The Two Primary Requirements for All Cost Estimators Are to Generate Costs That Are Comprehensive and That Reflect the Lowest Credible Cost

Since Multiple Sites Exist for Both Design and Construction, Estimators Need to Make Provisions to Accept Labor Rates from the Planning Group That Will Change as Various Sites Are Considered

Cost Estimators Should Test Their Costs Against All Available Metrics to Ensure That They Are Not Too High

Estimators Should Minimize the Time Spent Tracking the Migration of Their Cost Estimate from May, 1999 (Lehman Review) to Now

The Cost Review Process Will Provide for Management Modification and/or Replacement of Estimator-Generated Estimates That Are Perceived to be Unacceptable

There Will be No Scoring of the Contingency Factors for This Round of Costing

We Will Ask for All Costs to Reflect a Specific Confidence Level, Possibly 50% (50% Chance That the Actual Costs Will be Either Higher or Lower Than the Cost Estimate)

We Will Ask for Probability Distributions of Costs Aggregated at the Work Package Level
NLC General Cost Estimate Guidance

The scope of the NLC is such that cost will always be a major factor. Cost estimates should be prepared in acknowledgement that there will be a continuous and aggressive program to drive down costs both in the design and in the construction phases of the project. While an estimator will endeavor to make his/her estimate clear and supportable, this should not be done at the expense of a higher cost.

Example: There is extensive history on the cost of electromagnets in small quantities built at SLAC for PEP II. Utilizing this data as the basis for an NLC magnet cost makes for a highly defensible and supportable cost. However, NLC magnets will be built in higher volumes in the most cost-effective location possible, most likely not at SLAC. This lower cost model is appropriate and should replace the PEP II model.

The detailed design and manufacture of components and systems for the NLC will take place years into the future. In this interval requirements will be simplified, tolerances will be opened up as large as manageable, standard components will be used wherever possible, value engineering and cost trade-off studies will have been undertaken, and teams will have worked with potential suppliers to obtain the desired performance with the most cost-effective designs. Cost estimates should be prepared with the assumption that this process has occurred.

Example: Experimental X-Band Structures for the NLC are presently being built at a rate of one per year and a cost on the order of $1 million each. The machining and straightness requirements are very strict, and the amount of measurement is intense. The structures actually manufactured for the NLC will have their fabrication and measurement requirements simplified. The cost estimate should reflect tomorrow’s structure, and not today’s.

Cost estimators should select a cost model that will result in the most cost effective product or service for the NLC. In the case where an industrial capability exists or could be developed, it is likely that an industrially obtained item will be more cost-competitive than the same item built or performed by a DOE laboratory. Where industrial competence exists, much
of the ED&I may also be more effectively performed by industry. In other cases, having a lab do the design and industry performing on a build-to-print contract would work the best.

Example: The philosophy at the SSC was that significant quantities of components and services would be done with industrial contracts. Small quantities would be produced by the SSC since they could be done at lower cost, plus this would provide needed technical knowledge to the SSC technical staff about the intricacies and critical aspects of the item.

Cost estimates should be predicated on commonality and standardization to the maximum extent possible. Custom designs for every situation will be prohibitive financially. Using an available off-the-shelf part, or condensing the number of custom parts or styles down to the absolute minimum will be necessary in order for the NLC to be economically feasible. Cost estimators need to anticipate that this standardization process will occur before construction begins, and to prepare cost estimates accordingly.

Example: The current strategic focus at NASA on space missions is “faster, better, cheaper”. The “cheaper” in most cases was accomplished by using available technologies, systems, launchers, and even software. As a result, earth-orbit missions can now be accomplished for $20 million, including launch costs, and interplanetary missions for $85 million.

The cost model that reflects the best productivity available at the lowest cost realizable should be selected. In many cases, this will not reflect the present way that projects are executed at SLAC or other DOE laboratories. Cost estimators need to carefully select the optimum cost model, and not the one that is most familiar.

Example: It is generally recognized that the lowest cost installation model minimizes the work done in the tunnel or in situ, and maximizes the work done in another staging or assembly area. A more competitive labor rate will result from the work being done offsite by a contractor or contractors, which generally will not require labor covered by the Davis-Bacon Act.
Cost estimates need to reflect that costs will vary in proportion to the quantity produced. Quotes or actual data obtained at one quantity level need to be adjusted to the NLC volume level. An accepted cost-estimating tool for this adjustment is the learning curve, where unit costs decline at a fixed percentage rate for each doubling of cumulative units produced. A learning curve can be used both to adjust a small quantity cost to a larger quantity, and to arrive at an aggregate cost if only the cost of the last unit produced is known.

Example: A machine-produced part that costs $1,000 each in quantities of 100, if put on a 92% learning curve, will have the 1,600\textsuperscript{th} unit cost $716, and all 1,600 units will have an average unit cost of $810. A labor-intensive part that has a cost for the 1,024\textsuperscript{th} unit of $1,000 each, if put on an 85% learning curve, will have an average unit cost of $1,319 for all 1,024 units.