

ISOTOPE

3

H

Hydrogen

Tritium

Supporting a Glowing Future
for Canada's Isotope Sector



Feature of the Month

Tritium

H-3, commonly known as Tritium, is a radioactive isotope of hydrogen that is used for a variety of applications including environmental monitoring, scientific research, industrial applications, and emerging fusion energy programs. Tritium is also a promising fuel for producing energy in future power plants based on fusion energy.

Different Uses



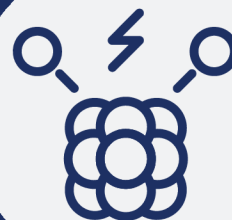
Used in self-luminous signs such as exit signs, watches, aviation markers, and marine safety equipment.



Used as a radioactive tracer in radiopharmaceutical drug research and development, and metabolic studies.



Used as a tracer to map underground water flows and pollutant transport without chemically altering the surrounding ecology.



Deuterium-Tritium is the most common fuel source for fusion energy devices, used in over 95% of fusion designs.

About Tritium



Half-life of 12.3 years



Pure beta emitter

Tritium is produced as a natural by-product of nuclear energy.

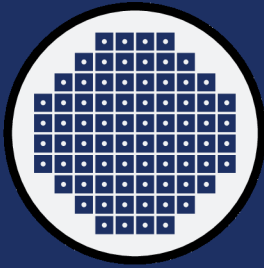


Canada's CANDU reactor fleet is the world's largest non-military source of Tritium.

DID YOU KNOW?

Tritium

How is it made?



Tritium is formed naturally during normal operation of CANDU reactors.



CANDUs use heavy water as a moderator and a small fraction of it transforms into Tritium.



Over time, this Tritium accumulates in the reactor's heavy water systems primarily as tritiated water.



Tritium's global market size is expected to reach up to **\$3.9 billion** USD by 2032.

Fusion energy, the process of combining lighter atoms to generate power, like the sun, is driving this market growth due its potential for clean, scalable energy.

DID YOU KNOW?



By the 1960s and '70s, Tritium was increasingly used in consumer products including:

- Watches
- Compasses
- Safety signage
- Glow fobs

Unlike battery-powered gadgets, consumer products that use Tritium can glow for over a decade without needing to be recharged!

Global Production

Canada is a global leader in Tritium expertise and supply.



Current global Tritium production is extremely limited, with only a handful of facilities capable of producing or recovering it at scale (i.e. Canada, China, and South Korea).

Tritium

Case Study of Canada's Leadership



Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

CNL offers world-class Tritium handling, clean-up, storage, and balancing technology.

CNL's Tritium Facility is located at Chalk River Laboratories and supports the Tritium technology needs for current and future CANDU reactors and utilities.

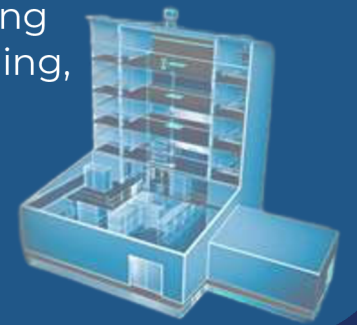
In 2025, CNL, Laurentis Energy Partners, Kinectrics, the Organization of Canadian Nuclear Industries and Fusion Energy Council of Canada hosted a Tritium Conference in Ottawa to dive into cutting-edge research, connect with industry pioneers, and explore the latest advancements in Tritium development.



FUSION FUEL CYCLES

Fusion Fuel Cycles Inc. (FFC) was established as a joint venture between CNL and Japan's Kyoto Fusion Engineering (KF) to develop and deploy deuterium-tritium (D-T) fusion fuel-cycle technologies, including systems for storing, processing, recycling, and managing tritium.

It is the world's first fully integrated fuel-cycle demonstration and will house the largest civilian inventory of Tritium in the world.



ONTARIO POWER GENERATION

OPG recovers Tritium generated in its reactors' heavy water via its Tritium Removal Facility (TRF), located on the Darlington site, which is the world's largest facility for Tritium extraction.

In September 2025, through an MOU with the United Kingdom Atomic Energy Authority (UKAEA), OPG is working toward supplying Tritium to the UKAEA – a critical fuel for nuclear fusion.



In November 2025, the Government of Ontario announced a **\$19.5 million** investment to establish a new Centre for Fusion Energy, in partnership with the federal government, the Stellarex Group Ltd., Atomic Energy of Canada Ltd.

(AECL), and OPG. The federal government, through AECL, is investing **\$33 million** and Stellarex intends to contribute up to **\$39 million** to the Centre. OPG will oversee all aspects of the project on behalf of the province.



KINECTRICS

In March 2026, Kinectrics, a division of BWX Technologies Inc., announced its selection by the UK Atomic Energy Authority and Global energy tech company Eni to be the design and fabrication partner for the UKAEA-Eni H3AT Tritium Loop Facility. The facility will be the world's largest and most advanced tritium fuel cycle facility.



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[International Atomic Energy Agency: Plasma physics and technology aspects of the deuterium–tritium fuel cycle for fusion energy](#)

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[Nuclear Engineering International: Qinshan 1 breaks CANDU-6 record.](#)

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[The power of nuclear isotopes. Ontario Power Generation](#)

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[Verified Market Research. Global tritium \(hydrogen-3\) market size, forecast, and trends.](#)

