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Safeguards by design: preparing for Small Modular Reactors

Safeguards are a set of technical measures applied by the IAEA on nuclear material and activities, through which the IAEA seeks to independently verify that nuclear facilities are not misused, and nuclear material not diverted from peaceful uses. States accept these measures through the conclusion of safeguards agreements with the IAEA, applicable for most States to all nuclear source or special fissionable material in all peaceful nuclear activities within the State's territory, under its jurisdiction, or carried out under its control anywhere. The IAEA's capability to implement safeguards on new nuclear technology must be ready before the technology is deployed. The innovative and evolutionary technologies proposed in several small modular reactor (SMR) designs will introduce unique safeguards challenges. This suggests the need for early awareness of the technology design, requiring direct engagement with design companies –a challenging prospect given the IAEA's limited resources and the number and variety of SMR designs in development. The process of early consideration of safeguards in the design process is known as safeguards by design (SBD). SBD can not only avoid costly retrofitting of safeguards equipment or modified facility features after construction, but also potentially improve the efficiency of safeguards implementation throughout the life of a facility, thus reducing the burden on all stakeholders (operator, State authorities, IAEA). To manage the SBD process with SMRs, the IAEA has initiated tasks with several Member State Support Programmes that allow direct engagement with SMR design companies, with the goal of facilitating timely deployment and efficient safeguards implementation during operation. The paper will summarize the status of this project, including lessons learned, next steps and future needs, as the IAEA works with Member States to jointly prepare for the timely and secure deployment of SMRs.

Country OR International Organization

IAEA

Email address

J.Whitlock@iaea.org

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Authors: LEE, Jae-Sung (IAEA); WHITLOCK, Jeremy (IAEA); NEWTON, Traci (IAEA)

Presenter: WHITLOCK, Jeremy (IAEA)

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