

## Transition-opportunity sector profiles

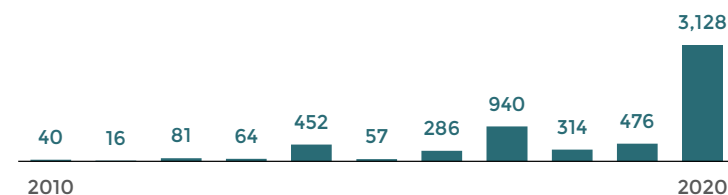
### CLEAN HYDROGEN

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)

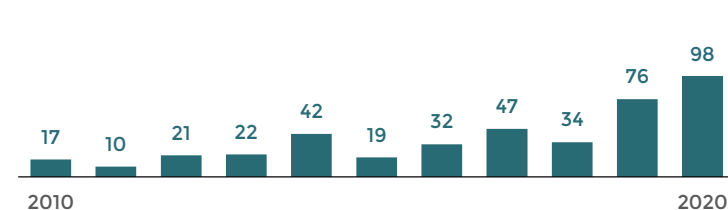
##### Capital invested (\$M)\*

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.<sup>1</sup>
- Optimistic estimate: global market worth \$2.5 trillion to \$12 trillion by 2050.<sup>2</sup>
- 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.<sup>3</sup>

##### Global market dynamics

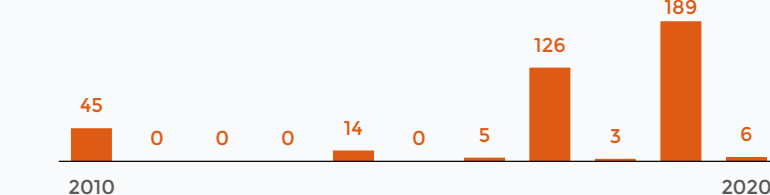
- Highly competitive market for hydrogen emerging: 18 economies, representing over 75% of global GDP, are developing hydrogen strategies.<sup>5</sup>
- EU is committed to building the equivalent capacity of China's Three Gorges Dam from renewable hydrogen by 2030.<sup>6</sup>
- High production costs, inadequate infrastructure, and lack of clear demand direction are barriers to growth.<sup>7</sup>
- 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.

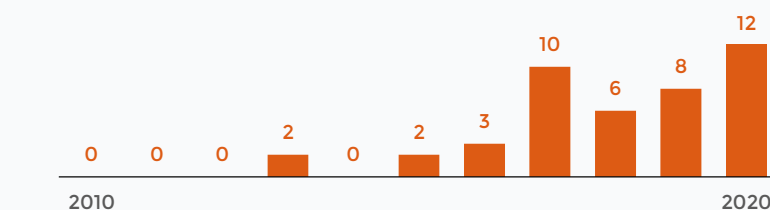
#### Canadian market (23 companies)

##### 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.<sup>4</sup>
- 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.<sup>8</sup>

###### Disadvantages

- Export costs and infrastructure, slow growth in domestic market.<sup>9</sup>

###### NOTABLE COMPANIES

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

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

## Disclaimer

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

## Endnotes

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- 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](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)