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Overview of the status of Fusion Technology: Progress and Deployment

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Recent years have seen a significant, quickly accelerating dynamic on the path towards making fusion a real option to meet net zero carbon emissions targets. International and national Government-funded programs are assisting the development of fusion technologies with a longer-term deployment window, with private fusion technology developers are focused on the commercialization of fusion over the next decade. Governments are establishing enabling programs to help progress these enterprises in parallel to the traditional public R&D programs. The technological development of fusion spans the three areas: (i) maturing fusion science, (ii) new enabling technologies (iii) private investment in fusion.

Fusion has already been demonstrated on a small scale, with a noted recent energy breakeven at LLNL in December 2022, with the expected scaling up in the next few years lead by the private sector's demonstration machines. It is the scaling up of the process that presents the key challenge to the commercialization of fusion technology, which require facilities reviewed in this webinar.

There is a significant gap in the availability of engineering data on the effects of intense fluxes of high energy neutrons on materials and components, a gap that both public and private programs must address. International cooperation and access to facilities, to enable their integration into the overall international effort, to help identify the optimum technological choices, will define the success of fusion as a power-generating option. Regulatory uncertainty and standardization also need to be addressed, where the development of global codes and standards, coupled with the harmonization of regulations, is a necessary requirement for the deployment of fusion as a viable energy source.

The international cooperation and access to worldwide facilities, as well as integral planning of how a particular facility is fitting in a structured programme to obtain results that allow to make optimum choices is of paramount importance to have a real progress in Fusion deployment.

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