THE CLEANTECH SECTOR IN ONTARIO

AUGUST 2024

Ontario

Canada

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TABLE OF CONTENTS

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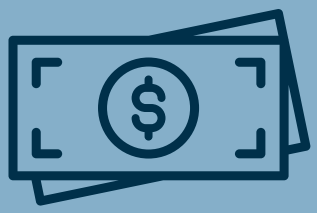
PURPOSE

Currently, the growth of the clean technology (cleantech) sector in Canada outpaces that of the rest of the economy. Ontario has the largest cleantech sector in Canada and is home to more than a third of all Canadian cleantech companies. This profile provides a comprehensive overview of the current state of Ontario's cleantech sector, including information on the sector at large and specific data pertaining to pure-play cleantech companies. It will be updated on an annual basis to ensure ongoing relevance and accuracy. This work is meant to equip stakeholders, including government, industry, investors, and academia, with information to move forward their decision-making and activities within the cleantech sector.

KEY STATISTICS:
Ontario's environmental and clean technology (ECT) sector*

$16.6 billion
revenue generated (2022)[1]



$202,101
GDP dollars per person employed in ECT sector (2022)[2]

$7.2 billion
in exports (2022)[3]

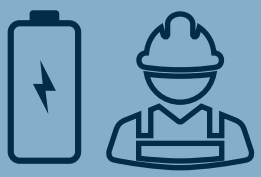
$8.8 billion
in imports (2022)[4]

135,971
jobs (2022)[5]

$101,049
average salary (2022)[6]

8.4%
GDP growth from 2017 to 2022[7]

Leading ECT sector **with over a third** of the national market (2022)[8]



>75%
of Canadian energy storage capacity based in this province (2024)[9]

*See Appendix A for further details.

KEY STATISTICS:
Ontario's pure-play clean technology companies*

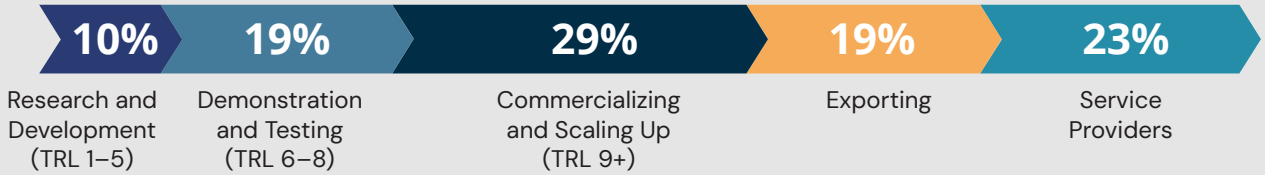
852
pure-play cleantech companies (2023)[10]

Manufacturing & Utilities
are the main cleantech customers (2022)[11]

9
identified Indigenous-owned companies (2023)[12]

7.9%
of companies managed by women (2023)[13]

Stage of Development:[14]

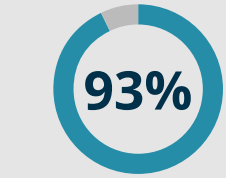


34
publicly listed companies (2022)[15**]

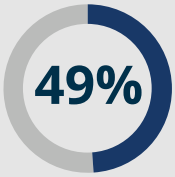
$22.6 billion
market cap of publicly listed companies (2023)[16]

$20.8 million
average export value (2020)[22]

$2.5 million
on average spent on R&D (2020)[21]



of companies have fewer than 100 employees (2023)[20]



of companies have positive net income (2021)[19]

111
companies have patents (2020)[18]

2,347
patents filed, the most in Canada (2020)[17]

*See Appendix A for further details.

**28 companies are listed on major exchanges.

WHAT IS CLEANTECH?

Clean technologies* can be any good or service that remediates or prevents environmental damage, and/or is less polluting or more efficient than equivalent normal products. Clean technologies contribute to clean growth and the transition to a low-carbon economy, and provide solutions to environmental issues such as climate change, air and water pollution, and resource scarcity.

Pure-play cleantech companies are companies that are predominantly engaged in developing and/or using innovative technologies that provide environmental benefits.

Cleantech spans several sectors, including energy, waste, water, transportation, built environment, agriculture, and a variety of industrial and manufacturing industries, such as steel, cement, and auto-manufacturing. It leverages enabling technologies, such as artificial intelligence and machine learning, to drive innovation and improve efficiency across these diverse sectors.

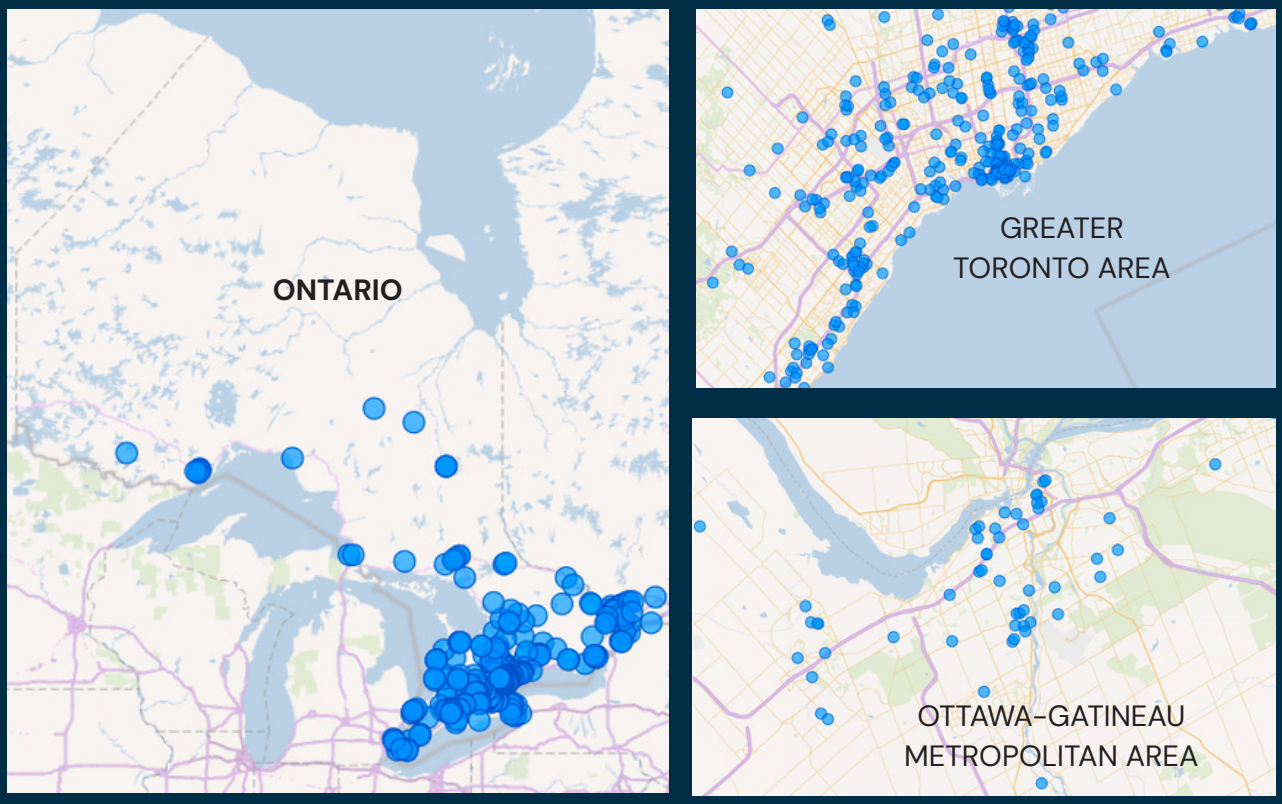
*See Appendix B for further details.

SECTOR DISTRIBUTION

The cleantech sector in Canada consists of ten industries. Ontario cleantech companies are concentrated in five of these:*

- Renewable and non-emitting energy supply: 32.4%
- Energy efficiency: 12.4%
- Biofuels, bioenergy, and bioproducts: 8.8%
- Water and wastewater: 8.7%
- Transportation: 6.5%

Around 11.5% of firms in Ontario operate in more than one of the above industries.



Map of Ontario pure-play companies.

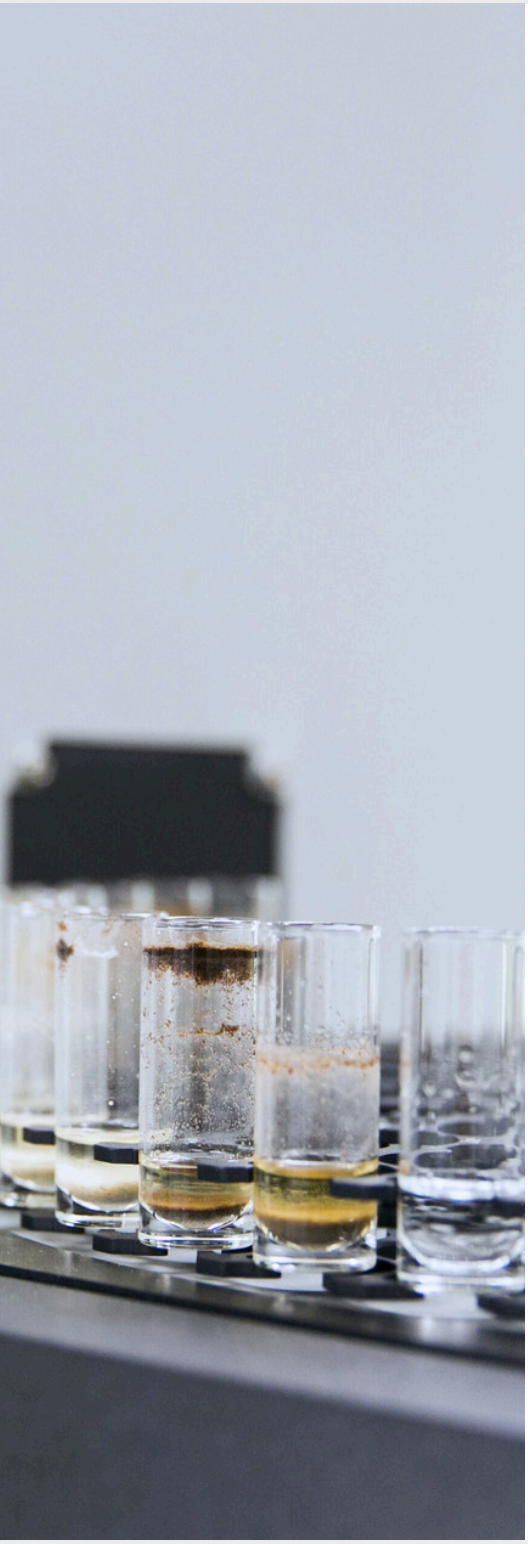
Most pure-play cleantech companies are headquartered in Southern Ontario. Over 25% of companies are headquartered in Toronto, followed by 6.7% in Ottawa, and 6.6% in Mississauga.

*See Appendix B for further details

OVERVIEW OF SECTOR

Ontario has the largest cleantech sector in Canada

- In 2022, the GDP generated by the sector in Ontario was $27.5 billion. This accounted for 34.3% of the total GDP contributed by the sector in Canada and 2.8% of Ontario's overall GDP (in nominal terms).[23]
- As of 2022, Ontario supplies the largest number of cleantech jobs in Canada, with 135,971 jobs and an average salary of $101,049. This is higher than both the average provincial and federal incomes for the total economy in 2021, which were $55,500 and $54,000 respectively.[24]
- As of 2022, Ontario produces $202,101 GDP dollars per person employed in the cleantech sector, compared to $103,335 GDP dollars per person employed in the total economy.[25]
- From 2017 to 2022, Ontario's cleantech sector grew 8.4%, compared to Canada's overall cleantech sector growth of 3.6%.[26]
- Ontario's cleantech domestic sales grew 6.8% from 2017 to 2021, compared to a national growth of 1.6% in the same period.[27]



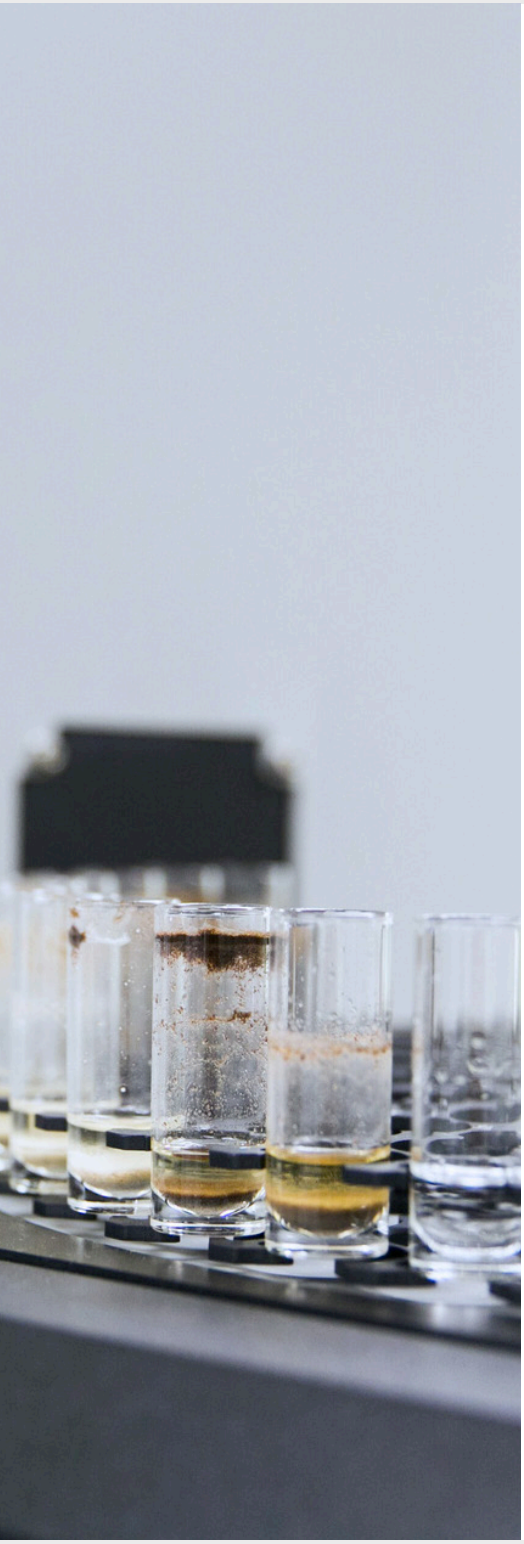
Ontario has expertise in many clean technologies and is a hub for investments

Energy Storage

- In the past 3 years, over $27 billion has been invested in the electric vehicle (EV) battery space to advance battery plants, manufacturing, and supply chains.[28]
    - Honda Canada has invested $15 billion to create Canada's first comprehensive EV supply chain, which will include a stand-alone battery manufacturing plant in Alliston.[29]
    - Stellantis and LG Energy Solution have announced a $5 billion investment for a large-scale lithium-ion battery manufacturing plant in Windsor.[30]
    - Volkswagen has invested $7 billion to build Canada's largest EV battery manufacturing plant in St. Thomas.[31]
- Through a series of procurement initiatives, Ontario's Independent Electricity System Operator has announced the largest-ever energy storage procurement in Canada, with almost 3000 MW in new battery storage capacity to enter service by 2028.[32]

Water Technology

- Ontario excels in water remediation; key contributions include UV disinfection and membrane filtration, both widely used for ensuring clean water.[33]



Hydrogen

- Ontario's Hydrogen Innovation Fund invested $15 million in 2023 to test existing and emerging technologies to determine how hydrogen resources can support reliability, affordability, and sustainability.[34]
- Atura Power, a subsidiary of Ontario Power Generation, is building Ontario's largest hydrogen electrolysis facility in Niagara Falls, which is expected to generate 20 MW once operational in 2025.[35]
- Sarnia-Lambton is an emerging low-carbon hydrogen hub, with Ontario's largest cluster of hydrogen producers and users across various industries, including petrochemical and refining, advanced manufacturing, and value-added agriculture.[36]

Renewable and Nuclear Energy

- 95% of Canada's nuclear energy is generated in Ontario.[37]
- Ontario's first Small Modular Reactor (SMR) is scheduled for completion by the end of the decade, with four more SMRs planned by the mid-2030s.[38]
- Ontario is Canada's top producer of renewable wind and solar energy, with approximately 7.5 GW of capacity.[39]
- Three new transmission lines in northeast and eastern Ontario, set for completion by 2029, will support clean energy initiatives, including electrifying Algoma Steel's steelmaking process.[40]

Ontario leads in cleantech innovation and exports

- 852 pure-play cleantech companies are located in Ontario, accounting for 35.1% of the national total.[41]
- These companies mostly operate in energy-related industries, such as renewable energy supply and energy efficiency.[42]
- In 2022, Ontario was the largest exporter of cleantech products in Canada, exporting $7.2 billion. This is an increase of 18.7% over 2017.[43]
- As of 2022, Ontario's major export destinations are the United States (79.4%), Norway (3.1%), the Netherlands (2.7%), and China (2.6%).[44]
- The Toronto-Waterloo Corridor is the top-ranking cleantech ecosystem in Canada and ranks 6th in North America.[45]
- From 2010 to 2022, 2347 patents were filed by 111 pure-play cleantech companies in Ontario, the most in Canada. The majority of patents were filed in the USA and Canada through the World Intellectual Property Organization and European Patent Office.[46]

LEADING COMPANIES

The annual **Global Cleantech 100 reports** highlight the world's most innovative companies with the most potential to make significant market impact. The following cleantech companies from Ontario made the report in 2024:

Cyclic Materials

eZinc

Genecis

The annual **Foresight 50 reports** highlight 50 of Canada's most investible companies. Ontario companies that made the list in 2023 include:

adaptis

brickeye

CleanInnoGen

HAZE CANADA

NOVAMERA

QEA

SWTCH

Symboticware

TROES The Revolution of Energy Storage

Waterotor Energy Technologies inc.

OPPORTUNITIES TO SUPPORT CLEANTECH

The following is a select list of opportunities to support cleantech from various stakeholders:

Federal Incentives and Tax Credits

- Capital Cost Allowance—Classes 43.1 and 43.2
- Clean Investment Tax Credits
- Scientific Research and Experimental Development tax incentives

Federal Program Opportunities

- Agricultural Clean Technology Program
- Canada Growth Fund
- Clean Growth Hub
- Energy Innovation Program
- FedDev Ontario
- FedNor
- Forest Innovation Program
- Industrial Research Assistance Program
- Low Carbon Economy Fund
- Next Generation Manufacturing Canada
- Smart Renewables and Electrification Pathways Program
- Strategic Innovation Fund
- Sustainable Development Technology Canada

Provincial Incentives and Tax Credits

- Ontario Made Manufacturing Investment Tax Credit

Provincial Program Opportunities

- Electric Vehicle (EV) ChargeON Program
- Forest Sector Investment and Innovation Program
- INVEST North Program
- Invest Ontario Fund
- Municipal Energy Plan Program
- Ontario Centre of Innovation programs
- Ontario Vehicle Innovation Network
- Regional Development Program
- Save on Energy

Incubators, Accelerators, Agencies, Supporting Organizations

- Agrivoltaics Canada
- Altitude Accelerator
- Bioindustrial Innovation Canada
- Centre for Research and Innovation in the Bio-Economy
- CleanTech North
- Energy Storage Canada
- Foresight Canada
- GreenCentre Canada
- Hydrogen Business Council
- Hydrogen Ontario
- Innovation Cluster Peterborough and the Kawarthas
- MaRS Climate Impact
- Ontario Clean Technology Industry Association
- Ontario Environment Industry Association
- Sustainable Waterloo Region
- The Transition Accelerator

Groups in Academia

- Carleton University's Sustainable Energy Research Centre
- EarTH District
- Ontario Tech University's Brilliant Energy Institute
- Ontario Tech University's Clean Energy Research Lab
- Toronto Metropolitan University's Clean Energy Zone
- Trent University's Cleantech Commons
- University Network of Excellence in Nuclear Engineering
- University of Ottawa's Positive Energy program
- University of Toronto's Institute for Sustainable Energy
- University of Toronto's Climate Positive Energy Initiative
- University of Waterloo's Institute for Sustainable Energy
- University of Waterloo's Institute of Nanotechnology
- University of Waterloo's Water Institute
- University of Western Ontario's Free Appropriate Sustainability Technology Research Group
- University of Western Ontario's Institute for Chemicals and Fuels from Alternative Resources
- York University's Sustainable Energy Initiative

ONTARIO INITIATIVES

As Canada's powerhouse for cleantech growth, Ontario's cleantech industry is at the forefront of sustainable development and environmental progress. Cleantech companies in Ontario are helping organizations and communities around the world implement effective, efficient solutions for tough environmental challenges.

Ontario's diverse cleantech sector continues to expand alongside its growing population and economy. The province's economic growth and shift towards electrification are increasing demand for electricity. Powering Ontario's Growth outlines actions to meet this growing demand, which includes introducing new zero-emissions generation, advancing long-duration storage, and building new transmission infrastructure.

The province also established the Electrification and Energy Transition Panel as a short-term advisory body to help Ontario's economy prepare for electrification and the energy transition. The Panel advised the government on high-value short, medium, and long-term opportunities in the energy sector to:

- help enable investment and job creation in Ontario by keeping energy rates low;
- create a more predictable and competitive investment environment;
- build on the government's work to meet energy needs and ensure a reliable, affordable, and clean electricity supply; and
- strengthen Ontario's long-term energy planning process by better coordinating the fuels and electricity sectors.

In addition, Ontario commissioned the independent Cost-Effective Energy Pathways Study to understand how Ontario's energy sector can support electrification and the energy transition. Together, the Panel and this upcoming study will help the government make strategic decisions for the energy system's future.

Other provincial policies to advance Ontario's cleantech space include:

Forest Biomass Action Plan: a five-year action plan that encourages the use of forest biomass resources to secure jobs, support economic development, and encourage sustainability in Ontario's forest sector.

Low-Carbon Hydrogen Strategy: outlines concrete and immediate actions that will accelerate the development of a low-carbon hydrogen sector in Ontario that will:

- create more local jobs
- attract investment
- help reduce greenhouse gas emissions.

Driving Prosperity—Ontario's Automotive Plan: focuses on supporting Ontario's market-driven pivot to electric, low-carbon, connected, and autonomous vehicles by bolstering the province's developing battery and EV supply chains.

Made-in-Ontario Environment Plan: aims to lower greenhouse gas emissions and protect air, land, and water to ensure a safe, healthy, and clean environment now and for future generations while creating economic opportunities for cleantech companies.

Key needs for companies, as identified by stakeholders and the **2022 Cleantech Industry Survey**, were securing capital, addressing rising salaries and wages, developing industry connections, and addressing lack of regulatory drivers for commercialization. Developing new standards for cleantech subsectors and creating uniform standards across Canada is another broader challenge, which is currently being addressed by the Standards Council of Canada.

APPENDICES

APPENDIX A

Environmental and clean technology (ECT) products are defined as any process, product, or service that reduces environmental impacts through any of the following three strategies: environmental protection activities that prevent, reduce, or eliminate pollution or any other degradation of the environment; resource management activities that result in the more efficient use of natural resources, thus safeguarding against their depletion; and, the use of goods that have been adapted to be significantly less energy or resource intensive than the industry standard.

The data referenced in relation to Ontario's ECT sector and pure-play cleantech companies are from the following sources:

2022 Cleantech Industry Survey Results

Completed by Natural Resources Canada, this targeted survey was sent out to 2427 pure-play cleantech companies identified through the Clean Technology Data Strategy. A total of 640 unique survey responses were received. In this report, data on the main customers of pure-play cleantech companies and cleantech company stage of maturity (sample size n=210) are sourced from this dataset.

Canada's Business Registries

The Business Registries' data is linkable to the Clean Technology Company List. In this report, data on pure-play cleantech company size (sample size n=601) and employment numbers are sourced from this dataset.

Clean Technology Company List

This dataset, internal to Natural Resources Canada, provides information on pure-play companies across Canada. It was last updated in April 2022 and includes information from the Indigenous Business Registry. In this report, data on pure-play cleantech companies is sourced from this dataset, including the number of companies managed by women.

Derwent Innovation

The Canadian Intellectual Property Office (CIPO) sourced patent data from Derwent Innovation. Natural Resources Canada then matched CIPO's filings to the Clean Technology Company List to retrieve pure-play patent data (sample size n=843 for Ontario).

Environmental and Clean Technology Economic Accounts (ECTPEA)

Published by Statistics Canada, ECTPEA provides information on the economic impact of ECT products. In this report, data on the ECT sector's employment, wages, exports, and imports are sourced from this dataset.

Linkable File Environment (LFE)

This dataset, internal to Natural Resources Canada, connects the Clean Technology Company List to Statistics Canada's linkable file environment. In this report, data on pure-play cleantech company research and development spending (sample size n=80), profitability (n=300), average export value (n=90), and ECT sector market size (n=580 for Ontario and n=1590 for Canada) are sourced from this dataset.

S&P Capital IQ

This dataset by S&P Global provides global financial intelligence, including information on public and private companies and market snapshots. In this report, data on the number of publicly listed companies and their market cap are sourced from this dataset.

Survey of Environmental Goods and Services (SEGS)

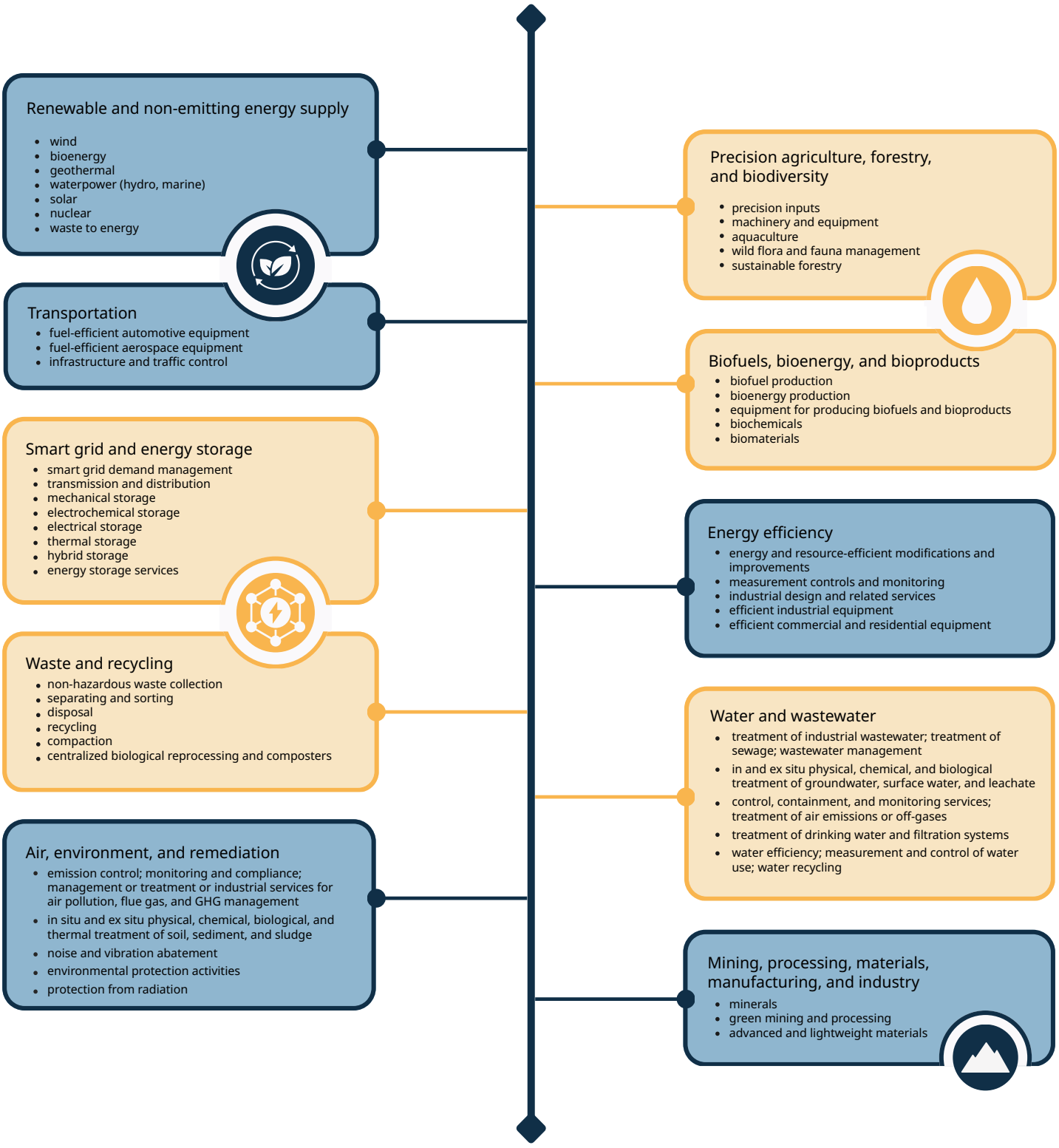
Published by Statistics Canada, SEGS provides information on sales and exports of ECT goods and services. In this report, data on the ECT sector's revenue is sourced from this dataset.

T2 Corporation Income Tax Return

This form is the federal, provincial, and territorial corporation income tax return for all corporations located outside of Alberta and Quebec. In this report, data on revenue and net income is sourced from T2 income statement data.

APPENDIX B

The following taxonomy represents the suite of products considered to be clean technologies by the Government of Canada.



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