ILC Technical De i n e alue e ae e laine

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The ILC's design team, the GDE, has produced what is known as a "value estimate," which is now the norm for large.scale internationally funded projects for e ample ITE , L C, z TLz , C , z L z , FEL, Fz I or E These projects are usually constructed using mainly "in.kind contributions

The ILC's *port* is currently at draft stage and will be published in une 2013 In that report, the value estimate for the construction of the ILC is **7.8 b** **1,000 dd b** This estimate is averaged over three regional sample sites and represents the construction cost of a 00.Ge linear collider as described in the cost chapter of the *port* The variance among the three regional site estimates is about 2

The *port* value estimate gives an uncertainty of 2 z more accurate estimate can be calculated when a host site is identified and the international project governance and in.kind contributions are agreed upon

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ILC stands for ILC value nit The total value of the project is based on component cost estimates that come from all three regions z mericas, z sia and Europe To produce a single number in useful way we must combine Dollars, apanese en and Euros amongst others using special conversion rates that reflect purchasing power in each region z single basis of currency the ILC was created for this purpose ne ILC is 1 Dollar in anuary 2012, but conversions to other currencies need to be made correctly, and not using today's commercial e change rates because those rates do not necessarily represent true comparative prices between items manufactured in different regions of the world For the TD value estimate, currency conversions were made using purchasing power parity indices from the rgani ation for Economic Co.operation and Development ECD indices are price relatives derived from the ratio of the prices in national currencies for the same goods or services in different countries Conversion of the value estimate from ILC into the national currency of a host nation re uires the use of both indices and e change rates, and depends on the details of how the project value is divided between the host nation and the in.kind contributors

Following the ‘value’ concept, the ILC is an artificial currency unit that has the same value in all regions and is more useful when considering international in-kind contributions in the form of hardware.

What is included in the value estimate?

Manpower is included in the estimate, but as person-hours rather than ILCUs. Manpower is the most complicated ‘currency’ to convert in a useful way because every country has its own rules and customs in the way labour is costed, and rates vary considerably across countries. A more precise number can be calculated when a host site is identified and the international project governance and in-kind contributions are agreed upon. Labour can also be contributed from a participating laboratory or country.

What have the value estimate authors included and not included?

The *Publication of the Technical Design Report* is very explicit about what is included in the value estimate. Because it is international, it is not an estimate made in any one country's accounting system, but it forms a solid basis for producing such estimates. The value estimate comprehensively covers all construction costs – civil engineering, accelerator components, etc. – for the accelerator complex.

The value estimate does not include contingency and escalation over the project period, commissioning with beam or operations costs. Such items may need to be included in a regional translation of the value estimate.

Costs for project engineering and R&D prior to construction start are not included. The cost of the detectors is also not included, since these are historically funded in a different way. Finally, some site preparation costs, such as land acquisition, roads, etc., are not considered. They are assumed to be the responsibility of the host.

How is the cost sharing envisaged?

The TDR assumes that construction costs are covered by all the participating countries, but it also assumes that the host nation would pay a fraction of at least 50% of the quoted value estimate. The remaining ~50% would be divided across several industrial nations. Using the published value estimate as a basis, individual countries would offer to construct and provide parts of the machine – and/or personnel – rather than

hard cash. Exactly how the pie will be divided remains the subject of future negotiations.

Research plan (reduced 250-GeV ILC) reduction

The GDE has not as yet produced an optimised design and cost for a reduced scope machine running at 250 GeV, but we believe that the cost savings based on the current value estimate for the 500 GeV machine would be in the range of 25-30%.

Technical aspects of the LHC

The quoted LHC construction costs of roughly 4 billion Dollars are effectively an increment on an existing infrastructure which included the tunnel formerly used by the LEP accelerator as well as the entire injector chain booster, and . If one were to estimate the cost of the LHC on a green field site in today's dollars, it would likely be comparable to that of the ILC.

Changes since Vancouver

We estimate an uncertainty of 25%. The cost risk of commodities such as niobium is covered by the 25% uncertainty estimate. The cost of civil construction – particularly underground construction – is quite volatile, but this is included in the relatively large uncertainty in our estimate. The costs of these things can swing in both directions, so cost could either go up or down. Furthermore the ILC team will continue to do D and work with its industrial partners to further reduce the costs, in part to help mitigate any market fluctuations.