

ICFA Statement on Sustainable HEP Programs

September 2024

At the 96th ICFA Meeting, which took place on 20/21 July 2024 during the ICHEP Conference in Prague, the chairs of the ICFA Panel on Sustainable Accelerators and Colliders¹ and of the LDG Working Group on the Sustainability Assessment of Future Accelerators² presented the activities of their groups.

The two bodies focus on the development of energy-efficient technologies for high-performance accelerators. Future facilities will have to prioritize low-energy consumption and a minimal CO₂ footprint during their construction, operation and decommissioning, i.e., over their entire “lifecycle”. To this end, all future proposals need to present lifecycle assessments of their energy consumption and CO₂ emissions. Performing LCAs provides a solid basis to reduce environmental impact by optimising the design and operation of these facilities. Goals for an LCA range from evaluation and optimisation of environmental impact at an early project stage, to providing input for technological choices, to fulfilling legal requirements for the approval of a project. Some large collider proposals (ILC, CLIC, CCC, CEPC, and FCC for the civil engineering works) have completed or are completing such studies. R&D towards sustainability focuses on topics such as more efficient power DC-to-RF converters, pulsed systems with energy recovery, more efficient cryogenics, heat recovery, advanced components like high-temperature superconductors or permanent magnets, energy-recovery systems.

Furthermore, with the aim of transparency and comparability across future project proposals concerning their environmental impact, the LDG has mandated the corresponding working group to work out key indicators and the methodologies and assumptions to be applied in the evaluation of future projects in Europe. The LDG recommendations may be useful also for projects outside Europe. A report will be provided by the LDG working group by the end of 2024 that will summarise the results. The ICFA Panel on Sustainable Accelerators and the managements of large HEP laboratories around the world will also provide input to this effort.

ICFA appreciates the very pertinent efforts of the LDG working group and the ICFA panel and stresses the significance of sustainability in HEP facilities, alongside the implementation of lifecycle assessments as an important tool. The results achieved so far may be useful to other research fields.

The 7th Workshop on Energy for Sustainable Science at Research Infrastructures (ESSRI) will be held in Madrid on 25-27 September 2024. ESSRI is the premier European workshop series on energy efficiency at accelerator laboratories. In the long run, this workshop series may be extended to include countries outside Europe.

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² Laboratory Directors Group, co-chairs M. Titov (CEA) and C. Bloise (INFN)