



UPES Centre for
Continuing Education

**A study of Project cost estimation and Bid evaluation criteria for solar
projects**

By

LALITH KUMAR M (500066241)
MBA IN POWER MANAGEMENT

Guided by

SATHISH BALASUBRAMANIAN

Sr. Business development Manager

M/s. TBEA Xi'an Electric Technology Co., Ltd.,

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Lalith Kumar
No. 29 Kalavai road,
Thimiri – Ranipet
Mobile -632512
Lalithymn@gmail.com

16.07.2020
Chennai

Declaration by the Guide

This is to certify that the Mr M. Lalith Kumar a student of MBA in Power management, SAP ID 500066241 of UPES has successfully completed this dissertation report on Mr SATHISH BALASUBRAMANIAN under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analysed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a towards partial fulfilment for the award of degree of MBA.

Signature



Sathish Balasubramanian
Sr. Business Development Manager
TBEA Xian Electric Technology Co., Ltd.,
Mobile: 82964 56934
Email: Sathish18bala@gmail.com

Date: 05.06.2020
Place: Bengaluru

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1. Introduction

This dissertation's aim is to understand a view of the bidder an expert to undertake their own study of solar projects and other related parameters of the area and make sound commercial judgment about power output i.e Net Electrical Energy Guaranteed Generation. The bid evaluation criteria shall be varies depends of the Private and Government developers. However in dissertation is elaborate bid evaluation method from 20MW GSECL Project, The Estimation of solar projects with main equipment's & Land related constrains, Project risk analysis with impacting the cost of the project.

And dissertation shall also explain the propose of Bank Guarantee's & EMD and Security Deposit cum performance bank guarantee (SD/PBG)

2. Review of literature

For the bidding, the body of the company shall be incorporated in India under the company's act 1956 or 2013 including any amendment thereto.

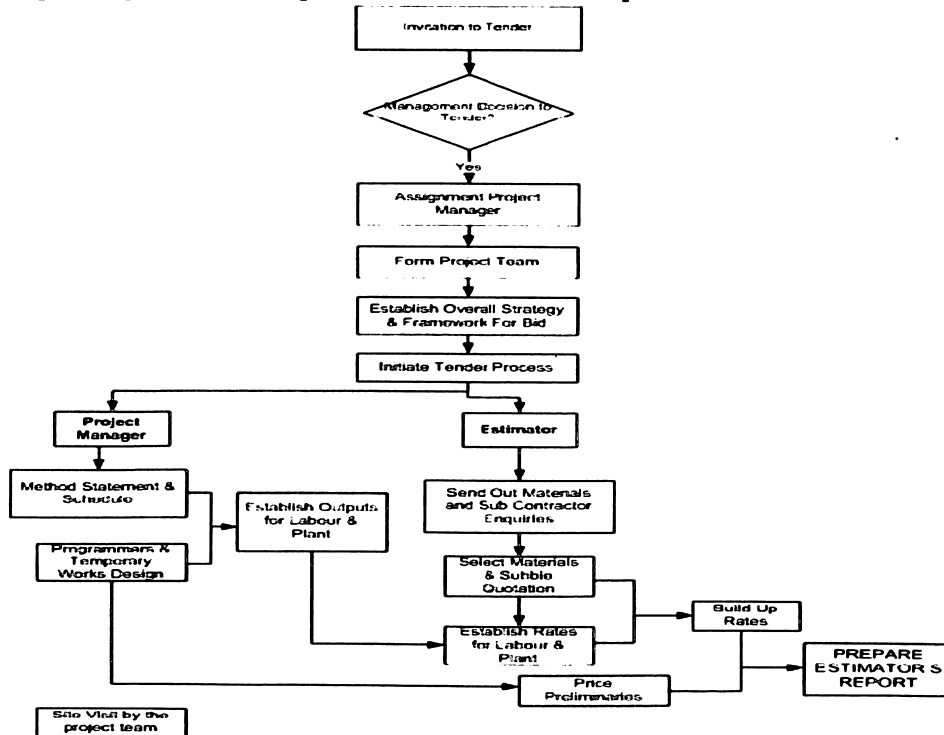
A bidding company shall be furnished certificate of incorporation along with the bid in supporting documents below. Bidder to qualifying the bidding various of qualification criteria like Experiences of project installation, financial qualification, cumulative turnover of last three year Net worth of current financial year & Audit report.

In additionally discussion about Bank guarantees, Earnest Money Deposit, BG against excess generation, BG against main driven equipment's, BG against underperformance, bid submission process and Reverse auction.

3. Research methodology:

In our project to start from invitation of Tender, Tender purchasing, qualifying the tender, risk review , approximation cost estimation of the project , Management decision of tender, assign the project team, kick off meeting, project technical review meeting, technical ordination, scope matrix of inter-discipline, site analysis & conditions, preliminary design, BOQ preparation , Cost Estimation , prepare the competitive techno- commercial offers , review of management, approval of management , BGs, EMDs & SDs,

Tendering Process: Tendering is the process of making an offer, bid or proposal, or expressing interest in response to an invitation or request for tender.



4. Invitation of Tender

Initiating step of a competitive tendering process in which qualified suppliers or contractors are invited to submit sealed bids for construction or for supply of specific and clearly defined goods or services during a specified timeframe.

5. Management Decision to tender

Defined project manager shall prepare detailed report of risk, opportunities, project value, and Time line of project. Management shall be review the all the risk parameters to take a decision on Tender to go head or not. If decision shall a go head, then below process are applicable. If management decided to not to go for the particular tender. Hence get stop on the sport.

6. Assignment project Manager

After a management approval to go head the tender, Tender head or proposal head shall allocate the projects to project manager & Project team to do the prepare the documentation , design , BOQ preparation for tender.

7. Project Team

A project team consists of different disciplinary members to be involved to preparing the design & BOQ, Project time line & strategy, cost estimation, Bank guarantee projects & site visit etc.

8. Establish overall strategy & Farm work.

As per the tender payment terms conditions & risk of project, Project team shall define the strategy of project & Farm the work flow of project. Once strategy & work flow shall be defined by project manager or project team, it process to get approval from top management for further ahead.

9. Initiate Tender process

Once tender get approved from top management, Tender shall pass to the EDRC Team, Costing Team, Project team & Operation & Maintenance Team. To put effect together to get Design & Bill of materials, Project schedules, Cash flow of the project, operation & execution plan to arrive & achieve the lowest cost of project.

10. Cost estimator

Cost estimators collect and analyze data in order to estimate the time, money, materials, and labor required to manufacture a product, construct a building, or provide a service. They generally specialize in a particular product or industry.

Duties

Cost estimators typically do the following:

Identify factors affecting costs, such as production time, materials, and labor Read blueprints and technical documents in order to prepare estimates Collaborate with engineers, architects, clients, and contractor Calculate, analyze, and adjust

estimates ,Recommend ways to reduce cost, Work with sales teams to prepare estimates and bids for client, Maintain records of estimated and actual costs

Accurately estimating the costs of construction and manufacturing projects is vital to the survival of businesses. Cost estimators provide managers with the information they need in order to submit competitive contract bids or price products appropriately.

Estimators analyze production processes to determine how much time, money, and labor a project needs. Their estimates account for many factors, including allowances for wasted material, bad weather, shipping delays, and other variables that can increase costs and lower profits.

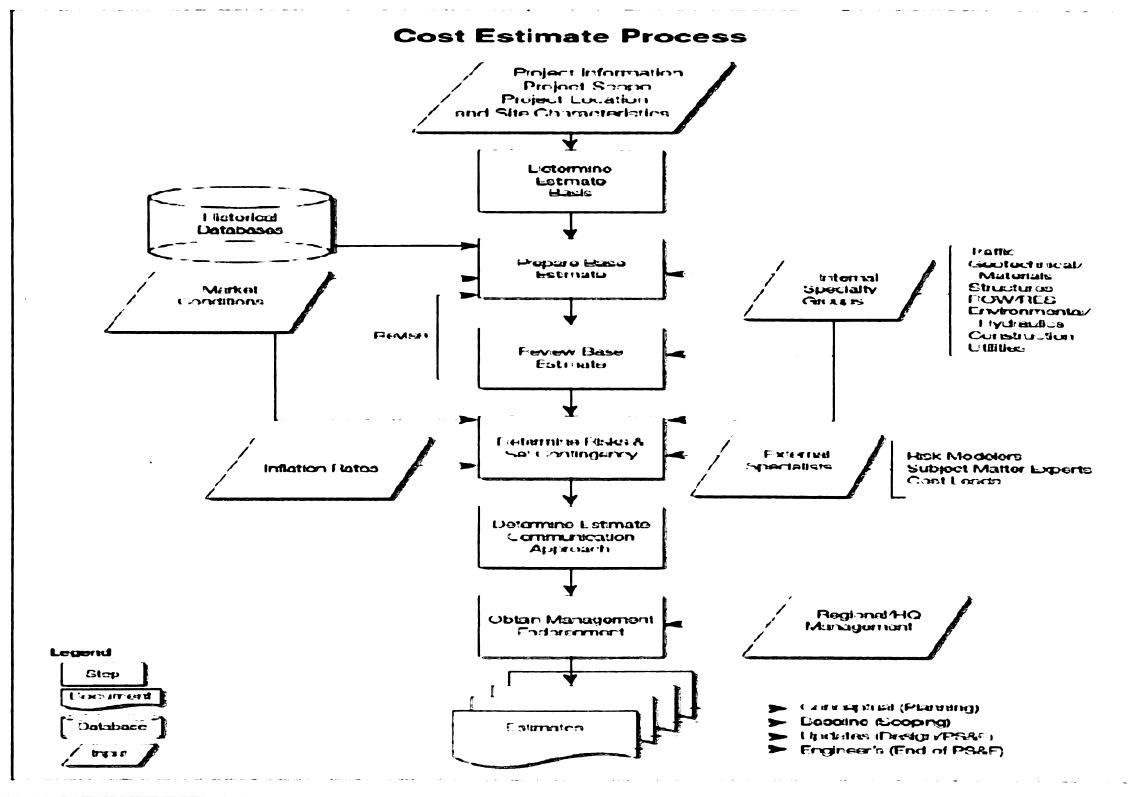
In building construction, cost estimators use software to simulate the construction process and evaluate the costs of design choices. They often consult databases and their own records to compare the costs of similar projects.

The following are examples of types of cost estimators:

Construction cost estimators prepare estimates for buildings, roads, and other construction projects. They may calculate the total cost of building a bridge or commercial shopping center, or they may calculate the cost of just one component, such as the foundation. They identify costs of elements such as raw materials and labor, and they may set a timeline for how long they expect the project to take. Although many work directly for construction firms, some work for contractors and engineering firms.

11. Cost Estimation

The process of cost estimation determines an amount of resources required to accomplish project activities. It involves the approximation and development of costing alternatives to plan, perform and deliver the project. It focuses on finding and allocating optimal expenses for the job.



Materials and Sub contractor enquiries

Due to limited time available in tender stage, it is a good practice to issue material and sub-contractor enquiries as early as possible. To enable this to be done it is essential for the estimator to follow these steps:

- To add all the bill items containing similar types in order to establish the principal quantities of work in each trade.
- Roughly estimate the cost of the whole project by using the all-in rate for the major items of work.
- To establish of key delivery dates for materials and sub-contractors
- To abstract and list all specification, drawings and bill items relevant to the trade of work, and to prepare enquiries.

12. Material enquires

- The estimator is usually required to obtain a quoted price for every major material on each tender because of the effect of inflation, variance in delivery cost, and the discount on quantity ordered. Also the estimator need to consider the availability of required materials. e.g. source of aggregates especially during a boom time in the construction industry and the time for delivery of materials or components or components manufactured abroad.

- Enquiry sent to supplier included :
 - The location of the project
 - The specification of the material used for construction
 - Quality of material
 - The delivery schedule and daily requirement
 - Method of transport by land or by sea
 - Deadline of quotation required
 - Closing date of tender
 - Name of the person of the contractor firm to whom any reference concerning the enquiry should be addressed.

13. Sub-contractors enquires

- The subcontractor's quotation will take more time to prepare. Prior to preparation the request for subcontractors quotation, the estimator may discuss preparation, department to ascertain the most efficient and practical way of splitting the construction work. This is more relevant for civil engineering project which are of a one off nature. Quotation must be compared and negotiated with subcontractor to obtain the best prices which are vital to the success of a tender. Generally, the rates for the selected subcontractor's will include both the allowance for attendance and other services. It is seldom for the estimation to assume a price for subcontractor rates. Usually the estimate waits until the actual quotation arrives before including them in estimate.

14. Selection of Material & Subcontractor

Once Subcontractors offers get finalized, after that techno – commercial comparison and evaluation shall be done by procurement team.

S. No	Item	Unit rate	Transport cost	Tax in %	Total

15. Project manager role

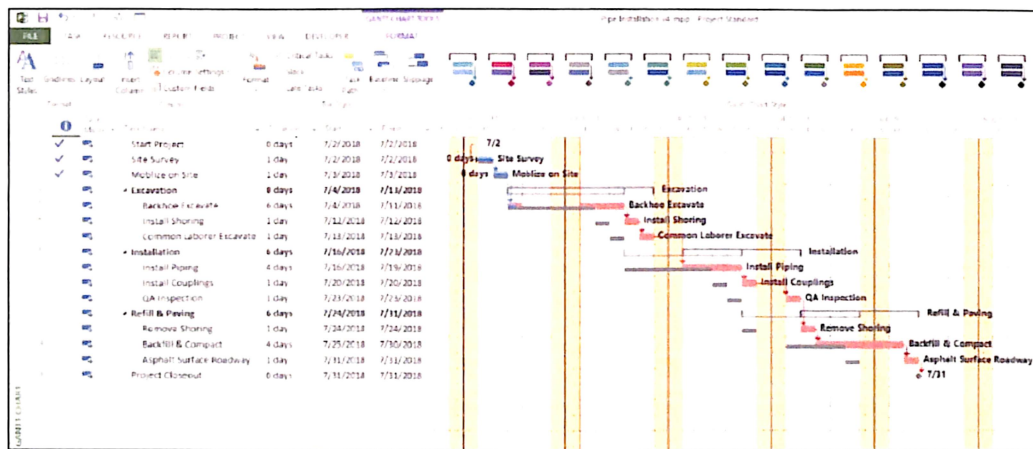
Project managers are responsible for planning and overseeing projects to ensure they are completed in a timely fashion and within budget. Project managers plan and designate project resources, prepare budgets, monitor progress, and keep stakeholders informed the entire way

Responsibilities of Project Manager

- Determine and define project scope and objectives
- Predict resources needed to reach objectives and manage resources in an effective and efficient manner
- Prepare budget based on scope of work and resource requirements
- Track project costs in order to meet budget
- Develop and manage a detailed project schedule and work plan
- Provide project updates on a consistent basis to various stakeholders about strategy, adjustments, and progress
- Manage contracts with vendors and suppliers by assigning tasks and communicating expected deliverables
- Utilize industry best practices, techniques, and standards throughout entire project execution
- Monitor progress and make adjustments as needed
- Measure project performance to identify areas for improvement

16. Project schedules

- Project scheduling is a mechanism to communicate what tasks need to get done and which organizational resources will be allocated to complete those tasks in what timeframe. A project schedule is a document collecting all the work needed to deliver the project on time



Prepare the estimator report

The preparations of detailed construction estimate consist of working out quantities of various items of work and then determine the cost of each item. This is prepared in two stages.

i) Details of measurements and calculation of quantities:

The complete work is divided into various items of work such as earthwork concreting, brickwork, reinforced concrete, plastering etc. The details of measurements are taken from drawings and entered in respective columns of prescribed preform.

The quantities are calculated by multiplying the values that are in numbers column to Depth column as shown below:

Details of measurements form

S.No	Description of Item	No	Length (L) m	Breadth (B) m	Depth Height (D:H)m	Quantity	Explanatory Notes

ii) Abstract of Estimated Cost:

The cost of each item of work is worked out from the quantities that already computed in the detailed measurement form at workable rate. But the total cost is worked out in the prescribed form is known as abstract of estimated form. 4% of estimated Cost is allowed for Petty Supervision, contingencies and unforeseen items.

Abstract of Estimate Form

Item No.	Description Particulars	Quantity	Unit	Rate	Per (Unit)	Amount

17. Bid preparation

General Terms

A Bidder is eligible to submit only one Bid for the Project. A Bidder shall not be entitled to submit another Bid either individually or in a Consortium, as the case may be

Notwithstanding anything to the contrary contained in this RFP, the detailed terms specified in the draft Contract Agreement shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Contract Agreement.

The Bid should be furnished in the formats mentioned in the RFP document which shall be duly signed by the Bidder's authorized signatory, provided that the Financial Proposal will be submitted in separate envelop.

The Bidder shall submit a power of attorney as per the format at "Appendix 12: Format of Power of Attorney as Authorized Signatory" authorizing the signatory of the Bidder to commit to the Bid or as per their Company's format.

Any condition or qualification or any other stipulation contained in the Bid shall tender the Bid liable to rejection as a non-responsive Bid. The complete Bid shall be without alterations, interlineations or erasures, except those to accord with instructions.

The RFP documents and all attached documents are and shall remain the property of the Company and are transmitted to the Bidders solely for the purpose of

preparation and the submission of a Bid in accordance herewith. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. The Company will not return any Bid or any information provided along therewith.

The Bidder shall submit PF code number allotted by Regional PF Commissioner. Failure to do so is likely to result in the offer being rejected.

Bidder shall note that the Price Bid of only those Bidders shall be opened who are found technically qualified and responsive to company. Tender terms and conditions including but not limited to Scope of Works.

18. Format and Signing of Bid

The Bidder shall provide all the information sought under this RFP. The Company will evaluate only those Bids that are received in the required formats and complete in all respects.

The Bid shall be typed or written in indelible ink and signed by the authorized Signatory of the Bidder who shall also initial each page, in blue ink. All the alterations, omissions, additions or any other amendments made to the Bid shall be initialed by the person(s) signing the Bid.

19. Performance Guarantee

Security Deposit cum Performance Bank Guarantee (SD/PBG) as per the format given in Appendix 18 (b): Format of Bank Guarantee for Security Deposit/ Performance Bank Guarantee shall be furnished in favour of Chief Engineer (P&P).

The Successful Bidder shall submit Security Deposit cum Performance Bank Guarantee of 10% of the EPC Contract Price, within seven (7) days along with the acceptance of LOI, initially valid for a period of twenty three (23) months from the date of issue of LOI and shall be valid for further 90 days. However, in case of delay in demonstration of the PG test, the same will have to be extended upto 3 months beyond the due date for successful completion of PG test. The period for Performance Guarantee Test shall begin from the date mentioned in NIT of this Tender and shall continue till next one (1) year.

20. Bid Evaluation Criteria (BEC)

The Evaluated Bid Value (EBV) shall be calculated using the following parameters:

Parameters Quoted by the Bidder:

- i. Quoted EPC Contract Price,
- ii. Quoted Annual Net Electrical Energy Generation Guarantee (NEEGG) at the Metering point of the Plant for each year during the O&M period (of 10 years),
- iii. Quoted O&M Contract Price for each year during the O&M period (of 10 years).
Parameters assumed constant for evaluation of each Bidder:
- iv. Discount Factor of 10.69% annually.
- v. Fixed Land Cost: Rs. _____ Cr.

The Evaluated Bid Value (EBV) shall be calculated using the above mentioned parameters as Follows:

Step 1: Quoted EPC Contract Price of Plot A, Plot B and Plot C at the zeroth (0th) year

Step 2: Net Present Value (NPV) of 10 years of O&M Cost quoted by the Bidder for Plot A, Plot B and Plot C

Step 3 ADD: Summation of EPC Contract Price and NPV of O&M for 10 years of Plot A, Plot B and Plot C

Step 4: Summation of quoted NEEGG for 10 years for Plot A, Plot B and Plot C

Step 5 DIVIDE (Sum of EPC Contract Price and NPV of each year O&M Contract Price for 10 years and Fixed Land Cost) by (Summation of quoted NEEGG for 10 Years) of Plot A, Plot B and Plot C i.e. *(Step3/Step4)*

The Evaluated Bid Value (EBV) shall be the Net Present Value (NPV) as calculated above.

Evaluated Bid Value (EBV) = [(EPC Contract Price) + (NPV of each year O&M Contract Price of 10 years at the rate of 10.69%)]

ΣNEEGG of 10 years

The Bidder with the lowest EBV in Rs. / kWh shall be the Successful Bidder.

EXAMPLE:

The following example will further clarify the methodology of comparison:

Note: Figures quoted by Bidder are in Box.

For 150MW

Figures Quoted by Bidder 1

EPC Price	Rs.	465	Crore	Derived/ Evaluated Figures	Remarks
Year		NEEGG	O&M Cost		
		(in KWh)	(Rs.)		
0		NA	NA		
1.		285,000,000	23,250,000		
2.		282,150,000	24,412,500		
3.		279,328,500	25,633,125		
4.		276,535,215	26,914,781		
5.		273,769,863	27,769,863		
6.		271,032,164	29,673,546		
7.		268,321,843	31,157,224		
8.		265,638,624	32,715,085		
9.		262,982,238	34,350,839		
10.		260,352,416	36,068,381		
	Total	272,51,10,862	29,24,36,001		

NPV of each year

O&M Contract = Rs. 16,75,54,566

**Price for the
Project (in Rs.)**

EBV (in Rs/ kWh) = 2.2345

Without Land Cost

For 150MW

Figures Quoted by Bidder 2

EPC Price	Rs.	465	Crore	Derived/ Evaluated Figures	Remarks
Year		NEEGG	O&M Cost		
		(in KWh)	(Rs.)		
0		NA	NA		
1.		315,000,000	19,440,00		
2.		311,850,000	20,412,000		
3.		308,731,500	21,432,600		
4.		305,644,185	22,504,230		
5.		302,587,743	23,629,442		
6.		299,561,866	24,810,914		
7.		296,566,247	26,051,459		
8.		293,600,585	27,354,032		
9.		290,664,579	28,721,734		
10.		287,757,933	30,157,821		
	Total	3,011,964,637	24,45,14,231		

NPV of each year

O&M Contract = Rs. 140, 09, 72,373

**Price for the
Project (in Rs.)**

EBV (in Rs/ kWh) = 2.0823

Without Land Cost

Result:

$$\text{EBV of Bidder 1} = [(465,00,00,000 + 167,55,45,662 + 150 \times 84,78,000) / 272,51,10,862$$

$$= \text{Rs/kWh } 2.2345$$

$$\text{EBV of Bidder 2} = [(486,00,00,000 + 140,09,72,373 + 150 \times 84,78,000) / 301,19,64,637$$

$$= \text{Rs/kWh } 2.0823$$

- EBV in Rs/kWh of Bidder 1 is Rs. 2.2345 per kWh.
- EBV in Rs/kWh of Bidder 2 is Rs 2.0823 per kWh.

- EBV of Bidder 2 is higher than Bidder 1.

Bidder with lower EBV in Rs./kWh shall be L-1 and Bidder with higher EBV will be L-2.

Hence, in the above Bidder 1 would be preferred as the Successful Bidder (L-1) compared to

Bidder 2.

NOTE: This is only example. Complete project of individual location will be given to one Bidder. There is an e-Reverse Auction after opening of the Financial Bid where the Bidder has to give discount as per the procedure of the e-Reverse Auction.

21. Conclusion

- Evaluation Methodology may vary for every tender and depends on client. This reference tender have below Evaluation methods.
- The Evaluated Bid Value (EBV) shall be calculated using the following parameters:
- Engineering Procurement Commissioning (EPC) Contract Price;
- Net Present Value (NPV) of O&M Price of ten (10) years;
- Net Electrical Energy Generation Guarantee;
- The Bid with the Lowest Evaluated Bid Value shall be considered as L-1 and the Successful Bidder

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