

# preprocessinc

## *Chemical Engineering for Entrepreneurs*

### Cost Estimating

Similar to schedule, both parties have to believe in setting realistic project cost expectations. Things always change, and with change comes impact on cost. Our philosophy is to manage change by keeping our clients informed as things develop and always being open with our findings and approach by bringing cost solutions to the issue at hand.

Cost estimating models are complex and ever changing, but we also realize the needs of financial drivers of the project to have decision-making quality cost information. We are experienced enough to tell it like we see it and have the strength and confidence in our experience to deal with changes as they occur. We believe that understanding that variability exists in cost estimation is important to a mature relationship build with a client where both parties realize that the best interests of the client's business is our first concern.

We like to structure our compensation package such that we have "skin in the game". We want to be part of our client's success. This usually embodies itself in some form of progressive equity stake tied to the success of the project. We pride ourselves on being a highly value added partner with our clients versus just a firm looking to book hours.

We work with four levels of cost estimate details:

1. Proportioned (+/- 50 to 100%), FEL1
2. Factored (+/- 25 to 50%), FEL2
3. Take Offs (+/- 10%), FEL3
4. Control (+/- 5%), Detail Design

Cost estimates are built progressively using varying percentages of each of the four methods. As details are defined, sections of the estimates move forward towards a Control Level Estimate (CLE). Usually the overall estimate is a continuing compilation of detail adding the next level of refinement to each piece of equipment or section of the estimate until a rational convergence at the client's desired risk level is attained.

Our approach would be to build upon what information is known and then attempt to stay within the bounds of the financial expectations that have been established for the venture. This may require evaluation of technical integration approaches, permitting strategies and equipment selection directions that give and take in the overall cost perspective.

We recommend that our clients consider the total installed cost and the effect on the operating expenses of the systems as the energy cost and maintenance cost can be unanticipated in the zeal to refine a capital cost to its optimum level.

As for our effort, and the effort to develop, engineer, construct, and operationalize the system, the best information we have at this point leads to a generalized proportioned cost. This becomes one of the living sets of information as the project progresses. As information is refined, the cost estimate is continually sharpened until we hit the control budget level. This, coupled with schedule, is a complex and dynamic thread of iterative thought throughout the life of the project.

The direct costs of a project usually are the ones that an owner tallies up in a project financial analysis early and these should be anticipated to be 70% of the Total Projected Cost (TPC). Each client has some allowance for the indirect costs associated with the TPC, and even the definition of what is in each category is always an area for detailed discussion. Typically the engineering, construction management, permitting, and operational normalization of a project should be about 30% of the Total Installed Cost (TIC) which many times is not accounted for in early financial models TPC. The total direct and indirect costs (TDI) is this 70% of the TIC. It is very important to have open and frank discussions so that both parties are on the same page as to what is included in each of these terms.

Another way to look at this is to proportion the early Total Equipment Cost (TEC). This would be the dollars expected to be paid to all the equipment suppliers, then multiply that total by a proportional factor to gain the TIC. There are many factors to consider such as: owners risk tolerance, the "first of its kind" versus established, the site's regulatory environment, and the local site conditions in this proportional multiplying factor. In a proportioned (or rule of thumb) analysis, a factor of 3 is considered tight, a factor of 4 is considered neutral, and a factor of 5 or 6 is not unreasonable depending upon the risk tolerance mood of the client and complexity of the project. Usually these factors are applied in a segmented and very careful breakdown to portions of the overall scope. These proportional factors could drive wildly different numbers. We point this out to illustrate the need to commission this level of refinement early in the project definition phase of the relationship build.

To set future realistic expectations, the proposal for Phase 1, 2, 3, and 4 support services will run into the 70/30 type percentages of the TPC, TDI, and TIC capital for this type of installation. Future similar projects will be able to re-apply a percentage of the engineering and project management efforts developed in the preceding efforts. The 30% proportional factor should be significantly reduced in subsequent efforts.

PreProcess, Inc. realizes that clients may be continually developing new and novel plug and play technologies. We are interested in a long term relationship proving ourselves as worthy partners in future ventures as clients build their companies and technology through multiple applications.