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Advanced Reactor Design –Ensuring Excellence in Non-Proliferation and Security

Advanced nuclear reactor technology is presently being developed in several countries with prototype reactors being tested. Several factors are driving forward international interest in advanced nuclear reactors including climate change and the urgent need to reduce carbon emission globally by mid-century, rising energy requirements in industrializing economy nations, and the applicability of innovative reactor concepts to serve industrial and small-scale energy needs. The contributed paper will present the results of an initial assessment of proliferation resistance and security robustness of each of the main technologies for advanced nuclear reactors.

Much of the current safeguards system has been designed for the water-cooled reactors that dominate the nuclear energy landscape. Advanced nuclear reactors are distinctly different compared with light-water reactors, with the use of different coolants and a broader spectrum of the uranium enrichment levels, in some cases just below 20%. The variety of advanced reactor designs, their range of sizes, their potential location, their coolants, and their fuel cycle designs present challenges to the existing safeguards regime. Some of these schemes allow for on-line fuel processing, fuel outside of the containment vessel and unique refueling. These features may require updated safeguards approaches and/or new tools for nuclear accountancy and control. The inclusion of built-in technological features will facilitate effective and efficient international safeguards and improve security, i.e. prevent malicious use of the facility or material. With the growing number of units and their dispersion in new countries, the safeguards friendly features of these new designs will be critical for the IAEA and national authorities. Such features are also likely to be considered as an added value commercially.

The paper communicates the initial findings of a comprehensive overview of the most prominent advanced nuclear reactor design, together with an analysis of their proliferation resistance or proliferation concerns and security robustness of each technology/reactor design. Particular attention is given to ease of implementation of international safeguards, as it is established in comprehensive safeguards agreements and additional protocols, as well as the risk of theft of nuclear material.

Which ”Key Question” does your Abstract address?

NEW1.1

Which alternative ”Key Question” does your Abstract address? (if any)

NEW2.3

Topics

NEW2

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