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Overview on the sustainability of future accelerators

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Future accelerators must be assessed for sustainability during their life cycle, including construction, operation, and decommissioning, to meet the global goal of carbon neutrality by 2050. Accelerator scientists should strive to achieve performance with less electric power in the optical design phase of accelerators, and to improve power efficiency during the design and manufacture of accelerator components. Furthermore, we should understand CO2 emissions during the manufacturing of concrete, steel frame, and reinforcing bars, which are the main causes of CO2 emissions during construction, and cooperate in efforts with industries to reduce these emissions. The main source of CO2 emissions during accelerator operation is the electricity generated in the region where the accelerator is located. Therefore, we should understand the power composition of the region and ensure that accelerator operations are powered by "green (sustainable) power" . The low-grade waste heat emitted from accelerators should also be recovered as much as possible and returned to society. In addition, to reduce CO2 emissions in the entire region where the accelerator is located, efforts should be made to increase CO2 absorption throughout the agriculture, forestry, fisheries, and livestock industries, as well as to increase long-term CO2 fixation by incorporating more wooden structures in local housing and large public buildings, including accelerator-related facilities. As described above, there are not only issues that accelerator researchers should address, but also many items that can be accomplished in cooperation with communities and companies where accelerators are located. I will discuss these items that should be addressed in these various areas.

Presenter: Prof. YOSHIOKA, Masakazu (K)

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