etc.

f) S – Soil Conservation

A provision of Rs. 5.00 Lakhs is made under this item towards works related to soil conservation measures.

g) O - Miscellaneous

A provision of Rs. 18.00 Lakhs is made under this item towards works related to maintenance of transport vehicles, infrastructural developmental works with in the project area, medical aid, health & sanitation, entertainment etc.,

h) R – Communication

Rs. 40.00 Lakhs has been provided in the estimate towards the cost of formation of approach road to Weir, Powerhouse etc.

i) Environment & Ecology Conservation

An amount Rs. 5.00 Lakhs is provided for works pertaining to the maintenance of Environment and Ecology of the area.

12.10 Electro Mechanical Works

The total provision made under this item is Rs 3105.00 Lakhs, including all taxes and duties. Provisions for Turbo Generators, Power Transformers, Crane, Outdoor Yard, switchgear Control equipment and other Electrical Engineering works are made based on the budgetary offers received from E&M manufacturers for similar equipment, factoring possible reductions through negotiations.

12.11 Transmission Lines

A provision of Rs. 800.00 Lakhs has been made towards the cost of power evacuation, which includes 16.5km of 66 kV single circuit transmission line using Coyote Conductor on double circuit tower to KPTCL sub station at Madhuvanahalli.

CHAPTER – 13

Financial & Economic Studies

13.1 General

13.1.1 Project Promoters

Mr Vikram Sreeram, Bangalore has been allotted the Bharachukki Mini Hydel Scheme by the Government of Karnataka, on Build, Own and Operate (BOO) basis under the policy of private sector participation in implementation of Power Projects.

13.1.2 The financial forecast has been prepared following the guidelines issued by Govt. of India/IREDA including all essential and requisite costs.

13.2 Project Cost

13.2.1 The basic estimated Project cost of Rs.7909.00 Lakhs, is based on KPCL schedule of rates and updated for the current year. The cost also includes the cost of Transmission Line from Bharachukki Mini Hydel Scheme to KPTCL Sub-Station at Maduvanahalli near Kollegal). The General Abstract & Abstract Cost is appended with this Chapter.

13.3 Total Project Cost Estimate

13.3.1 The total funding required for the Project is as below:

Particulars	Rs. Lakhs
1. Basic cost of the Project	7909.00
2. Escalation during construction	412.11
3. Financial Charges	295.34
4. IDC	641.30

Total	9257.75
Say	9258.00

13.4 Project Schedule

Project Zero Date (Expected)	October - 2014
Expected date of Commissioning of the Units	June - 2016

The project is envisaged to be completed in 28 months time including pre construction activities. This is split into 7 months for pre-construction activities and 21 months for actual execution from zero date. The construction of the project is proposed to be started by October 2014 and completed by June 2016.

13.5 Phasing of Capital Expenditure

5.1 The quarterly phasing of expenditure excluding escalation, without financial expenses, IDC etc. as per the programme of construction will be:

Rs. in lakhs.					
		Work Component			
Period		Civil	Electrical	T-Trans	Total
2014	2015				
Third Qtr	Oct- Dec	600.60	155.25	40.00	795.85
Fourth Qtr	Jan - Mar	600.60	465.75	120.00	1186.35
2015	2016				
First Half	Apr-Sept	800.80	776.25	200.00	1777.05
Second Half	Oct- Mar	1201.20	1086.75	280.00	1567.95
2016	2017				
First Qtr	Apr-June	800.80	621.00	160.00	1581.80
TOTAL		4004.00	3105.00	800.00	7909.00

Phasing of expenditure in detail is furnished in **Appendix 13.01**

13.6 Means of Finance of the Project

13.6.1 Total funding requirement for the implementation of Bharachukki MHS is Rs. 9258.00 lakhs. The project cost is proposed to be funded in the Debt / Equity ratio of 70: 30.

Means of Finance

Particulars	Rs in Lakhs
Total Equity: (Comprising of equity from Mr Vikram Sreeram, Bangalore / Associates / Others)	2777.00
Loans from Financial Institutions	6481.00
Total	9258.00

Equity

The total Equity of Rs.2777.00 will be funded by Sriram Mallige, Bangalore and their associates & others.

Debt

The debt portion of Rs.6481.00 Lakhs will be funded through Rupee Term Loans from Financial Institutions and Banks.

13.6.2 Loan Repayment Term

The loan repayment is proposed from the date of COD viz July 2014 onward. The outstanding loan of Rs.6481.00 Lakhs is paid in 36 installments in quarterly installment viz Rs 150.03 lakhs.

4.3 Rate of Interest on Rupee Term Loans

Though the rate of interest will be firmed up at the time of signing the loan agreements, an interest rate of 13% is considered for economic evaluation.

4.4 Table showing cost of completion of the Project & means of financing schedule is enclosed as **Appendix 13.01.**

13.7 Available Annual Energy for Utilisation

5.1 The Project will generate average energy of annual 59.46 GWhr. After allowing for consumption of the auxiliaries in the generating station and the losses in the transformer, annually energy of 57.165 GWhr will be available for utilization/sale. On the first year the energy generated is 75% of average annual energy.

13.8 Plant Load Factor

The plant load factor for this scheme is 38%.

13.9 Cost of Generation – Tariff Rates

13.9.1 The Power Purchase Agreement (PPA) is yet to be executed with the Karnataka Power Transmission Corporation Ltd. (KPTCL). As on 2016, it is presumed that the tariff could be about Rs.4 per unit sold. The computation statement of first year cost of generation as per CEA norms is enclosed (**Appendix No. 13.02**). The first year cost of generation is Rs.3.81 per kWhr.

13.10 Expenses Considered For Financial Evaluation

13.10.1 Annual interest charges on the outstanding loans have been considered as per the financial package, during the year of operation.

13.10.2 Depreciation has been provided at 5.28% per annum of the completed cost as per norms, which works out to Rs. 488.82 Lakhs per annum. However, for the first year 75% is considered, as energy generation is restricted to 42.87% of annual generation (57.17 Gwhr). This works out to Rs. 366.62 lakhs.

13.10.3 Annual O & M charges are provided at the rate of 2% of the completed cost as on 2009 level with escalation of 5.72% per annum. This is projected to 2016 level.

13.10.4 Interest charges on working capital at 15% per annum.

13.10.5 Tax on Income

Tax holiday benefit has been availed for first ten years, consequently MAT at the rate of 10% + 10% surcharge + 2% EC is proposed to be payable for the first ten years of generation. From 2026th year onwards corporate tax at the rate of 30% with 10% surcharge and 2% EC is payable on the income. However, the MAT paid is deducted from the 11th year to 17th year of generation. The details of tax are indicated in profit and loss account statement.

13.10.6 Payment of Royalties, Taxes and Levies

This will have to be provided as per actuals on a year to year basis. However, as per the exemptions given to small hydro projects, no royalty is considered for utilisation of water for Power Generation and no other taxes and levies are considered for Generation of Power for this Project.

13.11 Financials

13.11.1 Financial Statements

Considering the realization from sale of power, annual operating costs, interest charges, depreciation, the financial statements viz., Projected Profit & Loss Account (**Appendix 13.03**), Projected Cash Flow Statement (**Appendix 13.04**) are prepared and enclosed.

From the Financial statements, it is evident that the cash flows are robust and surplus funds are available after repayment of debt.

13.12 Internal Rate of Return (IRR)

13.12.1 The cash flows generated in first 10 years of operations are considered for computation of internal rate of return. The project gives an Internal Rate of Return of 10.64% pre-tax. The details are furnished in the enclosed **Appendix 13.05**.

13.13 Debt Service Cover Ratio (DSCR)

13.1 The average DSCR of the Project till the repayment of loans stands at 1.65 the working computation is given as **Appendix No. 13.06** based

on the earnings of the Project. It is seen that enough cover is available for servicing debt.

13.14 Levellised Tariff

13.14.1 Levellised tariff for 12 years of operation starting from first year has been tabulated in and enclosed as **Appendix No. 13.07**. The first year saleable rate of power is Rs. 4.25 per unit. With a discount factor of 4.51% (weighted average escalation), discount tariff for the first year stands at Rs. 4.25 per unit and on 12th year, it reduces to Rs. 3.08 per unit and average is computed as Rs. 4.35 per unit against average tariff of PPA viz. Rs.4.38 per unit. Thus, the Project is economically viable.

13.15 Conclusion

13.15.1 The proposed Hydro project gives an Internal Rate of Return (IRR) of 10.64%. Therefore, the project is economically viable. The power generated through renewable energy resources is environmentally clean and Small Hydel Power Projects are being encouraged by World Bank, International Institutions and has support from Ministry of Non-Conventional Energy Sources, Government of India and Government of Karnataka.

CHAPTER – 14

Conclusion and Recommendations

14.1 Conclusion and Recommendations

The following conclusions are drawn from the studies carried out on the proposal of implementation of Bharachukki Mini Hydel Scheme as detailed out in this Detailed Project Report.

- a) It is economically feasible to install 3 units of 6MW capacity as per the detailed studies made.
- b) Considering the available hydrological data, average annual energy generation is 59.46 GWhr, which indicates an annual plant load factor of 38% for the installation. The net energy available after allowing transformer losses and station auxiliary consumption considered is 57.17 GWhr per annum.
- c) The cost of the scheme at completion is estimated at Rs.7909.00 Lakhs including the cost of transmission lines, escalation and IDC. Cost per kW of installed capacity is Rs. 51433.00 inclusive of cost of escalation, financial charges and interest charges during construction period. The cost of generation during the first year works out to Rs.3.81 / GWhr.
- d) The financial forecast for Bharachukki Mini Hydel Scheme is enclosed at **Appendix No. 13.01**. Interest on capital at 13% per annum is considered. The financial forecast carried out indicates that the project

generates net earnings from the day of commissioning.

- e) The project implementation period is 21 months including monsoon months from the date of financial closure.
- f) The project is technically feasible and economically viable.
- g) The project provides adequate return on investment.
- h) The project has no impact on the environment of the surrounding areas. The project is eco-friendly.