

Transition-opportunity sector profiles

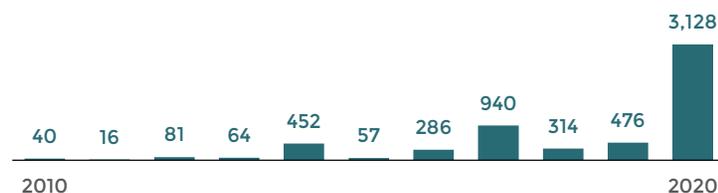
CLEAN HYDROGEN

Hydrogen is a versatile energy carrier. It can provide heat, fuel, electricity, energy storage, or be used as a feedstock. Clean hydrogen can be produced from low-carbon electricity (green hydrogen) or from fossil fuels with carbon capture, utilization and storage (blue). Canada has opportunities in hydrogen production and in fuel cells that convert hydrogen into electricity.

Global market (204 companies)

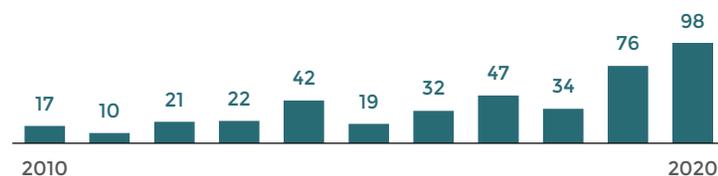
Capital invested (\$M)*

Total: \$5.9 billion



Deal count*

Six-fold increase from 2010 to 2020



Global low-carbon scenarios and trends

- Demand growth for low-carbon hydrogen is highly dependent on sector-specific technology choices but could reach more than 6% of total final energy consumption by 2050.¹
- Optimistic estimate: global market worth \$2.5 trillion to \$12 trillion by 2050.²
- The global fuel cell market is projected to reach \$29 billion by the end of 2028, growing at a CAGR of 36% between 2021-2028.³

Global market dynamics

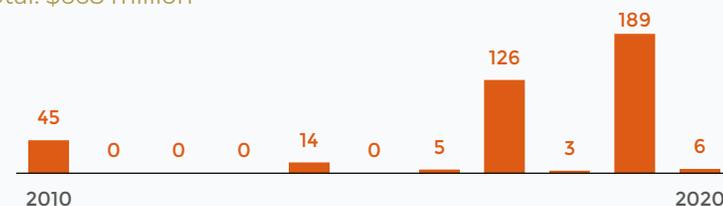
- Highly competitive market for hydrogen emerging: 18 economies, representing over 75% of global GDP, are developing hydrogen strategies.⁵
- EU is committed to building the equivalent capacity of China's Three Gorges Dam from renewable hydrogen by 2030.⁶
- High production costs, inadequate infrastructure, and lack of clear demand direction are barriers to growth.⁷
- Countries with low-cost solar power could be very competitive in green hydrogen market (e.g., Saudi Arabia, Chile, Australia).
- Canada has one of the world's leading fuel cell companies (Ballard).

*Source: PitchBook Data, Inc. (2021). Data is drawn from a custom search that has not been reviewed by PitchBook Analysts.

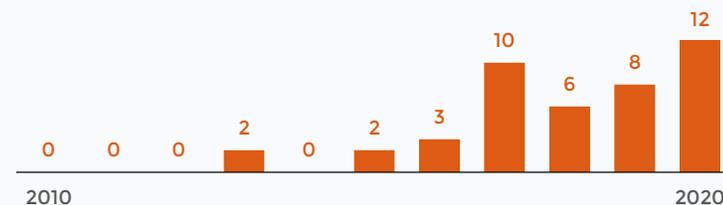
Canadian market (23 companies)

Capital invested (\$M)

Total: \$668 million



Steady increase from 2 in 2013 to 12 in 2020



Canadian net-zero scenarios and trends

- Demand growth potential in industry, buildings, electricity, and transportation.
- Domestic demand growth depends on costs relative to alternatives, enabling infrastructure, and policy development.
- Net zero scenarios show investment in hydrogen increasing to \$8-20 billion per year by 2050.⁴
- Fuel cell potential in rail, marine, and heavy transport.

Canadian competitiveness

High potential in fuel cells, but tougher competition in green/blue hydrogen markets.

Advantages

- Proximity to US, expertise.
- Western geology for CCS, solar/wind potential.
- Eastern low-carbon hydroelectricity.⁸

Disadvantages

- Export costs and infrastructure, slow growth in domestic market.⁹

NOTABLE COMPANIES

Ballard Power Systems: market cap rose from \$237 million (2015) to over \$7 billion (2021).¹⁰

Proton Technologies: tech that produces hydrogen from oil and gas reservoirs

Disclaimer

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The information and data contained in this analysis has been obtained or prepared from publicly available documents and other sources prepared by third parties, some of which may be proprietary and used under license. In particular, the global and domestic investment trends included in the two figures are obtained from PitchBook Data, Inc., drawn from customized searches that have not been reviewed by PitchBook analysts. These data and trends also underestimate total market activity. The PitchBook database contains information on over 3 million companies globally but is not exhaustive. Within this database, not all deals are included and not all deals have a disclosed value. The sector also only includes companies whose primary line of business aligns with the sector description (e.g., it excludes large multinationals with multiple lines of goods/services and those with only indirect linkages to the sector). Total investment includes company-level data through December 31, 2020.

All dollar values included in this document are expressed in USD.

Endnotes

- 1 Network of Central Banks for Greening the Financial System. 2020. "NGFS Scenario Explorer (REMIND-Magpie Immediate 1.5 with CDR and Delayed 2 with limited CDR)." <https://data.ene.iiasa.ac.at/ngfs/>; IEA (International Energy Agency). 2021. Net Zero by 2050: A Roadmap for the Global Energy Sector. May.
- 2 Bloomberg NEF. 2020. Hydrogen Economy Outlook: Key Messages; Natural Resources Canada. 2020. Hydrogen Strategy for Canada: Seizing the Opportunities for Hydrogen. Government of Canada.
- 3 Fortune Business Insights. 2020. "Fuel Cell Market to Exhibit Exceptional 36.0% CAGR by 2028 Backed by Growing Demand for Zero-Emission Emitting Vehicles Worldwide, says Fortune Business Insights." Press release. March 26.
- 4 Navius Research. 2021. Achieving Net Zero Emissions by 2050 in Canada. Analysis commissioned by the Canadian Institute for Climate Choices. <https://climatechoices.ca/wp-content/uploads/2021/02/Deep-Decarbonization-Report-2021-01-21-FINAL.pdf>
- 5 Yahya Anouti, Raed Kombargi, Shihab Elborai, and Ramzi Hage. 2020. The Dawn of Green Hydrogen. PwC; Eurasia Group. 2020. "World in a Week: 22 June 2020." Eurasia Live. June 22; Baker McKenzie. 2021. "Russia Taking a Stand in Global Hydrogen Race." Lexology. February 3.
- 6 Vanessa Dezem. 2020. "Hydrogen Breaks Through as the Hottest Thing in Green Energy." Bloomberg. September 23.
- 7 Dan Murtaugh. 2019. "World's First Liquid Hydrogen Ship Debuts to Export Australian Fuel. Financial Review. December 13.
- 8 Natural Resources Canada. 2020. Hydrogen Strategy for Canada: Seizing the Opportunities for Hydrogen. Government of Canada. https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/environment/hydrogen/NRCan_Hydrogen-Strategy-Canada-na-en-v3.pdf
- 9 Jimmy Burg, Josh Jantzi, Wally Braul, and Emma Hobbs. 2021. "Hydrogen: The Next Clean Energy Frontier. Gowling WLG. February 2; Viorelia Guzun, Anne Drost, and Paulina Balabuch. 2021. "Canada's Hydrogen Strategy: An Ambitious Framework for a Strong Hydrogen Economy." Blakes. February 2.
- 10 PitchBook Data Inc. 2021. Custom search (data has not been reviewed by PitchBook analysts). [Pitchbook.com](https://pitchbook.com)