## NLC CDR Roadmap

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Model Iteration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>CD-1 Model</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DOE “Lehman” Review</strong></td>
</tr>
<tr>
<td>2000</td>
<td>CD 0.4 Model</td>
<td><strong>We are here.</strong></td>
</tr>
<tr>
<td>2001</td>
<td>CD 0.8 Model</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>SLAC-FNAL Request FY04 Start</td>
<td></td>
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<tr>
<td></td>
<td>“Two-Site” CDR</td>
<td></td>
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<tr>
<td>2003</td>
<td>Site Selection</td>
<td></td>
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<tr>
<td></td>
<td>Final CDR</td>
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Goals and Charge

The goals for NLC CD 0.4 Costing Workshop are to review and further develop the technical definition and cost estimation of the NLC CD 0.4 Model. This includes examination of the completeness of definitions for machine and technical systems, development of the WBS with its underlying base of activities and resources, and initial estimates of the costs of the resources that would be required to build the NLC in the CD 0.4 Model. Emphasis will be on the completeness of the Model, the methodologies used to make cost, risk, and contingency estimates, and the roles and responsibilities of the cost estimating groups. Estimates should be given for all costs, but validation of the accuracy of these estimates is not the focus of this Workshop.
**Total Project Cost**  5,107 M$
(FY2000, without detectors, contingency, or escalation)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injector Systems</td>
<td>19 %</td>
</tr>
<tr>
<td>Main Linacs</td>
<td>39 %</td>
</tr>
<tr>
<td>RF Power Systems</td>
<td>18 %</td>
</tr>
<tr>
<td>Beamline Systems</td>
<td>10 %</td>
</tr>
<tr>
<td>Civil Construction/Facilities</td>
<td>11 %</td>
</tr>
<tr>
<td>Beam Delivery</td>
<td>11 %</td>
</tr>
<tr>
<td>Global Costs</td>
<td>17 %</td>
</tr>
<tr>
<td>E.g. Controls/Software</td>
<td></td>
</tr>
<tr>
<td>Central Facilities</td>
<td></td>
</tr>
<tr>
<td>Management, Business Services,</td>
<td>14 %</td>
</tr>
<tr>
<td>and Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>
Progress Since Lehman

- R&D “in the pipeline” in May, now in hand ...
  - Solid-state modulator.
  - PPM klystron at 75 MW and 3µsec - twice as much energy per pulse as in the design presented to Lehman.
  - Multi-mode DLDS.
  - RDDS Structure.

→ See slides.

Number of modulators and klystrons reduced by factor of 2.
Framing NLC CD 0.4 Model.

• Alternate technologies identified for key systems …
  • Permanent magnets for beamlines.
  • “Wireless” electronics located in the tunnels.
  • C-Band for injector linacs.
  • “Consumable” collimators.
  • Cut and cover civil construction.

• Optimization and new ideas for accelerator designs ...
  • Re-evaluation of margins and performance overheads.
  • Re-optimization of reliability/availability budgets.
  • Subsystem and beamline configurations.
  • New solutions - e.g. “Raimondi” Final Focus.
    → See slides.

  No long-haul cable plant.

  Beam Delivery reduced from 10 km to 4 km.
Framing of NLC CD 0.4

• Process
  – Put results and ideas on the table.
  – Rough and limited analysis of performance, cost, and risk.
    • “Is it 3M$, 10M$, 30M$, 100M$ and what does it mean for the machine?”
  – Documentation.
    • Working Group Web sites and Database.

• Over 130 major items generated.
  – ~ 50 Incorporated (≥ 1.0 B$) → Plot
  – ~ 30 Pending (≥ 0.5 B$)
  – ~ 20 Tabled (for now) (FY00 w/o esc or contingency)
  – ~ 5 Change of Scope

• Potential cost reduction of ~ 33%
  incorporated or pending further analysis - without change of scope of the project.
NLC CD 0.4 Schedule

(Updated April 10, 2000)

✓ U.S. Collaboration Meeting (@SLAC) Jan 31– Feb 2

✓ NLC-JLC ISG5 (@SLAC) Feb 22 - 25
✓ CD 0.4 Machine Configuration Finalized March 3
✓ HEPAP Briefing March 9 - 10
✓ Project Review (WBS) March 27 - 28

✓ Physics and Detectors Workshop (@LBNL) March 29 - 31

Project Costing Workshop April 24 - 27
Project Review (Technical and Cost) May 18 - 19

MAC Briefing (@FNAL) May 31-Jun 2

CD 0.4 Optics and Hardware Finalized June 8
Project Review (Technical, Cost, and Schedule) June 22 - 23

CD 0.4 Release September