



# Cost Management

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**Cost Estimates for SB2009 Studies**

**CLIC-ILC Cost & Schedule Working Group**



# Cost Estimates for SB2009 Studies

- SB = Strawman Baseline – For the TDR, the GDE is considering possible changes in the ILC RDR Baseline to improve performance or to reduce cost
- Such possible scenarios or proposals were outlined for further study at DESY in May 2009
- Adoption of each of these cost reduction proposals must be weighed against increasing the risk of meeting performance goals by GDE Management
- Estimates for each of these scenarios are needed in order to identify and concentrate our limited resources on those with highest cost reduction impact
- Area Systems Leaders & Conventional Facilities team performed another cost estimating pass for these possible scenarios



# SB2009 Estimate Differentials - ABQ

- New data, less than ~ 1 week old, incomplete, not checked or digested  
I apologize, but do not feel guilty, for any errors or omissions....
- Remember RDR expressed in M ILCUs where 1 ILCU = 1 \$ 2007
- **6,618 M** ILCUs = RDR Estimate as starting point = avg of 3 regions ests.
- 6,642 M ILCUs = European RDR Estimate (near CERN)
- 6,533 M ILCUs = Asian RDR Estimate (in mountainous region)
- 6,678 M ILCUs = Americas RDR Estimate (centered at Fermilab)
- The 3 regional estimates differ only for Conventional Facilities & Services
- Since Americas CFS estimate is most complete for SB2009 cost studies,  
I will use this as our starting point for these differential comparisons
- BUT, since RDR, there were 3 significant errors found with Americas CFS  
est: overestimated cavern volumes, forgot tunnel floor for RTML,  
used incorrect ratio for engineering, both contracted and in-house
- Implementing corrections for these reduces the Americas estimate to:
- **6,610 M** ILCUs – use this as our starting point for SB2009 studies



## SB2009 Estimate Differentials - ABQ

- **6,610 M** ILCUs – corrected Americas starting point
- Some minor differentials are not yet available in below info

### Possible Action

### Impacts (M ILCUs)

Value Eng Cooling for ML

ML Klystron Cluster (1 tunnel)

ML Klystron Cluster – Low P

3.2 km DR – Low P

Central Region Optimization

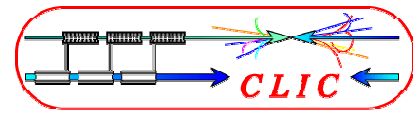
*possibilities* so far (~ 2/3 CFS)

DRFS 1 tunnel & Low P      **not available yet**

**Remember:** these are just inputs to GDE management for consideration of whether to pursue these proposed actions



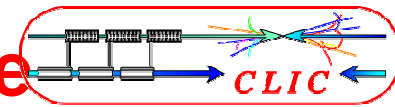
# CLIC-ILC Cost & Schedule W.G.



- from CLIC: Philippe Lebrun, Germana Riddone, Katy Foraz, and Jean-Pierre Delahaye
- from ILC-GDE: Peter H. Garbincius, Tetsuo Shidara, and John Carwardine (by webex)
- CLIC intends to produce a design report by end of 2010 with cost estimate, we are preparing for comparisons to ILC est
- Philippe - template for gathering CLIC cost estimating info (deadline 30sept09) from Domain Coordinators and Sub-Domain Coordinators (with some feedback)
- Peter & Philippe discussed our **slow** progress on common “cost risk methodology” document, and how applied, also ILC has a ranked “technical risk register” w mitigation plan CLIC lists “feasibility” (must be solved for project to proceed), “cost”, and “performance” issues



# Impact of 1 Tunnel on ILC Schedule



- Katy Foraz, LHC scheduler, performed a preliminary comparative study considering:

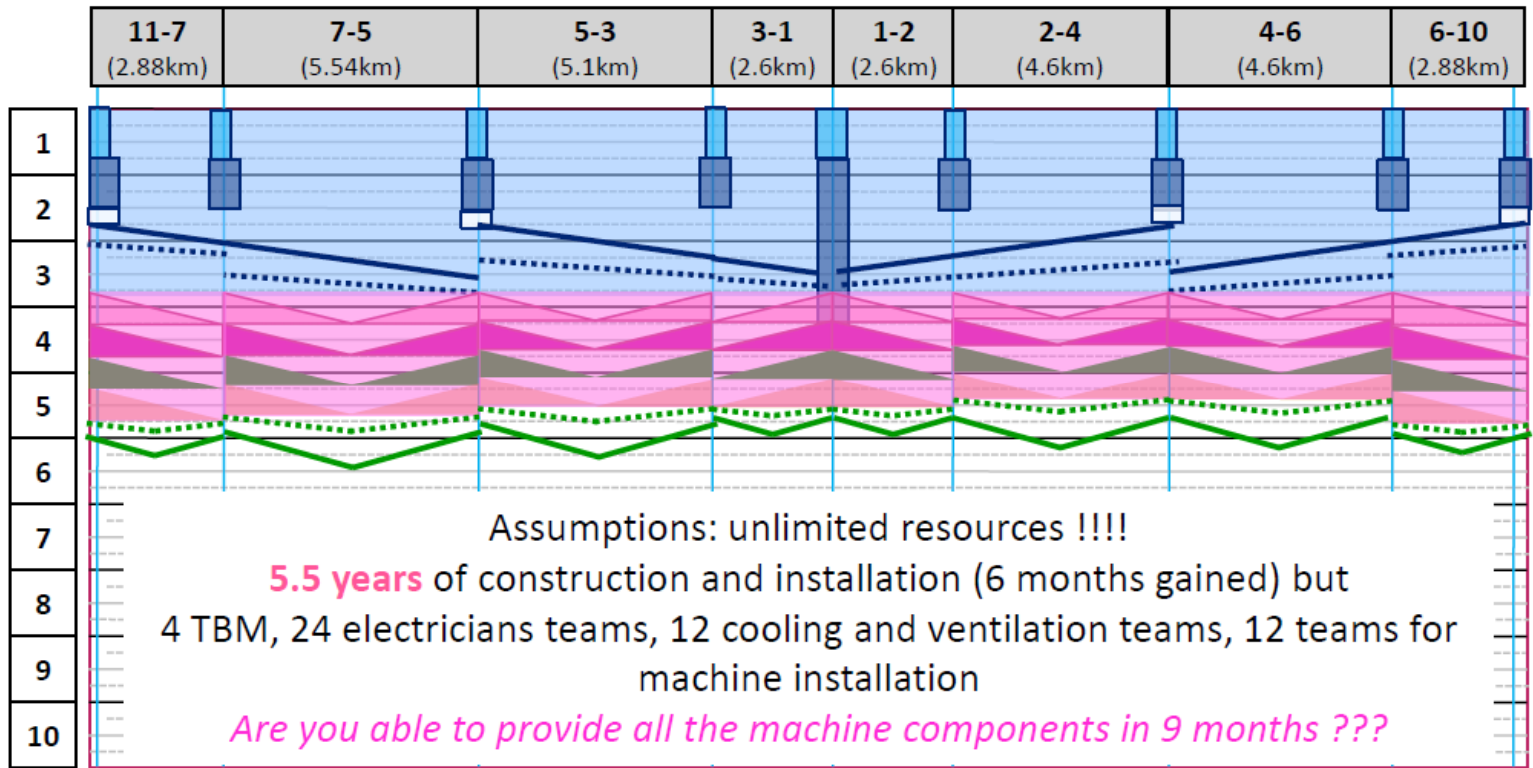
## Unlimited resources

|   | 2 tunnels<br>6 years | 1 tunnel<br>5.5 years |
|---|----------------------|-----------------------|
| Nb of TBM                               | 9                    | 4                     |
| Nb of teams for elec. general services  | 24                   | 12                    |
| Nb of teams for cooling and ventilation | 12                   | 12                    |
| Nb of teams for cabling                 | 24                   | 12                    |
| Nb of teams for machine installation    | 12                   | 12                    |

## Resources leveled

|   | 2 tunnels<br>8.5 years | 1 tunnel<br>8 years |
|---|------------------------|---------------------|
| Nb of TBM                               | 4                      | 2                   |
| Nb of teams for elec. general services  | 8                      | 4                   |
| Nb of teams for cooling and ventilation | 4                      | 4                   |
| Nb of teams for cabling                 | 8                      | 4                   |
| Nb of teams for machine installation    | 2                      | 2                   |

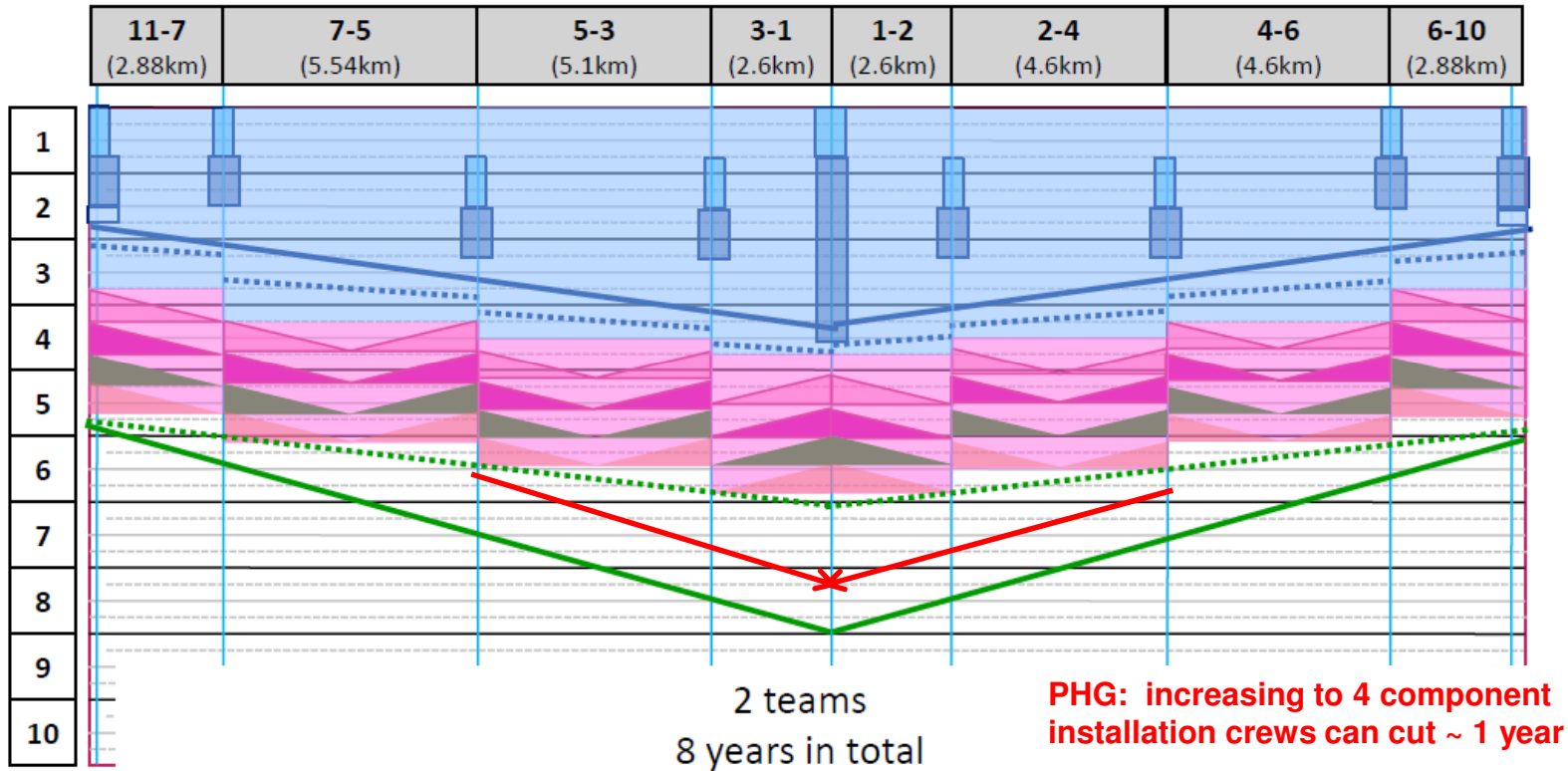
# 1 tunnel - Unlim. Resource\*\* Machine installation



..... Support installation and alignment (250m/wk)

— Machine inst.: transport and interconnections (progress rate to be confirmed 100m/wk)

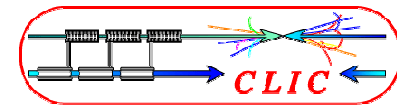
# 1 tunnel – Resource levelled \*\* Machine



..... Support installation and alignment (250m/wk)

— Machine inst.: transport and interconnections (progress rate to be confirmed 100m/wk)





- One can trade-off between schedule and cost
- Must minimize interference between teams
- Slowest progress per team is tech component installation  
=> increase number of qualified installation teams
- Schedule depends on keeping teams supplied with parts as they need them  
=> no gain in installation outpacing production  
=> must optimize production, testing, & installation
- Asked Katy to also consider schedule for 1 tunnel for 4 TBM, 8 electrical, 4 HVAC, 8 cable, 4 install teams
- Also, Peter will ask members of ILC RDR Installation Estimating Team to consider a more detailed comparison of resource needs & advance rates for 1 vs 2 tunnels

