

## Internship

### Project proposal

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NucAdvisor is an independent private company providing advisory services, technical assistance and financial expertise, as well as training for clients across the whole of the nuclear industry, for new entrants (countries) who are constructing civil nuclear plants and/or nuclear research reactors (and associated facilities), ensuring compliance with international nuclear requirements and IAEA guidelines.

#### **Project:**

Since the beginning of civil nuclear energy, there is a continuous trend to improve the safety of nuclear reactors. Lessons learnt from operating experience and major accidents have driven the progresses.

One of the consequences of the Fukushima accident, in 2011, was the abandon of Generation II NPP designs for new construction projects. Nuclear reactors vendors are now only proposing designs with enhanced safety features for mitigating potential accidents (Generation III/III+). The project intends to compare and analyse the technical solutions implemented by the vendors in their most recent designs:

- AREVA, from France: EPR,
- AREVA/MHI from France & Japan: ATMEA-1,
- CGN/CNNC from China: CAP1400 & Hualong,
- GE/Hitachi, from USA & Japan: ESBWR,
- KHNP, from Korea: APR-1400,
- ROSATOM, from Russia: VVER-1200,
- Westinghouse, from USA/ Japan: AP1000

The systems considered for this analysis will be:

- Those involved in the 3<sup>rd</sup> level of the defense in depth: reactivity control and core cooling control;
- Those involved in the 4<sup>th</sup> level of the defense in depth: core meltdown mitigation and radionuclides confinement.

The project, of about 6 months duration, will be realized in 4 steps:

- Collection of data,
- Functional analysis of the systems,
- Design of the systems, separation, diversity, redundancy, lay-out...
- Comparative analysis of the various solutions

#### **Candidates:**

The candidates have a Master in Nuclear Engineering or close to achieve it (the project could be the final thesis for a Master).

English and French languages are mandatory.