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On some safety aspects in Small Modular Reactors

The development of the new generation of nuclear power reactors is a result of continuous improvement from efficiency and safety perspectives. Even if safety criteria are very important, the nuclear reactor technology is targeting a development area of an optimum between them and the performance criteria.

As there is a large set of new types of Small and Modular Reactors (SMR), the evaluation of the benefits and challenges of each of them is very important in the strategic development of SMR.

The paper is presenting an approach from two perspectives on the criteria to be considered in the SMR development:

1. Exegetics, i.e. evaluation of the impact of the reactor from the maximum possible energy to be used in the existing thermodynamic conditions.
2. Risk level, i.e. the evaluation of the risks as defined in the traditional existing safety analyses.

Exergy balance in nuclear power plants also indicates the plant risk map, including the impact on the environment for the whole lifecycle. The methodology of the exergy balance and risk analyses is presented for three cases of SMR types are areas of potential risk: water, gas and molten salt cooled.

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