Publication | 10.01.2013

Flawed Reactor Pressure Vessels in Belgian Nuclear Plants Doel-3 and Tihange-2

A report commissioned by the Greens/EFA Group in the European Parliament

Executive Summary

In August 2012 the Belgian Federal Agency for Nuclear Control (FANC) informed the public about the finding of thousands of flaws in the reactor pressure vessel of the nuclear power plant Doel 3. Similar flaws in the reactor pressure vessel of the nuclear power plant Tihange 2 were revealed in September 2012.

In December 2012, Electrabel - the owner/operator of the nuclear power plants - announced the planned restart of the two plants in January 2013. No detailed information on the background of this decision had been provided.

Also in December 2012, Rebecca Harms, Co-President of the Greens/EFA Group in the European Parliament asked the author to evaluate the available facts on the issue.

Both pressurized water reactor-type nuclear power plants are operated by Electrabel, part of the GDF-Suez Group, since the early 1980ies.

The information given by FANC has revealed that the documentation of the reactor pressure vessel manufacture for both nuclear power plants is not complete.

It was also revealed that the vessel manufacturer RDM—a Dutch company that went bankrupt in the meantime—has obviously not performed any dehydrogenation treatment and this had not been known by the Regulatory Authorities.

Ultrasonic testing of the reactor pressure vessel's base metal outside the weld region has been performed for the first time in 2012 at Doel-3, that is after 30 years of operation.

The Safety Authorities obviously were never asking for documentation, fabrication methodology (incl. hydrogen control) and ultrasonic testing results.

Electrabel's statement that the flaws originate from manufacture cannot be followed, since no defects were found during the final tests after manufacture while the flaws found 30 years later have extensions up to 24 mm wide and up to 100 mm deep and exist in remarkable density (ca. 8,000 in the case of Doel-3 and ca. 2,000 at Tihange-2).

The real nature of the flaws is still unknown and can hardly be determined with a high confidence level, since sampling cannot be performed without destruction of the vessel.

The assumed hydrogen flaking process has a considerable incubation time and is continued during operation, hydrogen flakes are considered as very dangerous defects causing unexpected failures.

The influence of radiation effects and low-cycle fatigue on possibly manufacture-induced defects during operation resulting in growth of defects has obviously not been considered by Electrabel.

Electrabel's argument that each defect was individually justified to be not dangerous for the vessel's structural integrity is not sufficient since interactions and growth of thousands of defects with sizes up to 24 mm under operational conditions (temperature, pressure, radiation) cannot be excluded.

The absence of similar flaws should be proven in all reactor pressure vessels that have not yet undergone full body inspection or where their documentation leaves doubts about appropriate hydrogen control in the fabrication process. While this aims primarily at vessels of the same manufacturer/steel provider as in the Doel/Tihange cases, similar flaws cannot be excluded in vessels from other manufacturers/providers.

In summary the restart of the two power plants has to be considered as hazardous. A possible failure of the reactor pressure vessels due to sudden crack growth in case of local thermal stresses cannot be excluded and would have catastrophic consequences, especially in the vicinity of densely populated and high-economic activity areas (Antwerp, Liège). The corium (melted reactor core) relocation to the lower plenum entailing steam explosions would sooner or later cause containment failure with the consequence of large scale radioactive releases to the environment.

- DOWNLOAD THE WHOLE REPORT (pdf)

[End dependence on autocrats - make energy affordable -…]

22.04.2026

Opinion

[Trumpflation and a new energy crisis in Europe – Why w…]

22.04.2026

Press release

Canon, EOS R

[Time to free communities from fuel autocrats, save mon…]

10.03.2026

Press release

vitali-adutskevich-unsplash

[Russian gas phase-out/RePowerEU: Parliament and Counci…]

03.12.2025

Responsible MEPs

Rebecca Harms

Member

Please share

- E-Mail