

IMPORTANCE OF THE SCENARIO STUDIES ON THE “BY DESIGN” PROLIFERATION RESISTANCE IMPROVEMENT

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Abstract

In relatively recent times there is a growing belief that the implementation of safeguards at an early stage of the project, of a given “component” of the fuel cycle, will contribute significantly to the improvement of the proliferation resistance behaviour. At this aim, the IAEA is cooperating with the international community to develop a new process called “Safeguards by Design” to help ensure that safeguards are fully integrated into the design process of a nuclear facility from initial planning through design, construction, operation, and decommissioning. By taking into account design features that facilitate the implementation of international safeguards early in the design phase, i.e. Safeguards by Design, the proliferation resistance of the system can be improved.

Of course a complete fuel cycle should be considered in the assessment of the proliferation resistance, even if often during the nuclear reactor (= a fuel cycle component) design there is a lack of design information and specifications on fuel cycle, installations/plants and location, etc.

Moreover, from the reactor designers point of view the proliferation resistance (and physical protection), despite of their importance, are not the main technical parameters or constraints considered in the early conceptual design stage.

Because any optimisation freezes the neutron design, in order to be feasible and efficient, proliferation resistance improvement by design at core level, should be based on a clear and self-consistent set of proliferation resistance requirements (like design constraints) given at a very early stage. An approach, that could help the core designer to enhance the proliferation resistance characteristics, will be discussed. It is based on the scenario studies and information coming from these, by analysing performances and behaviour of physical “observables” parameters.

Promising and useful indications and results have been obtained by such approach application to a European level energy demand scenario.