

Canada Strategy for Fusion Energy Production and Use

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Fusion Energy
Council of Canada



Conseil canadien
de l'énergie de fusion

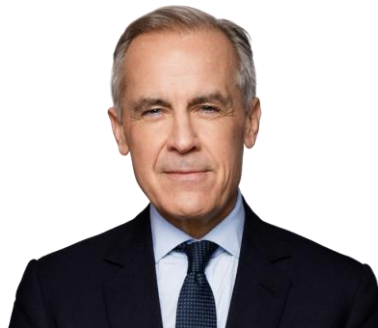
CWFEST 2025
December 2 and 3, 2025



Canada an 'Energy Superpower'



**“Canada has what the world needs. We are an energy superpower in clean and conventional energy, ...”
(Budget 2025, page 8)**



**Mark Carney,
Prime Minister**



**Tim Hogson
Minister of Energy
and Natural Resources**

Countries with Fusion Energy Strategies

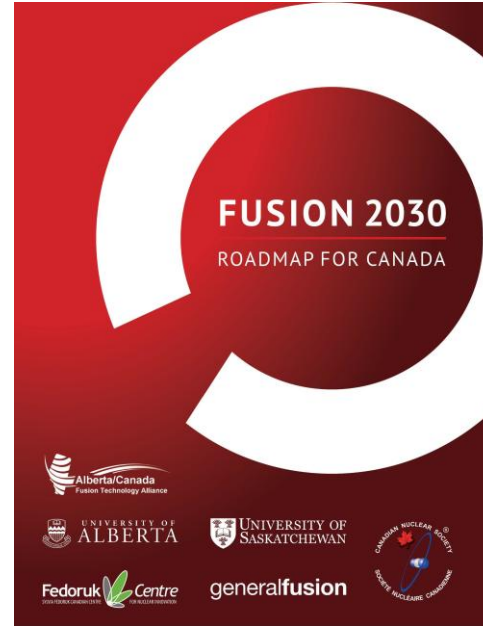
Country/Region/ Organization	G7 Member	Strategy	Funding for Strategy	ITER Member
Canada	✓	✗	✗	✗
France	✓	✓	✓	✓
Germany	✓	✓	✓	✓
Italy	✓	✓	✓	✓
Japan	✓	✓	✓	✓
UK	✓	✓	✓	✓
U.S.	✓	✓	✓	✓
EU	✓	✓	✓	✓
China	✗	✓	✓	✓
Korea	✗	✓	✓	✓
Russia	✗	✓	✓	✓
IAEA	✗	✓	✗	✗

Major Canadian Fusion Energy Roadmap Reports



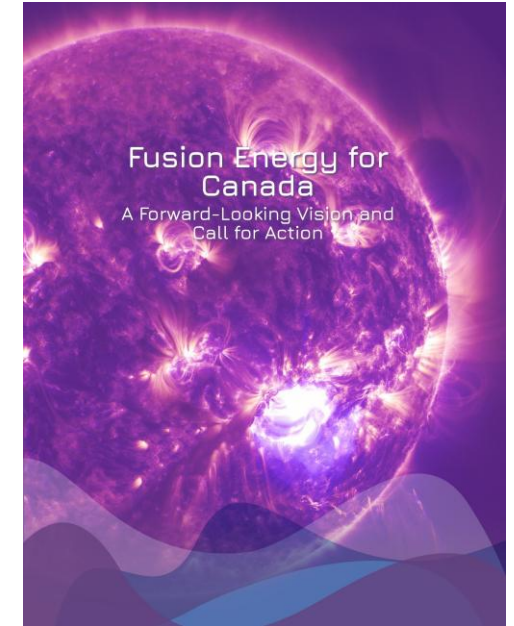
2014

<https://fusionenergycanada.ca/wp-content/uploads/2020/08/Status-of-Fusion-Energy-Impact-Opportunity-for-Alberta-Vol-I-Summary-March-2014.pdf>



2017

<https://www.cns-snc.ca/wp-content/uploads/2022/08/Fusion-2030-Roadmap-for-Canada.pdf>



2024

https://www.cns-snc.ca/wp-content/uploads/2024/08/CNL-Fusion-Roadmap_V11-digital.pdf

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Aug 25, 2025; Updated Nov 20, 2025

Executive Summary

Canada has a tremendous opportunity to participate in what is potentially one of the largest energy opportunities humankind has ever experienced. Current scientific and engineering advances indicate that we are on the cusp of creating the ultimate, large-scale source of energy on earth: fusion energy. Fusion energy results from the fusion of light atomic nuclei and occurs naturally under extreme conditions in stars, including our Sun.

Investing in fusion energy is essential for a stronger Canada and will help position Canada as an energy superpower. Canada's future prosperity, environmental sustainability and global competitiveness require clean energy that is both affordable and accessible. Fusion energy has the potential of achieving these outcomes while also creating economic opportunities, including higher-paying work for Canadians.

Canada is alone amongst G7 and other major countries in not having a strategy for the production and use of fusion energy. At present, Canada has only a small number of leading fusion companies, innovators, and researchers. This document advocates the creation and implementation of a 'Canada Strategy for Fusion Energy Production and Use', abbreviated to 'Canada Fusion Energy Strategy'. This strategy has seven essential components: Fusion Energy Uses, Science and Technology, Centres and Hubs, Workforce Development, Organization, Financial Resources, and Timelines.

The Canada Fusion Energy Strategy is based on insights from previous work in Canada and on strategies of other major countries and the European Union.

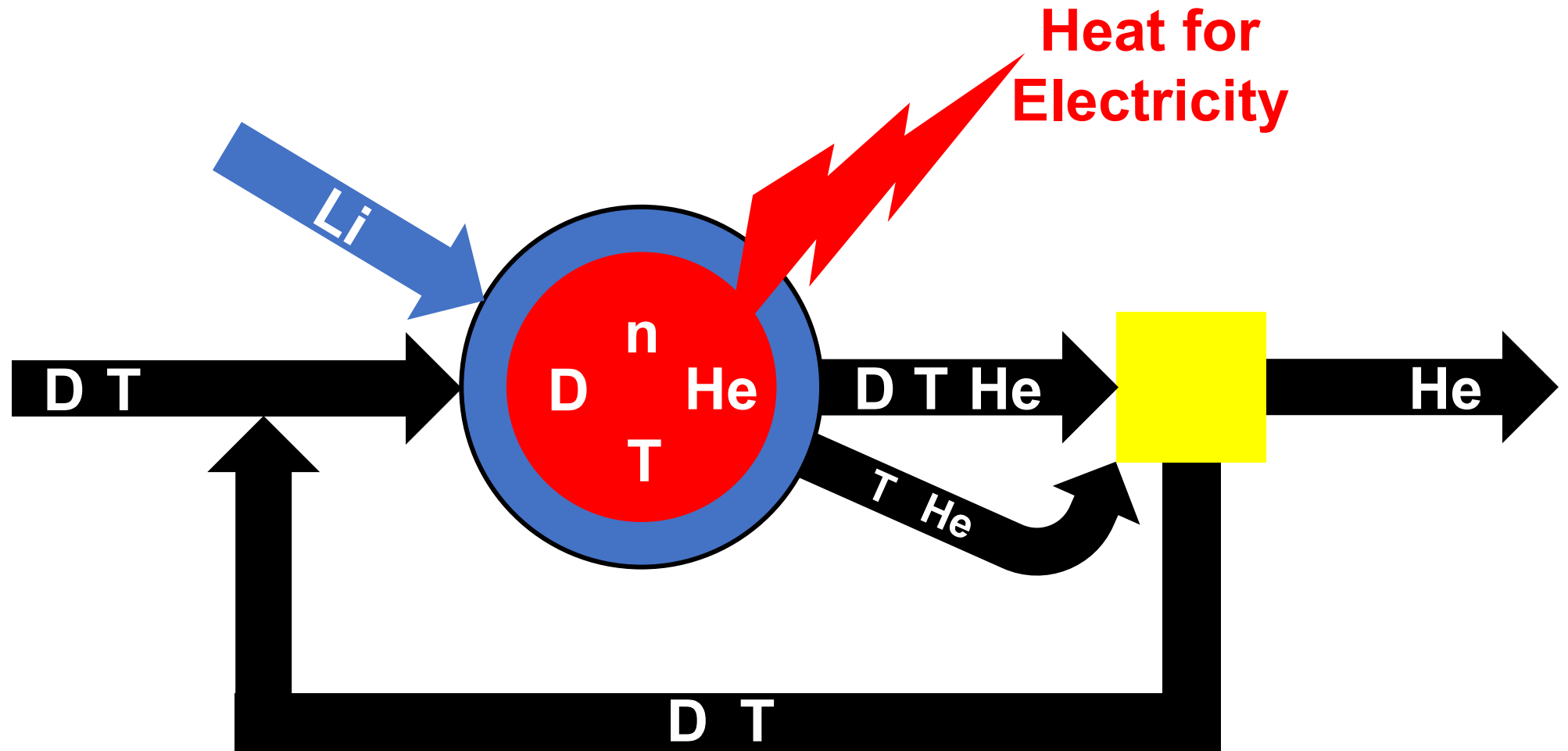
While recognizing and advocating the enhancement of present Canadian fusion-related strengths (especially strengths regarding tritium at CNL and OPG, and inertial, magnetic, and magnetized target fusion at the University of Alberta, University of Saskatchewan, and General Fusion), the Canada Fusion Energy Strategy should be broad-based and collaborative, involving public and private sector organizations inside and outside Canada. An effective oversight organization (possibly called 'Fusion Energy Canada') must be created and appropriately funded. Funding levels ranging from approximately \$2 to 4 billion over 25 years are outlined (see pages 6 and 7), with the magnitude and complexity of funding requiring further determination by a formally constituted group of experts.

International activities and the extraordinary benefits of fusion energy to Canada necessitate specific objectives to be attained in the time frame of 2025 to 2050 and beyond. Timing details are given on page 8. The creation and start-up funding of Fusion Energy Canada is of utmost importance in the 2025-2026 period.

Seven Major Components:

- Fusion Energy Uses
- Science & Technology
- Centres & Hubs
- Workforce Development
- Organization
- Financial Resources
- Timelines

Energy Production by D-T Fusion



Key: D = Deuterium T = Tritium He = Helium n = Neutron Li = Lithium

Canada Fusion Energy Strategy: Energy Uses

Electricity:

Common Grid

Transportation

Data Centres

Artificial Intelligence

Quantum Computing

Hydrogen

Iron, Steel, Other Metals

Waste Recycling

Water Treatment

Heat:

SAGD

Petrochemicals

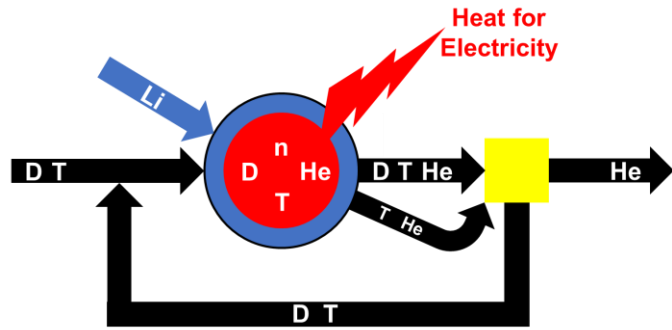
Ceramics

Syngas & Synfuels

Light:

Food Production

Canada Fusion Energy Strategy: Science & Technology



Fusion reactors

Magnets & lasers

Materials

Injectors & diverters

Heat transfer

T breeding

Pumping

Isotope separation

Isotope hold-up & storage

Simulation & control

Risk assessment & control

Waste management

Regulatory compliance

Canada Fusion Energy Strategy: Centres & Hubs



Missions

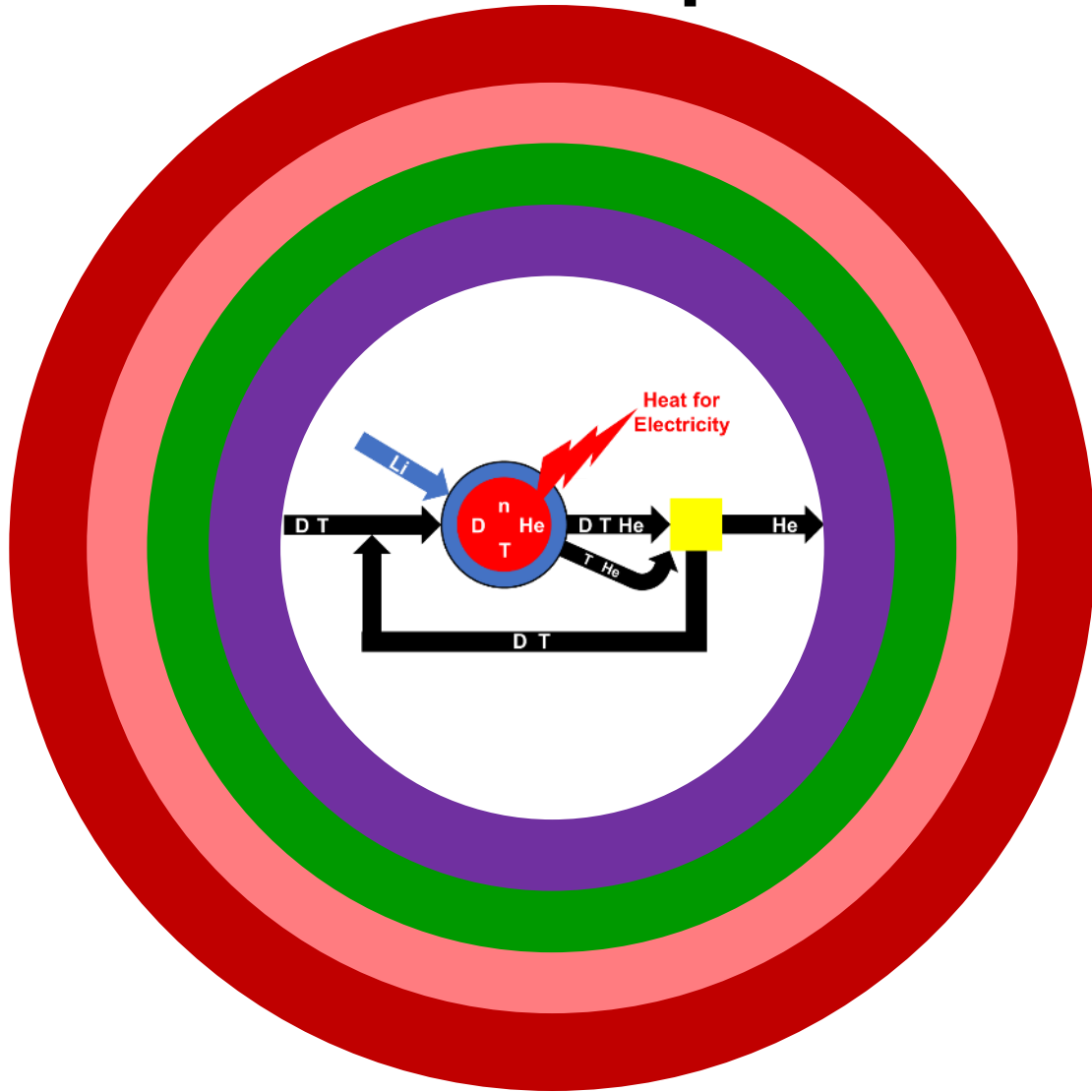
- Fusion technologies
- Fuel cycle
- Fusion fuels
- Materials
- Simulation

Locations

Collaboration

- National
- Sectoral
- International

Canada Fusion Energy Strategy: Workforce Development



- Plasma & materials
- Process engineering
- Procurement & logistics
- Fabrication & construction
- Plant management
- Sales
- Licensing
- Financing
- Insurance
- Partnerships
- Government work
- Community relations
- Major industries
- General grid

Canada Fusion Energy Strategy: Workforce Development



Self study



Mentoring



Classroom instruction



Plant experience



Community experience

Practice Schools: Hands-on Practice



The JT-60SA International Fusion School (JIFS)



L3Harris Nuclear Power Plant Simulator

Ideation Schools: New Ideas Generation



Oberwolfach Research Institute for Mathematics, Germany <https://www.mfo.de/>

Canada Fusion Energy Strategy: Organization

Legally constituted organization ('Fusion Energy Canada'):

- Small multi-disciplinary Board with oversight responsibilities
- Expert advisory board
- Focus on effectiveness & excellence

Comparators:

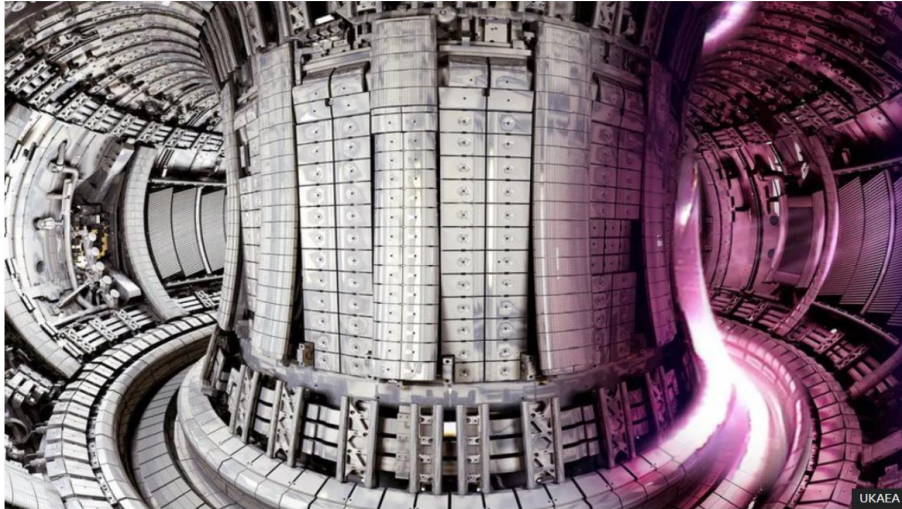
- National Research Council of Canada
- Canada Foundation for Innovation
- Canadian Space Agency
- Petroleum Technology Alliance Canada
- Canadian Institute for Advanced Research
- Genome Canada
- TRIUMF



Canada Fusion Energy Strategy: Financial Resources

Resource determination:

- Expert Panel
- Funding levels with targets and milestones
- \$2 to \$4 billion over 25 years



The nuclear fusion reactor at Culham in Oxfordshire was decommissioned last year

UK: £2.5 billion to 2029

Sources:

- Federal, Provincial, and Territorial Governments
- Private sector, including user industry



Germany: €2 billion to 2029

Canada Fusion Energy Strategy: Timelines

Period	Principal Actions
2025 - 2026	1a. Develop & finalize Canada Strategy for Fusion Energy Production and Use 1b. Legally constitute 'Fusion Energy Canada' 1c. Appoint Founding and Advisory Boards
2027 - 2034	2a. Funding secured for 'Fusion Energy Canada' 2b. Identify and characterize major new opportunities for fusion energy uses 2c. Establish R&D centres and hubs in Canada. 2d. Demonstrate prototype fusion reactor & ancillary technologies in Canada 2e. Create workforce development programs in Canada 2f. Establish Canada as a source of fusion fuels (especially tritium) & expertise 2g. Identify & mitigate risks associated with fusion energy production and uses
2035 - 2050	3a. Advance 2a to 2g 3b. Demonstrate commercially viable fusion reactors & associated technologies 3c. Canadian experts & companies participate in commercial fusion plants abroad
>2051	Canada positioned as a global supplier of fusion energy plants, fusion fuels, fusion energy technologies, and fusion expertise

Late News (Nov 28, 2025): Centre for Fusion Energy*

Centre Partners:

- Government of Canada (AECL/CNL)
- Government of Ontario (OPG)
- Stellarex



Centre Objectives:

- Platform for Canadian fusion ecosystem
- Advanced domestic fusion capabilities
- Advanced fusion R&D

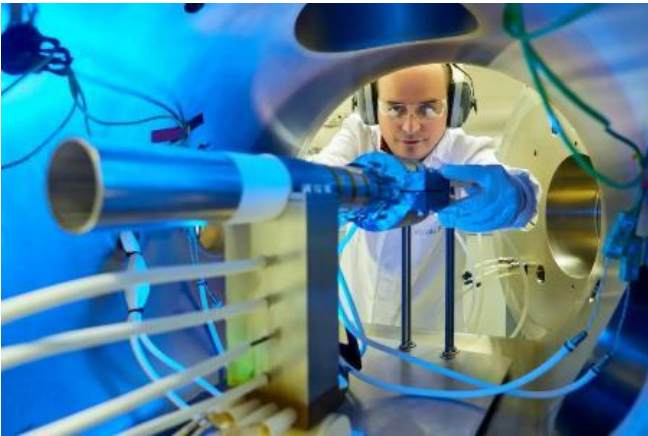
Centre Funding:

- Canada (AECL/CNL): M\$33
- Ontario (OPG): M\$19.5
- Stellarex: M\$39

* <https://www.aecl.ca/federal-government-continues-investment-in-fusion-sector-to-establish-centre-for-fusion-energy/>

Conclusions

- **Create and implement a *Canada Strategy for Fusion Energy Production and Use* with seven major components**



- **Focus on people and ideas, including fusion energy users**
- **Ensure timely funding for companies, centres, academia, and workforce development**
- **Time is of the essence**

Declaration

Acknowledgement

Some images in this slide deck were taken from publicly available websites, with their use being gratefully acknowledged.

Restriction

The contents of this slide deck are for informational and educational purposes only.