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Linear Collider Carbon Assessments: A Life Cycle Assessment of the CLIC and ILC Linear Collider Feasibility Studies

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Linear colliders are a promising technology for exploring the frontiers of particle physics. However, the construction and operation of these large-scale scientific instruments have significant environmental impacts, particularly in terms of carbon emissions. In this talk, we present a comprehensive life cycle assessment (LCA) of both the Compact Linear Collider (CLIC) and International Linear Collider (ILC) feasibility studies, focusing on the assessment of LCA construction phases A1 to A5. The LCA considers the materials and construction methods proposed for both the CLIC and ILC and assesses the carbon footprint of each phase of the construction process, from the extraction of raw materials to the disposal of waste. In addition, our study identifies opportunities for reducing the embodied carbon of linear colliders, including the use of low-carbon materials. We conclude that a careful consideration of the environmental impact of linear colliders is crucial for the future of particle physics research, and that reducing the embodied carbon of these large-scale scientific instruments should be a priority for the scientific community.

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