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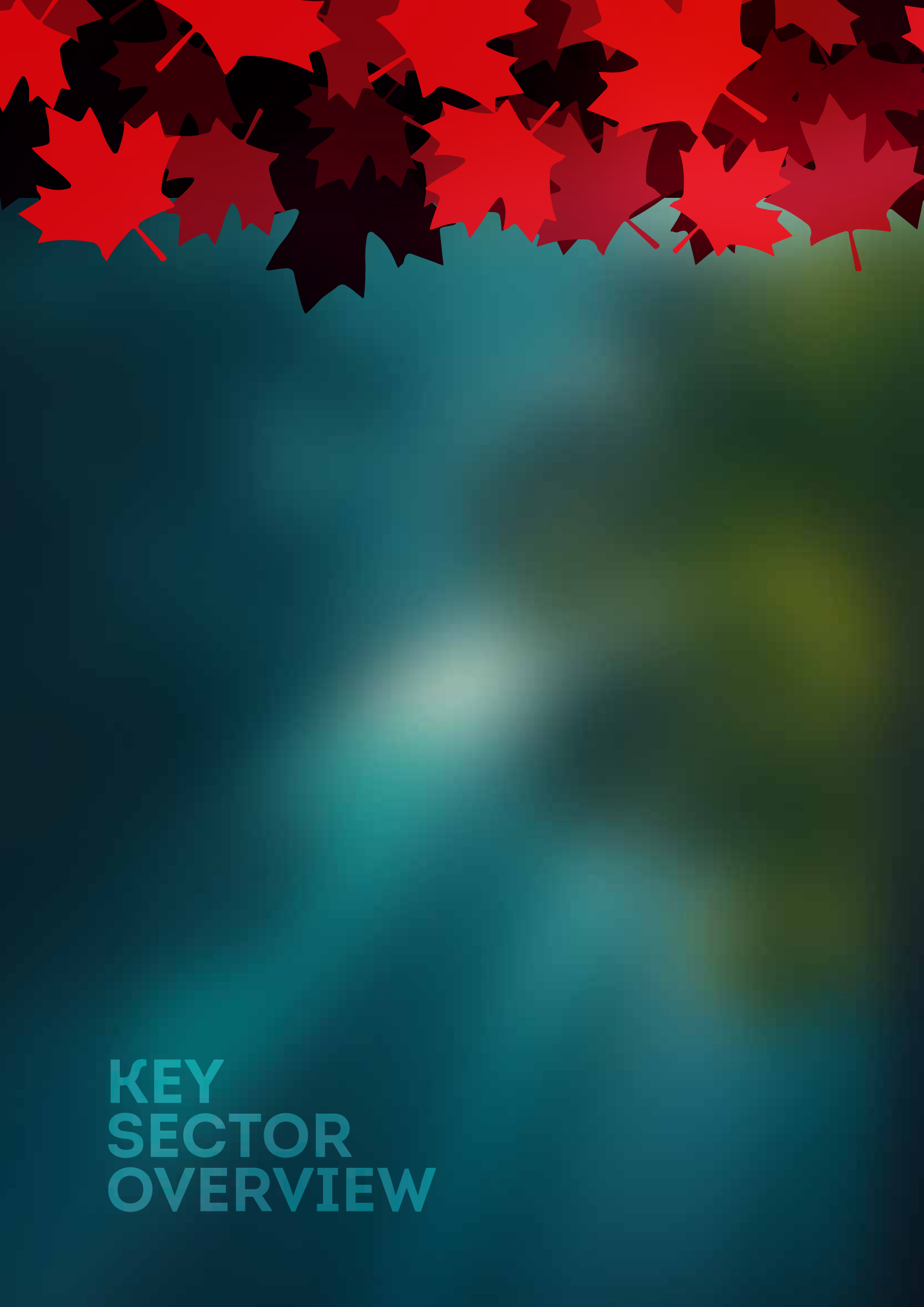
KEY SECTOR OVERVIEW



KEY SECTOR OVERVIEW

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KEY SECTOR OVERVIEW
HEAVY INDUSTRY CHEMICALS & FERTILIZERS

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· HEAVY INDUSTRY · CHEMICALS & FERTILIZERS

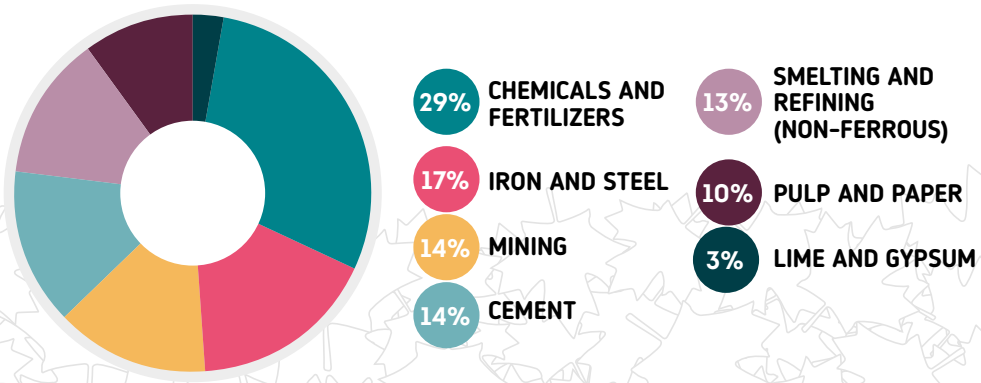
OVERVIEW

Canada's chemical and fertilizer industry is a subsector of Canada's heavy industry sector and includes the production of chemicals and products through chemical processes. The sector provides critical inputs to other economic sectors such as manufacturing, agriculture, pharmaceuticals, and energy. Canada's chemical and fertilizer sector presents significant opportunities for decarbonization, driven by its substantial emissions and export exposure. As the industry works to improve its sustainability performance, there is growing demand for clean technologies that support emissions reductions, energy efficiency, waste recovery, and feedstock diversification. For technology providers, this presents a clear opportunity to support an established sector in its transition toward more sustainable production.

CHEMICALS AND FERTILIZERS REPRESENT

- Chemicals and fertilizers account for 30% of emissions from Canada's heavy industry sector, making it the largest source of emissions within heavy industries.
  - The chemical industry generates a total of 23 million tonnes of direct greenhouse gas emissions annually.
  - Majority of emissions footprint is in Alberta (65% of emissions) and Ontario (20%).
- Significant contributor to Canada's economy: $22.9 billion annually in GDP (1% of Canada's GDP), shipments totaling $74.8 billion, exports of $48 billion, and imports of $83.8 billion.

Emissions from Canada's Heavy Industry Sector



Source: Environment and Climate Change Canada. (2024). National Inventory Report, 1990–2022: Greenhouse Gas Sources and Sinks in Canada. Available online at: canada.ca/ghg-inventory

DRIVERS & LEADERSHIP

- Canada's industrial carbon pricing systems establish long-term financial incentives for companies to continuously reduce emissions.
- The Chemical Industry Association of Canada, representing over 50 chemical companies, supports Canada's goal of net-zero by 2050.
- Circularity, which emphasizes resource efficiency and the reuse of materials, is reshaping the chemical and plastics industry.
- Regulatory pressures and consumer demand are accelerating a transition toward recyclable or biodegradable alternatives.

CLEANTECH CHALLENGE AREAS

Decarbonizing high-temperature chemical processes and transitioning from traditional fossil fuel energy sources to electricity and low-carbon alternatives (e.g., electrified steam cracking, industrial heat pumps).

Retrofitting facilities with carbon capture, utilization, and storage (CCUS) to capture and store CO_2 from emissions intensive industrial production sites. Operational challenges include high energy use, storage capacity, and costs.

Substituting fossil-fuel based feedstocks used in chemical production processes with renewable and sustainable feedstocks such as biomass and hydrogen. Scalable low carbon hydrogen production methods could replace natural gas for ammonia and methanol production.

Enhancing circularity through improved chemical recycling methods. Advanced chemical recycling could reduce fossil dependency by replacing virgin feedstock with recycled materials.

Reducing energy consumption through heat integration and technologies such as waste heat recovery and low-temperature cracking that can reduce emissions and improve production efficiency.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Low-Carbon Ammonia

EU policy leadership and the geopolitical landscape are driving innovation in green ammonia with potential for Canadian adoption.

Energy Efficiency & Management

Broad applicability across the sector and opportunity to leverage EU expertise.

Renewable Feedstocks

Growth in pyrolysis and circular bioeconomy solutions has been observed in the EU.

Electrification of Equipment & Processes

Most technology providers in this space are from the EU, presenting an opportunity for Canadian matchmaking.

Fuel-Switching & Clean Fuels

Hydrogen is a key component of the EU's energy transition strategy and a particular area of opportunity with established solutions providers.

Circularity & Advanced Recycling

The leading corporates investing in technologies and innovation for plastic recycling (specifically textiles and packaging) are EU-based.

CCUS

Increasing focus on fuels production in the EU with expanding market players.

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KEY SECTOR OVERVIEW
AGRICULTURE

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AGRICULTURE

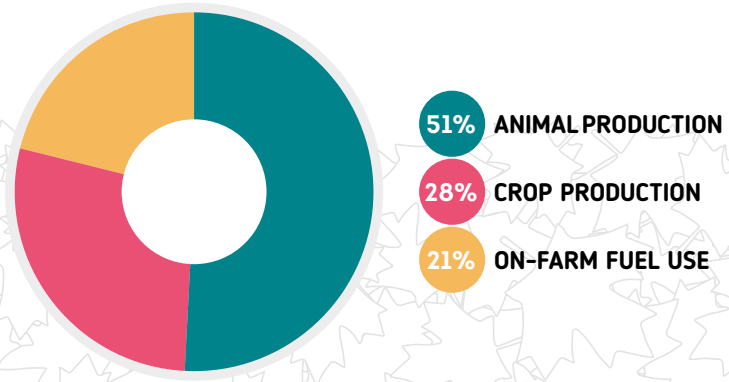
OVERVIEW

Canada's agriculture sector is a vital contributor to the economy and a key player in the transition to sustainable food systems. With vast arable land and a strong export market, Canada is a global leader in agricultural production, particularly in grains, livestock, and oilseeds. With a growing emphasis on reducing emissions, cutting waste, improving water efficiency, and enhancing soil health, the sector is ideal for clean technology solutions. From precision farming and bio-based fertilizer solutions to energy-efficient processing and sustainable irrigation systems, there are abundant opportunities for clean tech providers to help farmers meet sustainability goals and boost productivity. As demand for sustainable agricultural practices rises globally, Canadian farmers and processors are poised to be leaders in sustainable food production and processing, making the sector a prime area for innovation and investment. Canada's agricultural sector includes farming activities, crop and animal production.

AGRICULTURE REPRESENTS

- 10% of Canada's total greenhouse gas emissions, the fifth-largest emitting economic sector.
  - The sector generates a total of 69 million tonnes CO_2 equivalent annually.
  - Agricultural soils store 18 million tonnes CO_2 equivalent annually, offsetting about 26% of the sector's annual emissions.
- Rising water consumption, with agricultural irrigation increasing by 23% from 2020 to 2022 due to climate change-induced drought conditions.
- Significant contributor to Canada's economy, contributing $150 billion in 2023, accounting for about 7% of the country's GDP.
- One of the world's largest exporters of agricultural and food products and one of Canada's sectors with the greatest potential for economic growth.

Emissions from Canada's Agriculture Sector



Source: Environment and Climate Change Canada. (2024). National Inventory Report, 1990-2022: Greenhouse Gas Sources and Sinks in Canada. Available online at: canada.ca/ghg-inventory

DRIVERS & LEADERSHIP

- Policies are driving a shift toward more sustainable and climate-resilient farming practices while aiming to maintain economic competitiveness and food security.
- Targeted incentive programs support adoption of green energy, precision agriculture, and bioeconomy related technology.
- Canada's focus on methane emissions reduction is driving a need for new solutions in livestock and manure management.
- Canada's target of reducing fertilizer emissions by 30% below 2020 levels by 2030 is spurring demand for innovation in nutrient management practices.
- The $3.5 billion Sustainable Canadian Agricultural Partnership is focused on strengthening competitiveness, innovation, and resiliency in the sector.

CLEANTECH CHALLENGE AREAS

Addressing water scarcity and climate-induced drought conditions through improved irrigation efficiency, digital water monitoring, and precision agriculture technologies.

Reducing livestock-related emissions through new solutions such as methane inhibitors, optimized manure management, and improved feed efficiency.

Innovative solutions in fertilizer reduction and substitution that can balance productivity and sustainability in agricultural practices, such as enhanced efficiency fertilizers (EEFs), bio-fertilizers, and nutrient recovery systems to minimize nitrous oxide emissions.

Decarbonizing farm operations by transitioning to electric, hydrogen, and biofuel-powered farm equipment while overcoming cost barriers and infrastructure limitations.

Enhancing resource efficiency through precision agriculture and vertical farming to optimize land use, inputs, and water use.

Managing agricultural waste through solutions such as biodigesters and biofuel production to convert organic waste into renewable energy sources.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Fertilizer Reduction & Nutrient Runoff Prevention

EU has innovation in non-synthetic, PFAS-free alternatives and innovation around slow release and encapsulation.

Sensory & Digital Surveillance Technologies

EU has solutions in remote sensing, aerial imaging, and digital surveillance technologies.

Alternative Protein Production

EU is a market leader in plant-based production. The EU is active in alternative protein sectors, particularly in algae and plant-based proteins. Several alternative dairy innovators using advanced fermentation techniques.

Methane Minimization from Livestock Digestion & Manure Management

EU is ahead on innovation and adoption of solutions in methane reduction in livestock, with innovations in improved feed efficiency, better manure management, and methane inhibitors.

Agricultural Waste Management (such as Biodigesters)

Select innovation in this field in the EU that could be applicable to Canada.

Biofuel Production

Some EU innovators in this area, specifically focused on agri-food feedstocks for biofuel, with potential for Canadian application.

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KEY SECTOR OVERVIEW
BUILDINGS

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BUILDINGS

OVERVIEW

Canada's building sector is one of the country's largest sources of emissions and material consumption, making it a high-impact target for clean technology innovation. With growing demand for net-zero buildings, deep retrofits, and resilient design, the sector is scaling up its use of energy-efficient materials, smart systems, and low-carbon construction methods. For cleantech providers, this is a sector actively seeking solutions, with opportunities for partnerships in everything from building automation to sustainable materials and decarbonized heating. Canada's building sector encompasses residential, commercial, and institutional buildings.

BUILDINGS REPRESENT

- Canada's 3rd largest source of emissions: 13% of Canada's total direct GHG emissions, with indirect emissions from electricity use further increasing its footprint to 18%.
  - The sector generates a total of 89 million tonnes of direct greenhouse gas emissions annually.
  - Majority of emissions (96%) stemming from space heating and water heating.
- Over 26% of Canada's plastic waste is from the construction sector, much of which is hard- to-recycle plastic.
- A significant contributor to Canada's economy, generating approximately $150 billion annually in GDP, accounting for roughly 7.4% of Canada's GDP, and supporting jobs in construction, real estate, and building operations.
- The sector is set for expansion, driven by strategic investments, positive demographic trends, and supportive government policies focused on improving housing and infrastructure.

DRIVERS & LEADERSHIP

- Canada's building sector is at the forefront of a transition shaped by a growing emphasis on energy efficiency, sustainable materials, and resilience.
- Government policy aims to modernize building stock by scaling up retrofits, integrating resilience, and ensuring all new construction meets net-zero standards.
- Building codes mandate energy performance standards for building systems such as HVAC, lighting, and insulation, driving energy efficiency in new and existing structures.
- Provincial initiatives are promoting adoption of innovative low-carbon building and construction materials such as mass timber.
- Federal and provincial energy efficiency programs provide financial incentives to support the adoption of high-performance building technologies, reducing cost barriers for homeowners and businesses and accelerating demand for technology.

CLEANTECH CHALLENGE AREAS

Incorporating resilience to adapt to a changing climate. Floods, wildfires, and extreme weather events are driving the need for new technologies such as enhanced insulation, flood protection, and efficient cooling solutions.

Deep retrofit solutions to address Canada's aging building stock. Advanced technologies are required to affordably upgrade building envelopes and integrate energy-efficient systems.

Innovations like smart sensors, sustainability analytics, and stormwater management solutions are needed to cut energy and water use.

Transitioning from high-emission materials like concrete and steel to low carbon and renewable alternatives, such as mass timber, recycled materials, and low-emission concrete and steel, to reduce embodied emissions.

Waste management from the buildings and construction sector remains a significant challenge. Innovations in recycling, reuse, and circular construction are needed to reduce landfill dependency and material waste.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Climate Resilient Building Technology
EU has fostered innovation in this area through its policy leadership and is one of the leading regions globally for climate-resilient buildings technology, with significant potential for Canadian adoption.

Low-Carbon and Renewable Building Materials
EU leadership is driving innovation in sustainable construction with potential for Canadian adoption. The European Innovation Council (EIC) is active in this space, with startups working on carbon-negative materials.

Plastic Construction Waste Reuse and Recycling Technology
The EU has expertise in solvent dissolution technologies for handling contaminated plastic waste.

Energy Efficiency & Retrofits
Energy efficiency and retrofitting older buildings has been a key priority in the EU. Many startups in the EU specialize in this area with directly relevant innovations.

Energy and Asset Management Technology
Widespread presence of startups focusing on building automation and control.

Resilient Infrastructure
Advanced software solutions in the EU provide precise flood risk assessments for building retrofits and insurance purposes.

Smart City Technologies
The EU has a strong presence in sensor technology, data analytics, and urban digitalization.

Wood-Based Structures/Mass Timber Construction
The EU has strength and expertise in this area that could be leveraged.

District Energy Systems
The EU leads in district heating and cooling innovations, particularly in Eastern and Central Europe.

Building Sustainability Data Tracking
Some startups in the EU are working on solutions for sustainability data tracking in buildings.

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KEY SECTOR OVERVIEW
ELECTRICITY

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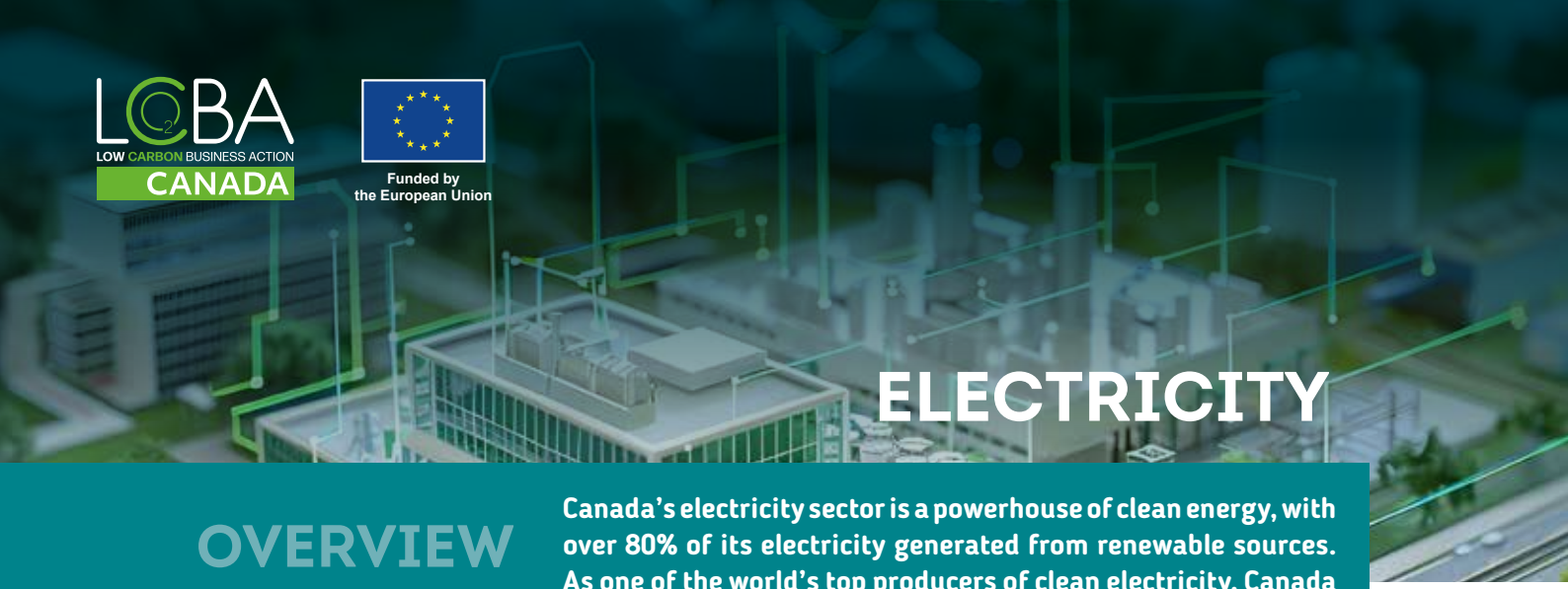


ELECTRICITY

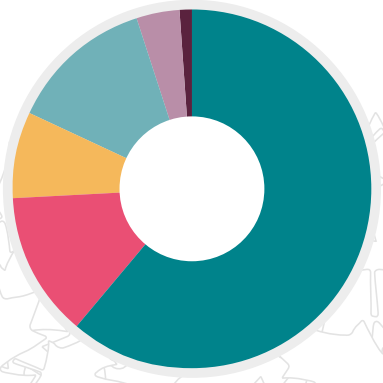
OVERVIEW

Canada's electricity sector is a powerhouse of clean energy, with over 80% of its electricity generated from renewable sources. As one of the world's top producers of clean electricity, Canada is increasingly focusing on expanding wind, solar, and energy storage while modernizing its grid infrastructure. With robust government support for clean energy initiatives and growing demand for decarbonization, Canada's electricity sector offers significant opportunities for innovation in sustainable technologies such as grid modernization, smart technologies, and energy efficiency. As Canada aims to meet ambitious emissions reduction targets, clean technology providers have a unique opportunity to shape the future of one of the world's cleanest electricity markets. The electricity sector is also a critical pillar of Canada's energy system, playing a central role in Canada's decarbonization strategy by driving emissions reductions across key sectors such as buildings, industry, and transportation. Technology providers can contribute to the development and deployment of innovative solutions that will support Canada's low-carbon future.

ELECTRICITY REPRESENTS

- 47 million tonnes CO_2 equivalent emitted in 2022, accounting for 6.7% of total national emissions.
  - In 2022, 82% of Canada's electricity came from non-GHG emitting sources.
  - Between 2000 and 2022, emissions from electricity production fell by 63%, largely due to Ontario's coal phase-out.
- Significant industrial water use: Thermal-electric power producers account for 83.7% of Canada's total industrial water intake.
- Significant GDP: Electricity generation, transmission, and distribution contribute 1.9% to Canada's nominal GDP, the second largest contribution from the energy sector.

Emissions from Canada's Electricity Sector



- 62% HYDRO
- 13% NUCLEAR
- 8% OTHER RENEWABLES
- 13% NATURAL GAS
- 4% COAL
- 1% PETROLEUM/OTHERS

Source: Natural Resources Canada. (2024). Energy Fact Book 2024-2025. Available online at: https://energy-information.canada.ca/en/energy-facts/clean-power-low-carbon-fuels

DRIVERS & LEADERSHIP

- Canada's electricity sector is experiencing significant shifts aimed at achieving a net-zero emissions grid by 2035.
- The federal Emissions Reduction Plan projects a 70% reduction in electricity sector emissions by 2030, necessitating innovation in generation, transmission, and storage.
- Canada's electricity generation capacity will need to increase 2.2-3.4 times to meet projected 2050 demand.
- The electricity sector has a key role to play in reducing emissions from other sectors such as buildings, industry, and transportation. These sectors require non-emitting generation to meet their emissions reduction targets.
- The Clean Electricity Regulations establish strict limits on GHG emissions from generation, requiring non-emitting technologies like renewables, SMRs, or CCUS for gas generation.
- Tax credits and dedicated funding provide financial incentives for grid modernization, non-emitting generation and grid infrastructure.
- Electricity Canada, the national association representing Canada's electricity industry, is committed to clean energy and supporting electricity to become Canada's primary energy source.

CLEANTECH CHALLENGE AREAS

Emerging non-emitting generation, such as renewable natural gas, hydrogen, CCS, offshore wind, geothermal, and SMRs.

Innovative solutions for integrating variable renewable sources like wind and solar while maintaining the reliability of energy systems.

Smart grids and advanced energy storage systems to balance supply and demand. Information and communication technologies to enable real-time monitoring and optimization to help solve the sector's demand-supply balancing challenges.

Dynamic line ratings to enhance the efficiency of existing transmission networks as well as demand-side technologies, including adaptive self-generation.

Enhancing grid resiliency through strengthening infrastructure with advanced conductors, grid-hardening materials, superconductors, and climate modeling.

Integrating renewables and other non-emitting generation for remote regions reliant on diesel.

Scalable, low-carbon nuclear solutions with innovations in fuel cycles and safety systems.

Fish protection technologies for hydropower and thermal facilities.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Smart Grid Technology for Real-Time Monitoring, Control, and Optimization

There is a high smart grid proliferation across Europe and availability of solution providers.

Solutions for Integrating Variable Renewables (Wind & Solar)

Strong EU focus and expertise in cross-border interconnectors, battery storage, pumped hydro, hydrogen, and thermal storage for grid stability with direct applicability in Canada.

Energy Storage

Europe leads in Battery Energy Storage Systems (BESS), primarily Li-ion, with emerging alternative storage technologies of interest.

Resilient, Climate-Proof Grid Technologies

EU expertise in wildfire-prone regions includes grid-hardening and managing above-ground powerlines for resilience.

Transmission Network Efficiency

Well-developed transmission networks across multiple EU Member States enable efficient electricity flow and cross-border energy trading, with expertise that could be leveraged.

Remote Community Off-Diesel Power Generation

EU solutions providers with a focus on storage technologies for island and off-grid communities have potential applicability in Canada.

Decentralized Generation Technologies (Solar PV, Micro Hydro, Renewable Natural Gas, etc.)

High proliferation of rooftop solar PV in the EU that is supporting decentralized renewable energy.

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KEY SECTOR OVERVIEW
FORESTRY AND FOREST PRODUCTS

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FORESTRY AND FOREST PRODUCTS

OVERVIEW

Canada's forest sector is a key economic driver, especially in rural, remote, and Indigenous communities, where it often provides vital employment. While it continues to produce traditional goods like lumber, pulp, and paper, the sector is increasingly diversifying into innovative products to meet evolving global demands. Canada's forest sector is evolving beyond traditional lumber and paper to become a key player in the emerging bioeconomy. With growing investments in biofuels, bioplastics, and engineered wood products, the sector is actively seeking clean technologies to support low-carbon production, waste utilization, and process innovation. For cleantech providers, this represents a strategic opportunity to collaborate with an established, resource-rich industry committed to sustainable transformation. The forestry sector in Canada includes forest management, solid wood manufacturing, pulp and paper manufacturing, and logging.

FORESTRY AND FOREST PRODUCTS REPRESENT

- $33.4 billion contribution to Canada's GDP, equivalent to 1.2% of Canada's nominal GDP in 2022.
- A growing sector, with GDP growth of more than 50% over five years.
- The world's largest producer of newsprint and northern bleached softwood kraft pulp, and the second-largest producer of softwood lumber.
- 9% of the world's total forested area.
- 7.6 million tonnes of CO_2 equivalent emissions from pulp and paper manufacturing.

DRIVERS & LEADERSHIP

- Canada's forestry industry operates under a comprehensive regulatory framework that emphasizes sustainable forest management and environmental protection.
- Sustainable Forest Management principles incentivize the adoption of cleantech solutions like precision forestry tools and sustainable harvesting equipment to maintain biodiversity and water quality.
- Canada's clean fuel standard is incentivizing operators to reduce fossil fuel use and consider opportunities for forest biomass for bioenergy and low-carbon fuels.
- Environmental regulations drive investments in technologies that monitor habitats, protect watercourses, and reduce ecological disturbances.
- The Forest Products Association of Canada represents Canada's wood, pulp, paper, and bioproducts producers. FPAC advocates for sustainable forest management, GHG emissions reduction, and economic innovation, and has released a roadmap to net-zero for the forest products sector.
- Producers are looking for further ways to reduce emissions from forest harvesting and forest renewal operations, transportation, and manufacturing.

CLEANTECH CHALLENGE AREAS

Bioenergy with carbon capture and storage (BECCS) to reduce emissions by capturing CO_2 from biomass-based energy production. Existing forest bioenergy facilities have an opportunity to retrofit with BECCS.

Electrification of forestry operations (including equipment for harvesting and transportation) and pulp and paper processes. Unique challenges exist at remote forestry operations where infrastructure is not developed.

Adoption of alternative fuels like biodiesel, hydrogen, renewable natural gas, and biomass as low-carbon alternatives.

Uses for forest biomass and excess wood materials, such as converting sawmill waste into energy or utilizing as a feedstock for fuel production.

Climate adaptation technology for forestry operations to enhance resilience, reduce forest stress, and maintain yield and forestry health in a changing climate.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Climate Adaptation Technology for Evolving Environmental Conditions

Countries like Finland and Sweden have strong tech ecosystems focused on forestry, with emerging technologies for improving resilience in forests. Germany, Portugal, and Spain are also making advancements in this area with relevance in Canada.

Technologies to Gather and Utilize Forest Harvesting Residuals for Bioenergy

Technological innovations to optimize processes like pyrolysis and other bioenergy production methods are available in the EU.

Bioenergy with Carbon Capture and Storage (BECCS)

Europe has several BECCS demonstration projects, and BECCS is considered a key solution for reducing emissions in the region.

Electrification or Decarbonization of Forestry Operations (Harvesting Equipment and Transportation)

Emerging technologies in the EU include electric harvesting drones and automation technologies for forestry equipment.

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KEY SECTOR OVERVIEW
OIL & GAS

OIL & GAS

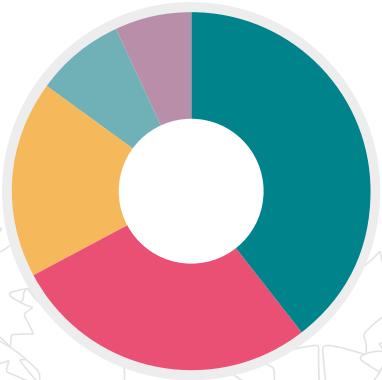
OVERVIEW

Canada's oil and gas sector remains a cornerstone of the national economy, contributing significantly to GDP and provincial revenues. The industry is undergoing a transformative shift, with increasing focus on sustainability, emissions reduction, and clean energy alternatives. With large-scale investments in carbon capture, renewable natural gas, alternative fuels, and electrification of operations, there is a growing demand for clean technology solutions. For cleantech providers, this is a pivotal moment to collaborate on technologies that help decarbonize Canada's energy landscape while maintaining its role as a global energy leader. The oil and gas sector includes extraction, distribution, refining, and upgrading of oil and gas products.

OIL & GAS REPRESENTS

- The world's fourth-largest producer of oil and the fifth-largest producer of natural gas.
- Canada's largest source of greenhouse gas emissions: 31% (217 million tonnes CO_2 equivalent) of Canada's total greenhouse gas emissions.
- A major role in Canada's economy: $71.4 billion annual GDP contribution, equivalent to over 3% of Canada's total, and $34 billion in provincial royalties.
- Significant water consumption: Production methods are highly water-intensive, with oil sands production requiring 0.4–0.6 barrels of water per barrel of oil and mining operations using 2–4 barrels of water per barrel of oil.

Emissions from Canada's Oil and Gas Sector



- 40% OIL SANDS
- 28% NATURAL GAS PRODUCTION & PROCESSING
- 18% CONVENTIONAL OIL PRODUCTION
- 8% PETROLEUM REFINING
- 7% TRANSMISSION & DISTRIBUTION

Source: Environment and Climate Change Canada. (2024). National Inventory Report, 1990–2022: Greenhouse Gas Sources and Sinks in Canada. Available online at: canada.ca/ghg-inventory

DRIVERS & LEADERSHIP

- Canada's oil and gas sector is undergoing significant transformation and diversification due to a suite of policies aimed at promoting sustainability and reducing emissions.
- The sector is forecast to contribute the greatest magnitude of emissions reductions by 2030, totalling 100 million tonnes CO_2 equivalent.
- Carbon pricing is incentivizing energy efficiency and low-carbon innovation.
- Canada's clean fuel standard is spurring investments into biofuels production and integration.
- The Carbon Management Strategy is catalyzing interest in carbon capture technologies.
- Companies are seeking new methane detection and mitigation technologies to meet Canada's goal of reducing methane emissions from the sector by 75% by 2030.
- Canadian oil and gas companies continue to invest heavily in low-carbon energy and clean technology; Canada's largest oil and gas companies are working together through the Pathways Alliance and other coalitions to advance CCUS and other clean technologies.

CLEANTECH CHALLENGE AREAS

Addressing methane emissions from venting, fugitive leaks, and area sources through advanced detection and monitoring technologies.

Enhancing leak detection and monitoring systems for methane and CO_2 emissions from oil and gas pipelines.

Repurposing pipeline infrastructure to transport hydrogen and CO_2, addressing challenges like hydrogen embrittlement and leak detection.

Low-carbon fuel production processes such as autothermal reforming for blue ammonia, electrolysers for green hydrogen, and integrating biomass feedstocks in refineries.

Reducing water use and improving reclamation efficiency in mining operations.

Exploring non-steam alternatives (electrical, chemical, or electromagnetic) to improve bitumen extraction efficiency and reduce environmental impact.

Alternative uses for bitumen such as carbon fiber, asphalt binders, and energy carbons for energy storage technologies.

Capturing and storing CO_2 from production and processing facilities; operational challenges include high energy use, storage capacity, infrastructure requirements, and costs.

Advanced devices and coating technologies to reduce scaling and fouling in heat exchangers and improve operational efficiency.

Alternative seismic exploration techniques to minimize land disturbance and biodiversity impacts.

Digital technologies (AI, big data, IoT) to improve operational efficiency, decision-making, safety, and sustainability through real-time monitoring and predictive maintenance.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Low Carbon/Renewable Fuels Production and Integration

Many solutions for advancing renewable fuels and bioenergy have been identified in the EU. Hydrogen is a key component of the EU's energy transition strategy and a particular area of opportunity with established solutions providers.

Water Recycling and Reduction

The EU has developed water recycling and reduction technologies that could be tailored to oil & gas operations.

Heat Exchanger Fouling Mitigation

Several EU-funded research projects are exploring advanced devices and coating technologies.

Carbon Capture, Utilization & Storage (CCUS)

Increasing focus on fuels production in the EU with expanding market players.

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KEY SECTOR OVERVIEW
TRANSPORTATION

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TRANSPORTATION

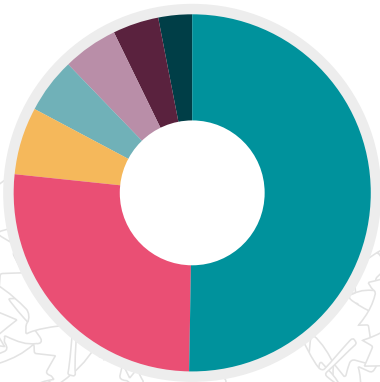
OVERVIEW

Canada's transportation sector is a vital part of the economy, facilitating the movement of goods and people across vast distances through roads, rail, aviation, and marine. As one of the largest countries in the world, Canada's transportation infrastructure is key to connecting cities, provinces, and international markets. The transportation sector is undergoing a significant transformation with a focus on reducing emissions and enhancing efficiency through the adoption of clean technologies. With a strong emphasis on electric vehicles (EVs), hydrogen fuel cells, sustainable biofuels, and intelligent transportation systems, Canada is advancing towards a low-carbon future. Supported by federal and provincial policies aimed at achieving net-zero emissions, the sector presents substantial opportunities for clean technology providers to contribute to the development and deployment of innovative solutions across road, rail, marine, and aviation. The transition to sustainable transportation is a critical area of focus, offering a promising landscape for technology-driven solutions.

TRANSPORTATION REPRESENT

- Canada's 2nd largest source of emissions, 22% of total emissions.
  - 156 million tonnes of CO_2 equivalent annually.
  - Passenger transport accounts for the largest share at 58% of emissions, while freight accounts for 33% of emissions.
- $81.4 billion annual GDP contribution (3.9% of Canada's GDP).

Emissions from Canada's Transportation Sector



- 50% ROAD, LIGHT-DUTY
- 26% ROAD, HEAVY-DUTY
- 6% PIPELINE
- 5% OFF-ROAD
- 5% AVIATION
- 4% RAIL
- 3% MARINE

Source: Environment and Climate Change Canada. (2024). National Inventory Report, 1990-2022: Greenhouse Gas Sources and Sinks in Canada. Available online at: canada.ca/ghg-inventory

DRIVERS & LEADERSHIP

- Transportation is a key focus for climate mitigation, and fuels must be low carbon or non-emitting to reach Canada's net zero targets.
- Policies are centered around a shift from fossil-based fuels to alternative fuel and propulsion technologies such as biofuels, hydrogen, and electric vehicles.
- A suite of complementary policies (Canada's clean fuel standard, carbon pricing, electric vehicle mandates, and targeted funding for biofuels production) is increasing the cost of fossil-based fuel production, incentivizing the shift to decarbonized transportation.
- The Emissions Reduction Plan mandates 100% zero-emission vehicles for light-duty vehicle sales by 2035 and 35% zero-emission medium/heavy-duty vehicle sales by 2030.

CLEANTECH CHALLENGE AREAS

Battery technology to enhance the range and efficiency of long-haul and heavy-duty electric trucks.

Hydrogen-powered fuel cell electric vehicles for long-haul and heavy-duty transport, along with advancements in electrolysis, alternative hydrogen production methods, and fueling infrastructure.

Innovations in engine compatibility and performance to facilitate greater integration of biofuels such as renewable diesel into fuel streams.

Feedstock processing and production methods for Sustainable Aviation Fuel (SAF) derived from renewable feedstocks.

E-methanol, produced using renewable hydroelectric resources, is a key area of interest for maritime decarbonization. Scaling production involves reducing electrolysis and DAC costs, alongside integration of renewable energy use.

Low carbon ammonia for zero-emission vessels. Scaling CCS-enabled ammonia requires efficient systems, renewable energy integration, and secure CO_2 sequestration.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Decarbonization of Heavy-duty Fleets

EU policy leadership in ICE phase-outs and vehicle mandates is driving innovation in electric heavy-duty vehicles. Most major HDV OEMs have released electric alternatives with potential for Canadian adoption.

Engine Tech to Accommodate High % of Alternative Fuels

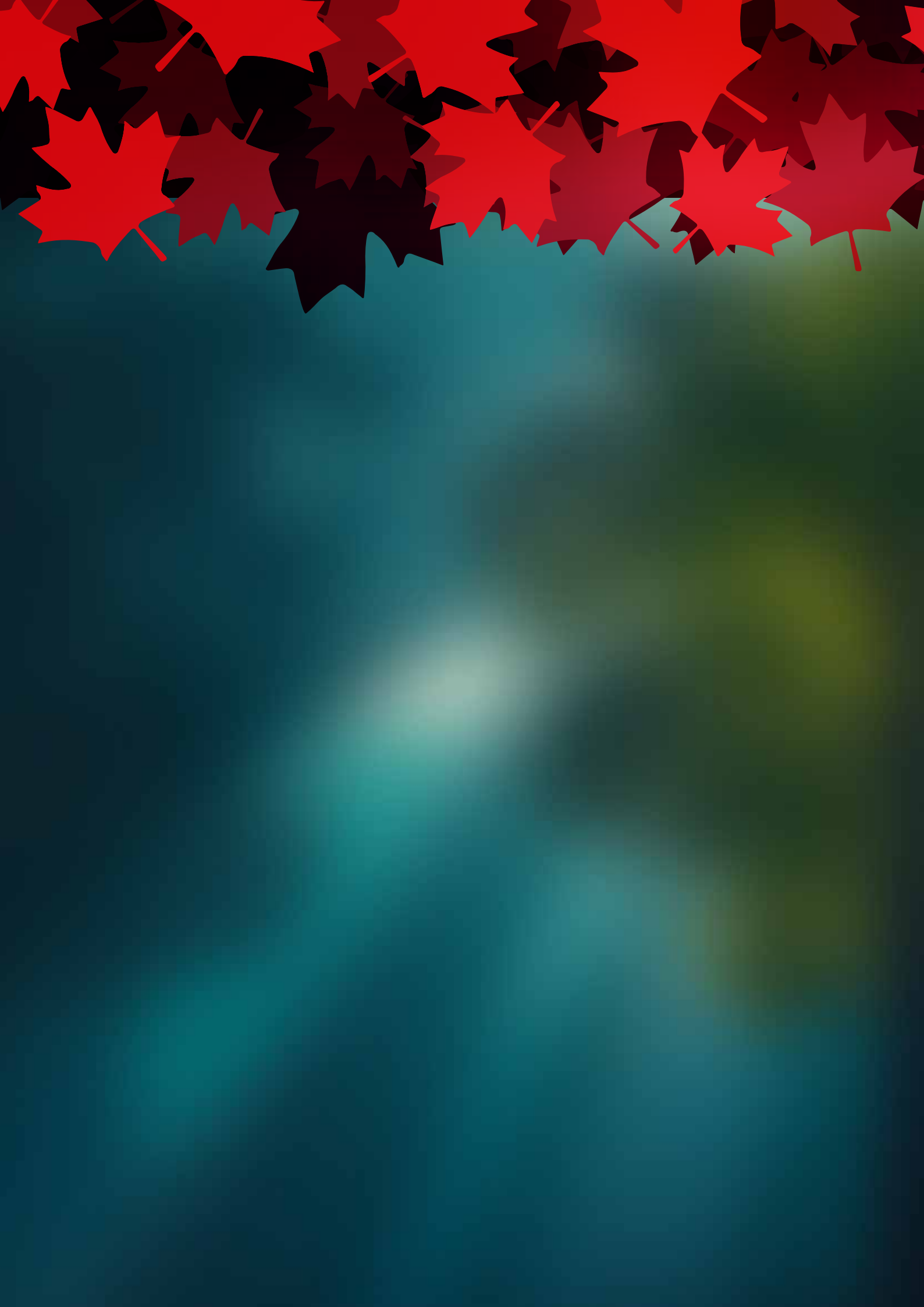
There has been notable progress in the EU, especially in the maritime sector, with EU OEMs developing engines capable of using alternative fuels. Additionally, off-road HDVs could be a market for EU technology.

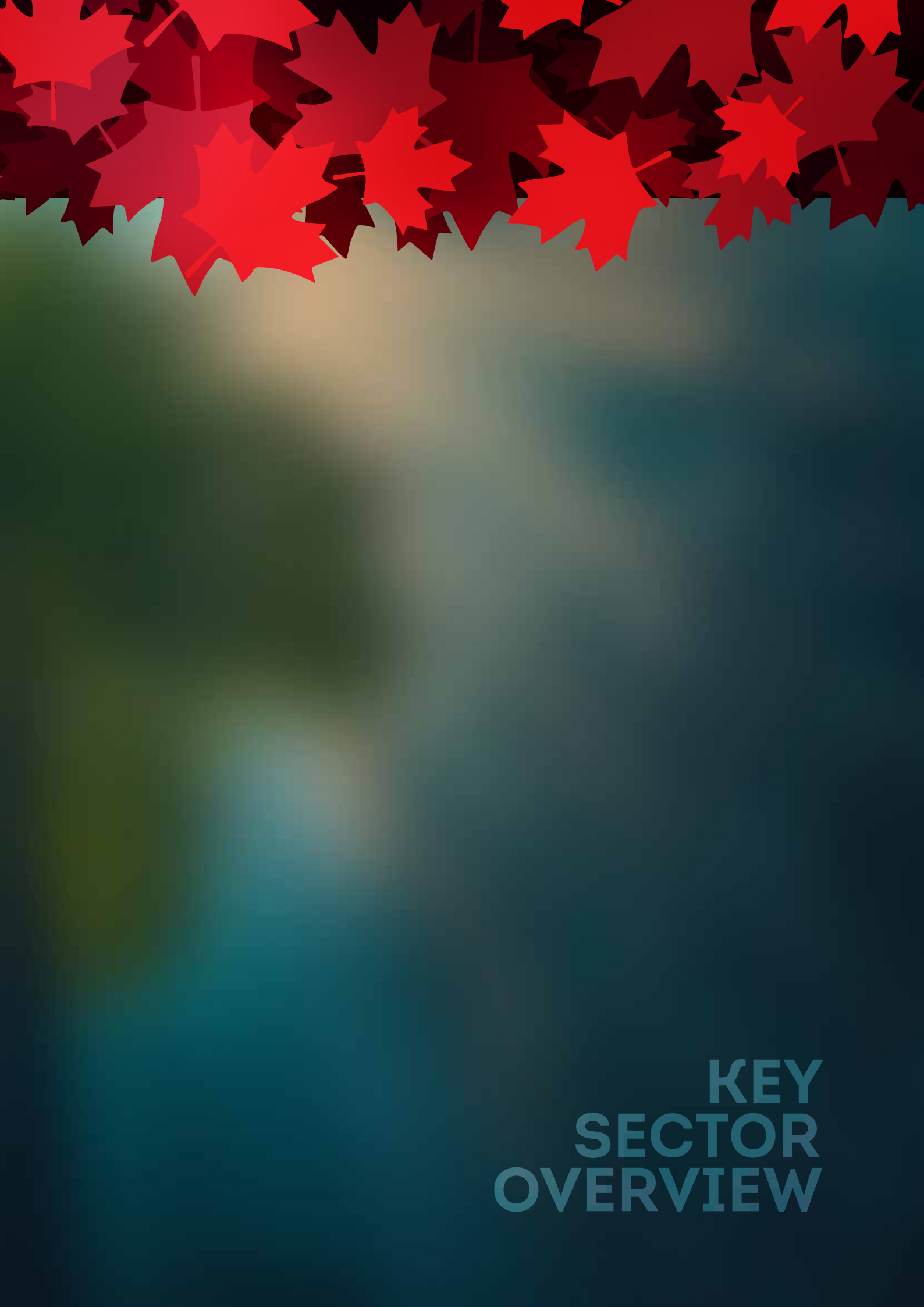
Transportation Infrastructure and Vehicle Electrification

Countries like Germany, the Netherlands, and France have made progress in building electric vehicle infrastructure, including expanding HDV charging networks, with expertise to be leveraged.

Fleet Advanced Logistics and Data Analytics

Urban areas in Europe are increasingly integrating fleet analytics, particularly in waste management.





KEY SECTOR OVERVIEW