

Nuclear power plant Tihange



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https://de.wikipedia.org/wiki/Kernkraftwerk_Tihange
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General

The Tihange nuclear power plant near Huy (Dutch: Hoei) in the Walloon region of Belgium consists of three units of pressurized water reactors that were on line from 1975 to 1985; Unit 1 with a net capacity of 962 MW(e) in 1975, Unit 2 with a net capacity of 1,008 MW(e), and Unit 3 with 1,038 MW(e) followed until 1985.

The nuclear power plant is located on the Meuse River, about 25 km southwest of Liège and 57 km west-southwest of the Aachen city region.

Since 2005, Tihange-1 has been leaking about 2 liters of radioactive water per day, a problem that has not been solved to date.

In June 2012, thousands of hydrogen flakes were discovered on the reactor pressure vessel of Tihange 2, which, according to the nuclear regulatory authority, "most likely" already occurred during production in 1979.

Since December 2016, a class action lawsuit filed by the city regions of Aachen, Maastricht and Wiltz, with the support of the North Rhine-Westphalian state government and the Rhineland-Palatinate state government, has been pending against the operator before the European Court of First Instance in Brussels.

Tihange is one of two operating nuclear power plant sites in Belgium; the other is the Doel nuclear power plant in the port of Antwerp. The three nuclear reactors at Tihange and four at Doel are operated by Engie Electrabel, the Belgian subsidiary of the French group Engie.

History

The country of Belgium decided in 2003 to phase out nuclear power by 2025, according to which all Belgian reactors would be completely shut down after about 40 years.

The shutdown of Tihange-1 was planned for October 1, 2015, but the operator of the nuclear power plant said in November 2011 that it would shut down unit 1 in accordance with the 2015 law, because further investments would not be profitable at all.

On July 4, 2012, the then Di Rupo government decided to grant the operator of Tihange-1 a ten-year extension of the operating life of the Tihange-1 nuclear power plant until 2025. The reason for this was the fear of a power shortage. The other two units, 2 and 3, will still be shut down until 2023-2025.

In 2012, numerous tiny cracks became known in the reactor vessel at the Doel nuclear power plant and later in September at Tihange.

In February 2015, operators Engie Electrabel and the Belgian nuclear regulator spoke of finding more numerous hydrogen flakes in the Tihange-2 and Doel-3 reactors. At Tihange, the number rose from 2000 to 3150.

Since then, an overarching citizens' initiative has been engaged with scientific help against the "unsafe" power plant.

On March 28, 2017, it became known that Tihange-2 had been supplied with fuel elements from the Lingen fuel element fabrication plant in Germany since July 2016. The Federal Office for Nuclear Waste Disposal Safety, which is subordinate to the Federal Ministry for the Environment, allowed 50 transport permits, 10 of them to supply fuel elements to Tihange-2.

Complications

- 22. November 2002:

In unit 2, an incident occurred in which the closed reactor continued to produce decay heat, which was conducted into the primary circuit by circulating coolant while the power was on. During the test, the safety valve on the pressurizer was accidentally opened, causing the pressure in the primary circuit to drop extremely quickly from 155 bar to 85 bar. The high pressure in the primary circuit is intended to prevent the water from boiling at high temperatures during operation and to keep its liquid constant. When the pressure drops, the boiling temperature of the water also drops. There is a risk of core meltdown because the decay heat of the fuel element can no longer be removed. Finally, after the pressure dropped rapidly, several safety systems were activated. These safety systems pump water into the main circuit to cool the fuel assembly. The overpressure valve, which had been opened accidentally, was closed after about 3 minutes.

- 25. Oktober 2006:

About 30 Greenpeace activists came to the power plant site and occupied it. These represent huge cracks in the dome, with which action Greenpeace wanted to make people aware of the aging problem of nuclear power plants.

- 4. Oktober 2010:

After 6 p.m., about 600 liters of acidic water flowed from the ditch into the Meuse River. According to the operator, this is not a major problem because the acid in the river water was quickly neutralized and no radioactive material escaped.

- 5. Dezember 2011:

An unexplained deviation occurred during the inspection of the cooling system. According to the Belgian Nuclear Inspection Authority, the problem has been solved.

- 7. Februar 2012:

The Nuclear Regulatory Commission announced on February 15, 2012, that it had confirmed that a set of heating rods of the Tihange-1 pressure vessel had failed. A

compressor with an integrated heating rod and spray system is required to maintain the necessary pressure stability in the main circuit. This may be relevant in case of subcooling transients, which can lead to a reduction in coolant density. The pressure can be stabilized by switching on the holding pressure heating stage, since the pressure vessel is always saturated (e.g. 155 bar at 354°C).

- **Juni 2012:**

Thousands of hydrogen flakes were detected on the reactor pressure vessel of Tihange-2 and in the Doel-3 reactor during a routine inspection with new Ultrashall measuring equipment, according to the nuclear regulator.

The nuclear regulator noted that the hydrogen flakes had probably already been created during the manufacture of the pressure vessels and would therefore not be a problem.

- **Juli 2012:**

It became known that the decay pool of Tihange-1 would lose about 2 liters of radioactive water every day, this problem has existed since 2005 and has not been fixed since then.

- **August 2012:**

Unit 2 was shut down after numerous hydrogen flakes were also detected on the reactor pressure vessel at the Doel-3 reactor.

Inspections revealed that these flakes had already been formed during construction in 1979.

The company Rotterdamsche Droogdok Maatschappij, which ceased to exist in 1996, had manufactured 22 reactor vessels of this type, meanwhile also Tihange-2 and Doel-3. Both pressurized water reactors in Tihange originate from Framatome and are not affected by the problem.

- **2012:**

The nuclear regulatory authority FANK ordered that the emergency cooling water, approx. 1 million liters, should be preheated to more than 40°C.

The reason for this is the reactor vessel, which is leached with hydrogen inclusions and could suffer a thermal shock from cooling water that is too cold.

The highest preheating temperature is 50°C, above this temperature the reactor will not be cooled sufficiently.

- **Februar 2013:**

A World War bomb was sighted on the power plant site near the administration building, which was evacuated for safety.

The explosive ordnance disposal service of the Belgian army had removed the bomb. This was supposed to have been a German grenade from the First World War.

- **Mai 2013:**

FANK allowed the nuclear reactors to continue operating. The head of FANK and the Doel nuclear power plant, Jan Bens, doubted that a reactor accident could occur at Beligen.

At the beginning of July in 2013, the reactor of Tihange-2 was started up again.

- **2013-2015:**

A total of eight precursors have occurred in Tihange-1, incidents in which, under certain conditions, severe damage to the reactor core can lead to a core meltdown.

This only became known in the media at the beginning of February 2018, following a letter from the Belgian nuclear regulator FANK.

However, according to FANK, these precursor analyses are not suitable for drawing conclusions about the safety status of respective reactors.

The nuclear supervisory authority told the WDR radio and the political magazine Monitor of it that one could guarantee that the Bereiber, as well as the FANK can guarantee the safety of the reactor.

- **2014-2015:**

By regulatory order, Tihange-2 and Doel-3 had to be shut down in March 2014. Tests at the Nuclear Energy Study Center in Mol on the reactor pressure vessel material of the two reactors Doel-3 and Tihange-2 had yielded "unexpected results" regarding mechanical strength. The shutdown lasted provisionally until summer 2015, and German media suggested that the final decommissioning of the units was imminent - given the deficiencies and the fact that it was not possible to replace the reactor pressure vessel. Belgian media emphasized in February 2015 that no final decision had yet been made.

- **30. November 2014:**

An explosion occurred outside the nuclear area of unit 3, followed by a fire at a transformer, which led to a shutdown of unit 3.

After repairs, the reactor was restarted on December 2, 2014.

- **23. Februar 2015 :**

It became public knowledge that the defects had continued to grow.

- **4. Mai 2015:**

The pressure relief valves in the containment building of the Tihange-1 reactor were opened after an incident and non-radioactive steam was released.

- **August 2015:**

It became known that the Belgian nuclear regulator had called in the public prosecutor's office because of deficiencies at the nuclear power plant.

- **Mitte November 2015:**

The Belgian nuclear regulator granted permission to restart the Tihange-2 reactor unit; the hydrogen inclusions would not pose a risk to the safety of the reactor. The operator Electrabel prepared for this on

December 15, 2015, and restarted the reactor on the evening of December 14. December. The Belgian newspaper De Morgen reported this under the headline "Belgische regering speelt Russische roulette met Tihange 2" ("Belgian government plays Russian roulette with Tihange 2") and quoted the environment minister of the state of North Rhine-Westphalia, Johannes Remmel.

- **18. Dezember 2015 um 22:35 Uhr:**

Unit 1 was shut down after a fire in the non-nuclear part, and the reactor was restarted a week later, on December 26, 2015.

- **24. Dezember 2015:**

German Environment Minister Barbara Hendricks (SPD) wrote that the federal government would be particularly critical of the restart of the Tihange-2 and Doel-3 nuclear reactors. A meeting with the Belgian nuclear regulator was scheduled soon, she said, between Hendricks and Belgian Interior Minister Jan Jambon, a proponent of nuclear power.

- **14. Januar 2016:**

Rebecca Harms, co-chair of the Greens/European Free Alliance group in the European Parliament, and Jean-Marc Nollet, Member of the Belgian Parliament, of FANK presented an evaluation of documents on material defects in the pressure vessels of the Doel 3 and Tihange 2 reactors by materials scientist Ilse Tweer, and a commentary on the final evaluation.

- **1. Februar 2016:**

The WDR announced that the cooling water held in reserve for the emergency

cooling of the Tihange-2 and Doel-3 nuclear reactors will be preheated. This takes into account the case that, due to a residual uncertainty that cannot be excluded, the flocculation should still be relevant.

- **9. Februar 2016:**

The Aachen city region filed a complaint with the Belgian Council of State against the continued operation of Tihange-2. The complaint is directed, among other things, against the lack of cross-border participation in an environmental impact assessment and the non-compliance with the provisions of the EURATOM Treaty, in particular with regard to the obligation under Article 37 to submit certain information on the release of radioactive substances to the European Commission. The NRW state government joined the action in April 2016.

- **23. Februar 2016:**

Block 1 shut down again after irregularities were detected at a pump.

- **Anfang März 2016:**

North Rhine-Westphalia's Environment Minister Johannes Remmel announced that NRW and Rhineland-Palatinate will jointly appeal to the UN and the EU Commission against the lifetime extensions for the two reactors in Doel and the first reactor in Tihange. A legal opinion commissioned by the two states concludes that the lifetime extensions for the Tihange 1 and Doel 1 & 2 nuclear reactors are not compatible with European law.

- **Anfang Juni 2016:**

It became known that the cities of Aachen, Maastricht (Netherlands) and Wiltz (Luxembourg) will file an official complaint on behalf of other municipalities because "the precautionary principle" was not observed during the restart of Tihange 2.

- **6. Juni 2016:**

The Dutch lower house of parliament called on Belgium to close its nuclear power plants.

- **7. September 2016:**

The Tihange-1 reactor shut down due to damage caused by construction work in the non-nuclear part, and on September 9, 2016, the Tihange-2 reactor was also shut down.

On November 15, 2016, in relation to the September 7 incident, it was reported that the damage to the building was a lifting of the floor slab. The operator Electrabel would have to reinforce the soil under the floor slab and ensure

stability even in the event of an earthquake. Belgian Interior Minister Jan Jambon called for the floor under Tihange 1's other buildings to be examined as well. The restart announced for Dec. 31 has been postponed.

- **Dezember 2016:**

Aachen city region together with Maastricht and Wiltz as well as natural and legal persons from the three federal states filed a civil lawsuit against the operation of the Tihange 2 reactor and the decommissioning demand before the Court of First Instance in Brussels,[64] in March 2017 the state government of NRW and the state government of Rhineland-Palatinate also joined this lawsuit.

- **1. September 2017:**

As a precaution, the city of Aachen began distributing iodine tablets to the population in the Aachen region and the districts of Düren, Heinsberg and Euskirchen. In doing so, it sent a clear signal of how seriously it views the situation at Tihange. In addition, emergency plans were drawn up with kindergartens and schools in the city of Aachen and parents were asked to sign up on lists with contact and emergency data.

- **Oktober 2017:**

Tihange-1 was temporarily taken off the grid due to a malfunction. In the night of November 10, 2017, unit 3 was automatically shut down due to problems with a valve in the non-nuclear part.

- **August 2018:**

Decayed concrete was discovered in unit 2 of the Tihange nuclear power plant during maintenance work. As a result, the reactor was taken off the grid until the end of June 2019.

- **September 2018:**

During a planned inspection, concrete decay (alkali-silica reaction) was detected by Engie Electrabel in the Doel 3 and Tihange 3 bunker buildings, where the emergency systems are located. According to FANC, the concrete decay had no effect on the immediate vicinity of the reactors, but the reactors are not to be restarted until further investigations are conducted. The restart of the Doel-1 and Doel-2 reactors had been postponed from October to December 2018 due to maintenance. [69] Concrete deterioration was also found in the ceilings of the buildings at Doel-4 and Tihange-2.

- **24. September 2018:**

Energy Minister Marie-Christine Marghem said she had contacted her counterparts in the Netherlands, France and Germany about additional emergency capacity. Engie Electrabel had reported that some reactors would remain shut longer because repairs to concrete damage were taking longer than expected, which could mean a blackout in November. Because only one of Belgium's seven nuclear reactors is active, certain areas may have to be taken off the grid for a short time, he said. The minister criticized Engie Electrabel for communicating the problems too late and for being responsible for a possible blackout.

Protests

- **17. September 2011:**

About 2000 people from Belgium, the Netherlands and Germany demonstrated in front of the Tihange nuclear power plant and demanded the closure of the nuclear reactors.

On the occasion of the revealed hydrogen inclusions in the reactor vessel, there was a demonstration in Maastricht on January 12, 2013, in which about 1000 people participated.

- **Dezember 2015:**

In Aachen, hundreds of citizens demonstrated for an immediate shutdown, supported by Lord Mayor Marcel Philipp and all factions of the city council. Philipp called the restart of Tihange-2 "threatening" and "irresponsible".

- **Oktober 2016:**

Stelae with the slogan "Tihange OFF" have been erected in the Aachen city region. At these "interactive memorials", citizens can express their concern and symbolically switch off Tihange with a lever. Each lever movement is counted and transmitted weekly to those responsible in Belgium. The initiators are Rolf Jägersberg and Lars Harmens.

- **12. November 2016:**

The soccer club Alemannia Aachen played against the U21 team of the 1st FC Cologne. At this match, the players of both teams wore the words "stop Tihange" on their jerseys instead of sponsor advertising.

- **25. Juni 2017:**

50,000 demonstrators formed an almost 90-kilometer-long human chain from Aachen (D) via Maastricht (NL) to Tihange (B). They demonstrated for the immediate shutdown of the nuclear reactors Tihange-2 and Doel-3.

Data

Reaktorblock ^[81]	Reaktortyp	Nettoleistung	Bruttoleistung	Baubeginn	Netzsynchronisation	Kommerzieller Betrieb	Abschaltung
Tihange-1	Druckwasserreaktor	962 MW	1009 MW	1. Jun. 1970	7. Mrz. 1975	1. Okt. 1975	(2025)
Tihange-2		1008 MW	1055 MW	1. Apr. 1976	13. Okt. 1982	1. Jun. 1983	(2025)
Tihange-3		1038 MW	1089 MW	1. Nov. 1978	15. Jun. 1985	1. Sep. 1985	(2025)

Kernkraftwerk Tihange	
 <p>Blick auf das Kernkraftwerk mit seinen Kühltürmen</p>	
Lage	
	
Koordinaten	50° 32′ 5″ N, 5° 16′ 21″ O
Land:	Belgien
Daten	
Eigentümer:	Engie Electrabel, EDF Luminus
Betreiber:	Engie Electrabel
Projektbeginn:	Juni 1970 (Tihange 1) April 1976 (Tihange 2) November 1978 (Tihange 3)
Kommerzieller Betrieb:	Oktober 1975 (Tihange 1) Juni 1983 (Tihange 2) September 1985 (Tihange 3)
Aktive Reaktoren (Brutto):	3 (3153 MW)
Eingespeiste Energie im Jahr 2009:	23.719 GWh
Eingespeiste Energie seit Inbetriebnahme:	614.561,192 GWh
Stand:	31. Dezember 2009

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