

## Ensuring Europe's nuclear fuel supply

***Energy security is getting a boost from EU-funded research on an alternative, European supply of the fuel assemblies used in Russian-made nuclear reactors.***



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The EU imports more than half its energy leaving it vulnerable to supply disruptions. The EU aims to reduce this vulnerability by ensuring diversity of supply – to avoid over-dependence on a single non-EU supplier.

In the EU around 130 nuclear power reactors produce around 25 % of all electricity consumed. Of these, 14 are the Russian-made VVER-440 design, located in Finland, Hungary, Slovakia and the Czech Republic. Another two reactors of the same design are currently operating in Ukraine.

These power plants supply over half of the electricity consumed in the EU countries with the Russian-made VVER-440 design and these rely on a single Russian supplier for their nuclear fuel – leaving these countries vulnerable to supply disruption.

The EU-funded ESSANUF project helps to advance the goal of achieving a coordinated approach for the qualification of the nuclear fuel assemblies used in VVER-440 reactors to diversify supply and reduce vulnerability to disruptions.

“A key challenge is to develop a common view,” says project coordinator Sabina Kristensson of Westinghouse Electric Sweden. “We are in the EU, but each country has its own rules and practices. We want to develop an integrated view on the design, qualification and authorisation for this fuel design that everyone can accept.”

### **Critical mass, critical knowledge**

Nuclear fuel rods are zirconium alloy tubes containing the fissile uranium consumed in nuclear reactors. The core of a nuclear reactor contains bundles of these rods – called ‘fuel assemblies’ – submersed in fluid. The fuel assemblies are specifically designed for particular reactor types and are made to highly-exacting engineering and safety standards.

“Over a decade ago we successfully developed, built and delivered fuel assemblies for a VVER-440 reactor in Finland, however, that project came to an end,” says Kristensson. “In

ESSANUF our main goal is to modernise and re-establish the supply chain, which involves three activities. First, to develop a state-of-the-art fuel design and re-establish the manufacturing capabilities, including sub-suppliers. Second, to further develop the methods and methodology for qualifying the fuel design. Finally, and most importantly, to work towards a generic fuel licensing scope with the national nuclear regulatory authorities in Slovakia, Czech Republic, Hungary, Finland and Ukraine.”

Once the new fuel design has been completed it will be subject to verification in test facilities as well as in a working reactor. However, this step is not part of the ESSANUF project, and requires an agreement between Westinghouse and the VVER-440 utilities.

A key milestone is the completion of the code validation. These are computer methods of modelling the behaviour of the fuel under reactor conditions. This modelling is an integral part of reactor safety considerations, and thus validated, known codes are important for qualification for regulators and end-users.

#### **A licensed alternative**

Licensing of the new fuel design is a significant future step.

“Our communications efforts have been a big help in sharing knowledge and building confidence between partners and the national authorities,” say” Kristensson. “Nuclear operators and national regulators are showing much interest in our work. They come to our presentations and provide us with useful information. They want to see an alternative supplier for VVER-440 fuel, which promises well for the future.”

This close cooperation is important as fuel manufacture needs the economies of scale that several European end-users offer. The important achievement for the EU will be a more secure supply of nuclear-generated electricity.

#### **Project details**

- Project acronym: **ESSANUF**
- Participants: **Sweden (Coordinator)**, Slovakia, Czech Republic, Finland, United Kingdom, Ukraine, Belgium, Spain
- Project N°: 671546
- Total costs: € 2 053 913
- EU contribution: € 2 053 913
- Duration: September 2015 to October 2017

#### **See also**

**Project website:** <http://www.essanuf.eu/>

**Project details:**

[http://cordis.europa.eu/project/rcn/196993\\_en.html](http://cordis.europa.eu/project/rcn/196993_en.html)

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