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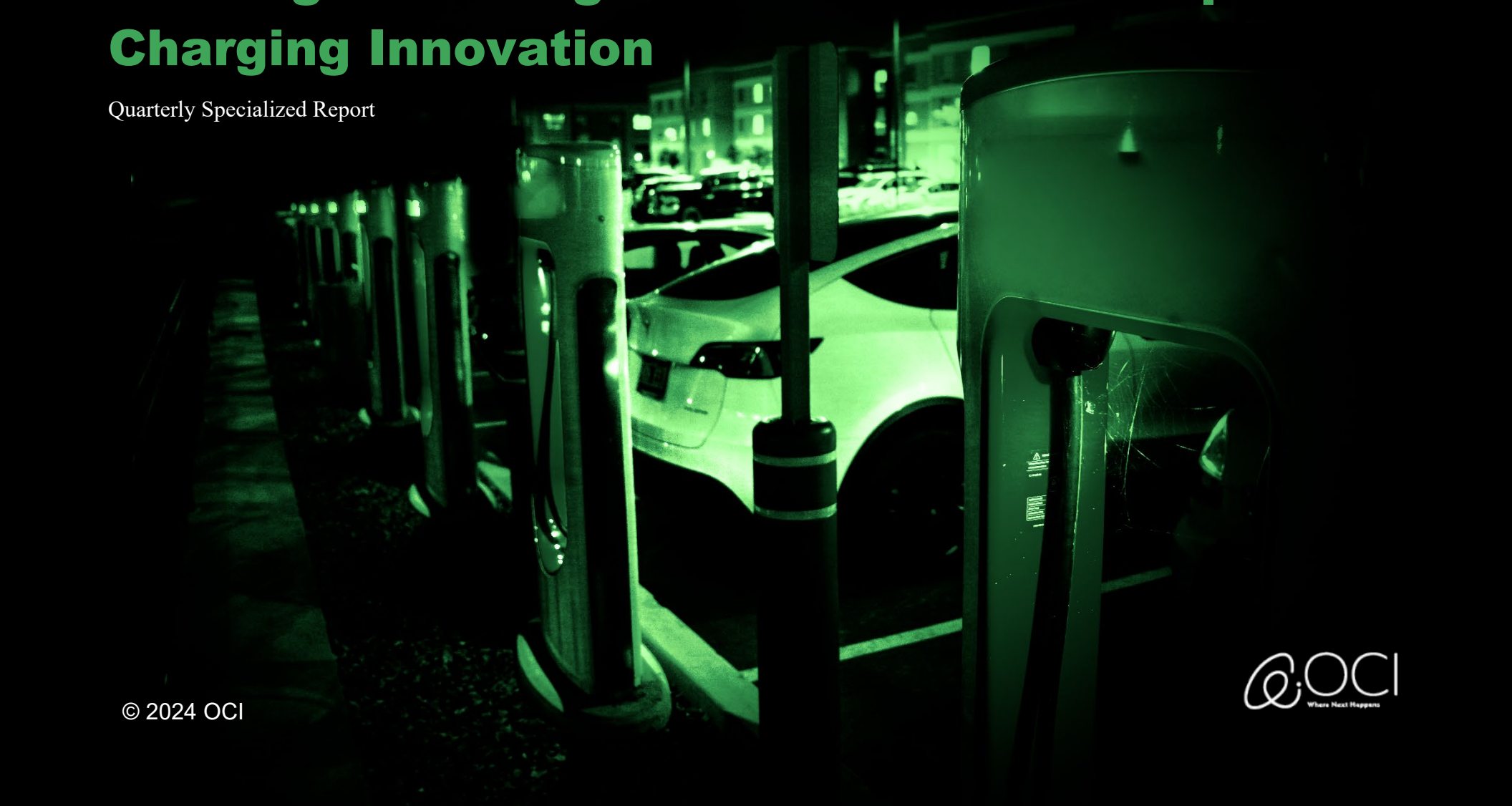
Ontario

OVIN INSIGHTS
Specialized Series

Executive Summary:

Leading the Charge: Ontario's Leadership in EV Charging Innovation

Quarterly Specialized Report



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Executive Summary

The electric vehicle (EV) charging industry has expanded rapidly in recent years, along with global ambitions to decarbonize the transport sector. EV chargers are essential to the development of the EV market – without sufficient charging infrastructure, the electrification of transport would not be able to keep pace with demand. This global expansion is pushing technological innovations, with EV charging organizations exploring opportunities for faster charging, wireless charging, and smart charging, and looking at how charging solutions can unlock opportunities for the sector.

It is predicted by the International Energy Agency that there may be approximately 240M EVs on roads globally by 2030. In Canada alone, Transport Canada predicts there may be 4.6M light-duty EVs on the road by 2030. This trend is supported by the mandatory target set by the Canadian government for 100% of new light-duty car and passenger truck sales to be zero-emission by 2035.

In order to meet this demand, Canada is expected to need up to 469K public EV chargers by 2035. Currently, the federal government's EV charging infrastructure targets are 84,500 chargers to be deployed by 2029. Federal policies related to EVs and their charging infrastructure are building a foundation for a strong industry and robust network across Canada.

Ontario is at the forefront of the EV charging industry, supported by its significant history as a leader in the automotive market. The province has a robust and well-connected ecosystem – including leading Original Equipment Manufacturers (OEMs), manufacturers, service providers, and research institutions – which is driving the implementation of standardized and efficient EV charging solutions, providing significant advantage in the EV revolution.

This report presents an overview of the EV charging industry and examines Ontario's current position and opportunities for growth. This report also highlights emerging EV charging technologies and discusses global trends, current initiatives within the province, and identifies opportunities for Ontario to lead the charge in advancing the EV charging industry.

An Overview of Charging Technologies

EV chargers provide electricity to the on-board batteries of EVs and plug-in hybrid electric vehicles (PHEVs). Available EV chargers fall into three categories:

- Level 1 – slow charging, standard domestic electrical outlet primarily found in residential settings.
- Level 2 – specialized domestic charging infrastructure, also commonly used for workplace and public charging.
- Level 3 – specialized fast chargers, generally found in dedicated public charging stations.

These different charger types have different power ratings and charge times. All EVs, and most PHEVs, are compatible with all charging levels.

EV charger types

	Level 1	Level 2	Level 3 DC Fast Charger
			
Input	120 V	208-240 V	480V
Outlet type	Standard electrical outlet (phone)	Special electrical outlet (stove or dryer)	DC outlet (not found in homes)
Time to charge*	8-50+ hours	4-10 hours	25-30 minutes
Range* (per hour of charging)	3 km to 8 km	16 km to 50 km	Up to maximum driving range of vehicles
Typical power output	1 kW	7 kW- 19kW	50 kW- 350 kW
Typical uses	Home charging and backup situations	Home charging, at business and public spaces	Charging at dedicated stations, public spaces, and highway

*The amounts shown are estimates only and assume 80% charging level limit

Standard Technology

There are currently two main types of EV chargers – alternating current (AC) chargers and direct current (DC) chargers. AC chargers provide electricity through Level 1 and Level 2 chargers, whereas DC chargers, also referred to as Level 3 fast chargers, provide a much faster charging rate.

In addition to the different charger types, there are also a variety of EV charging connectors available. These are dependent on the make and model of the EV. The majority of EV chargers and vehicles have a standard connector known as the SAE J1772, which is compatible with any Level 1 or Level 2 EV charger in Canada and the United States. For Level 3 fast chargers, there are three connector types available: SAE Combo connector, CHAdeMO (only used by Nissan and Mitsubishi), and the North American Charging Standard (NACS) connector.

Alternative Mobility Types

The EV offering has expanded over the past few years to cover different types of mobility, with different types of EVs having different charging requirements. A selection of these is outlined below.

Micromobility charging

Electric micromobility refers to any small, low-speed, electric transport device, such as e-bikes and e-scooters. These types of devices are generally charged using household 120-volt AC outlets, with charging times ranging between 2.5 and 9 hours.

Electric bus charging

Battery electric buses (BEBs) can be categorized as either long/extended range – larger battery packs (250-660 kilowatt-hours [kWh]) which only need to be charged once or twice per day – or fast charge – smaller battery packs (50-250 kWh) that require more frequent high-powered charges.

There are three types of charging infrastructure for BEBs; plug-in charging (both AC and DC options), overhead conductive charging, and wireless inductive charging (via floor-mounted charging pads).

Heavy-duty vehicle charging

The market for medium- and heavy-duty EVs is expanding, with nearly 840 models on offer. Of these, over 90% are battery electric, and they rely on off-shift charging for the majority of their energy.

For these types of EVs, overnight plug-in charging is the most convenient method due to slow charging being cheaper than fast charging.

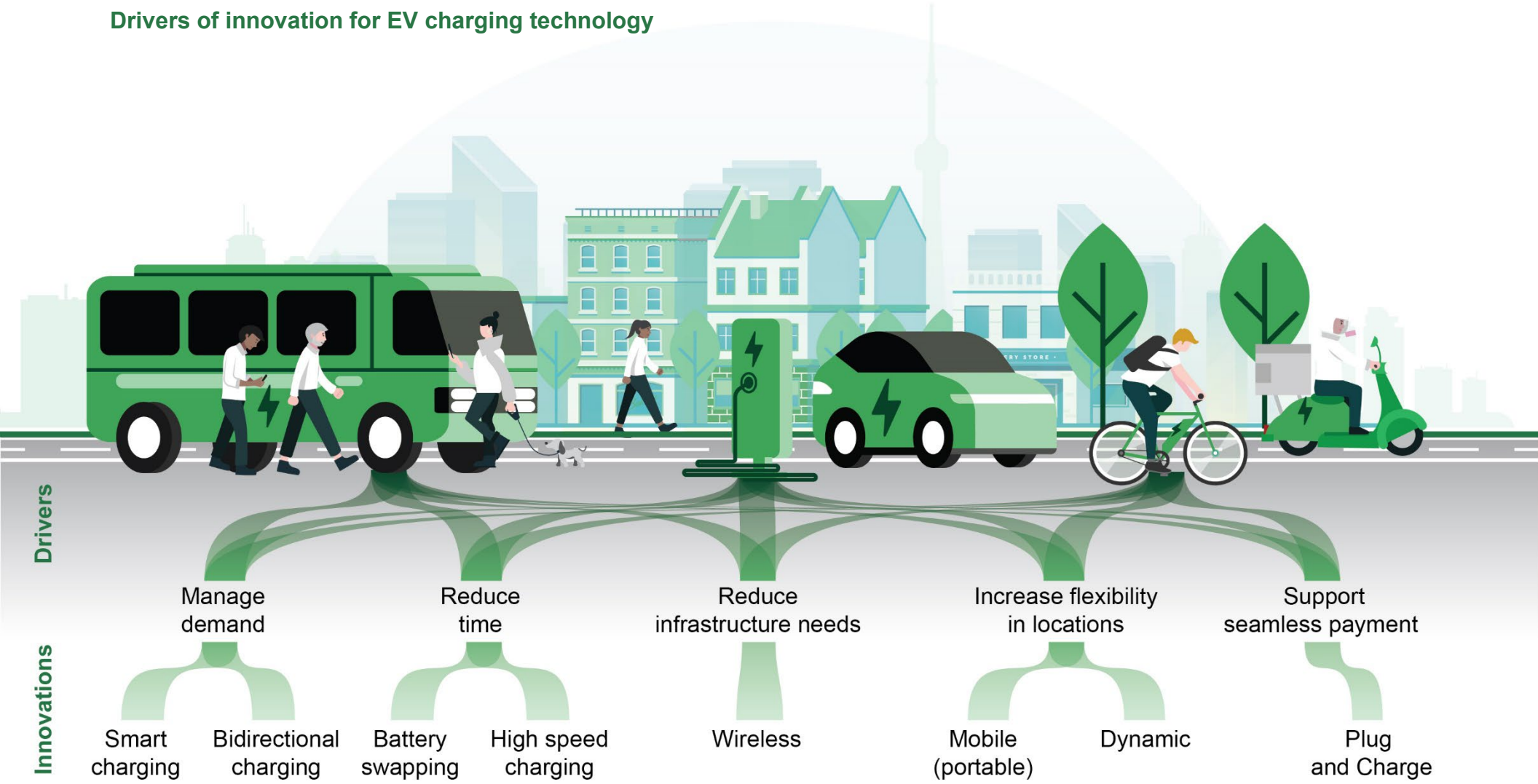
Train charging

Electric trains currently have three ways in which they can be powered: battery, diesel hybrid engine, and overhead electric lines. Recent innovations in battery technology have resulted in batteries which can be charged whilst a train is running on electricity from overhead lines, and which can harness the energy from a train braking.

Emerging Technology

An increased demand in EVs and the resultant requirement for charging to meet consumer expectations have led to a surge in technological innovation and emergent charging technologies. Additional factors include the need to manage demand on the electricity grid (through technologies such as smart charging and bidirectional charging), reduce the time taken to charge an EV (through high-speed charging or battery swapping), reduce the need to install charging infrastructure and increase flexibility (through, for example, wireless or portable charging), and support a seamless charging and payment experience (through the introduction of technologies such as Plug and Charge).

Drivers of innovation for EV charging technology



Global Drivers of Change

Demand for EV charging infrastructure is forecast to increase due to its necessity in the expansion of the EV market, and its role in the transition to net zero worldwide. This increased demand may require increased capacity of power grids around the world, with consumers pushing for a faster, more convenient charging experience. Additionally, the emergence of new EV markets and legislation to promote uptake and drive expansion of EV charging infrastructure is having an impact worldwide.

In this context, several overarching trends that are shaping the EV charging industry are detailed below.

Increasing demand for EVs

Demand for EVs, and the charging infrastructure which enables their use, is expected to grow over the coming years. In 2022, there were over 26M EVs on the road, with EV car sales exceeding 10M – an increase of 55% relative to 2021. It is predicted by the International Energy Agency that there may be approximately 240M EVs on roads globally by 2030. The global EV charging station market was valued at USD $12B in 2022 and is anticipated to expand to USD $141B by 2030.

Grid capacity

A core strategy in global ambitions to mitigate climate change and achieve net zero is the electrification of vehicles and increasing the percentage of electricity generated from renewable sources. However, it is expected that in order to meet charging demand at peak times, such as in the evening when vehicles are plugged in at the end of the working day, new power plants may be required.

Consumer expectations

Consumers have anxieties related to charging which is causing many to delay the switch to an EV. The time it takes to charge an EV is a concern for many (46%), along with the availability of charging stations (44%). In Canada, nearly 70% of people cite concerns around the availability and reliability of public EV charging stations. Additionally, 78% of Canadians have concerns around the pace at which battery technology is evolving in order to meet low-emission targets.

"Having attracted over $28 billion in automotive investments in the last three years, our province is a leading jurisdiction in the global production and development of EVs. By making it easier to build public charging infrastructure, our government is supporting Ontario's growing end-to-end EV supply chain and ensuring EV drivers can confidently and conveniently power their journeys."

- The Honourable Victor Fedeli, Ontario Minister of Economic Development, Job Creation & Trade

Access to charging infrastructure

The majority of EV drivers would prefer to charge their vehicle at home, but for those living in densely populated areas this isn't always an option. For EVs to be accessible to a wider audience, access to public and workplace charging is imperative. Globally, the number of public EV chargers has increased significantly; from nearly 315K slow chargers and just over 100K fast chargers in 2017, to nearly 1.8M slow chargers and over 895K fast chargers in 2022.

Heavy-duty vehicle charging

There is a growing market for electric heavy-duty vehicles. Nearly 66,000 electric buses and 60,000 medium- and heavy-duty EVs were sold worldwide in 2022 – around 4.5% of all bus sales and 1.2% of all medium- and heavy-duty vehicle sales worldwide. To enable this market to continue to grow, there is a requirement for charging to support long-distance applications through a combination of 'off-shift' slow charging, and 'mid-shift' fast charging.

Policy framework

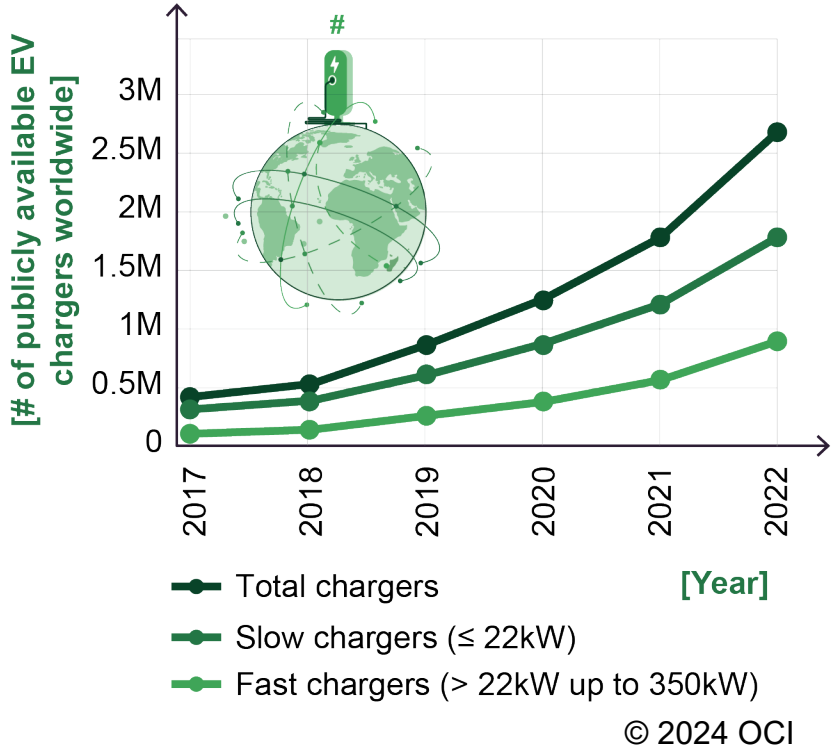
EV adoption

Globally there has been a drive by governments to encourage the uptake of EVs. Policies have been established worldwide to promote their use in order to meet net-zero emissions targets.

EV charging

In addition to policies around the adoption of EVs, governments around the world have also begun to introduce policies related to charging infrastructure.

Global public chargers



~1.8M
The number of public slow chargers globally in 2022

895K+
The number of public fast chargers globally in 2022

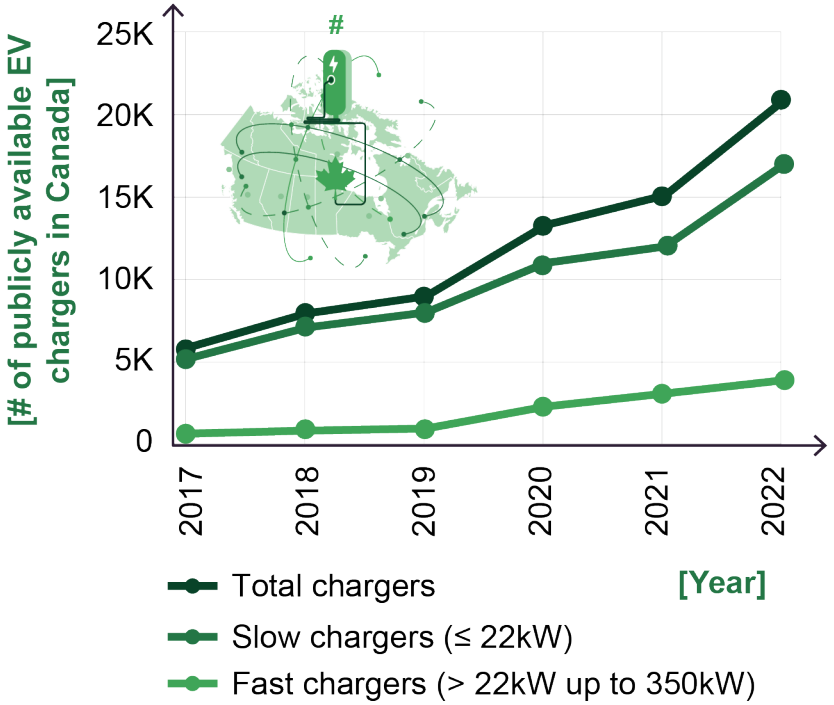
Canada’s EV Charging Trends

As of December 2023, Canada had over 10K public charging stations which provided access to over 21K Level 2 ports and over 4K Level 3 fast charging ports. The availability of these charging stations varies across provinces. In order to meet demand, Natural Resources Canada estimated that the number of public Level 2 and Level 3 charging ports may need to increase to between 727K and 914K by 2050. Federal policies related to EVs and their charging infrastructure are building a foundation for a strong industry and robust network across Canada.

State of play

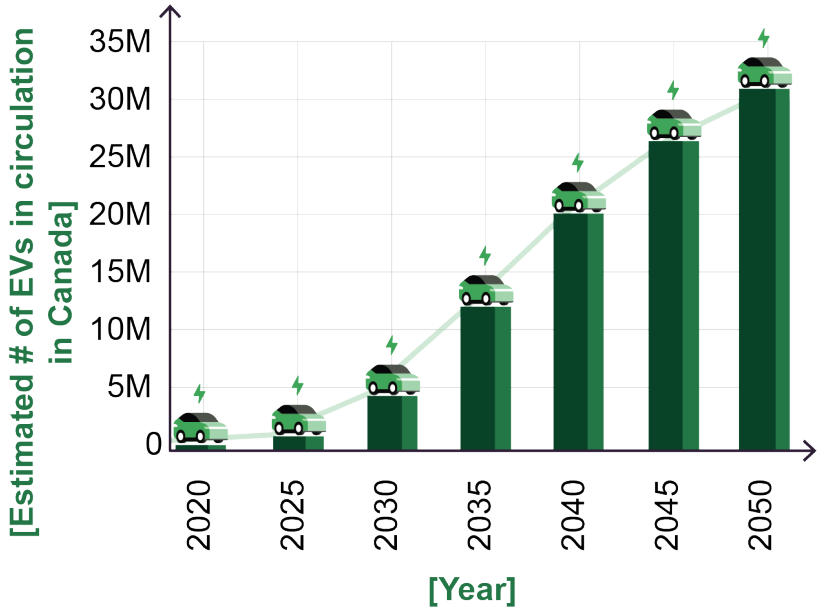
Public chargers in Canada

Canada has seen growth in the availability of public EV chargers, with a rise from nearly 6K in 2017 to nearly 21K in 2022.



EVs in Canada

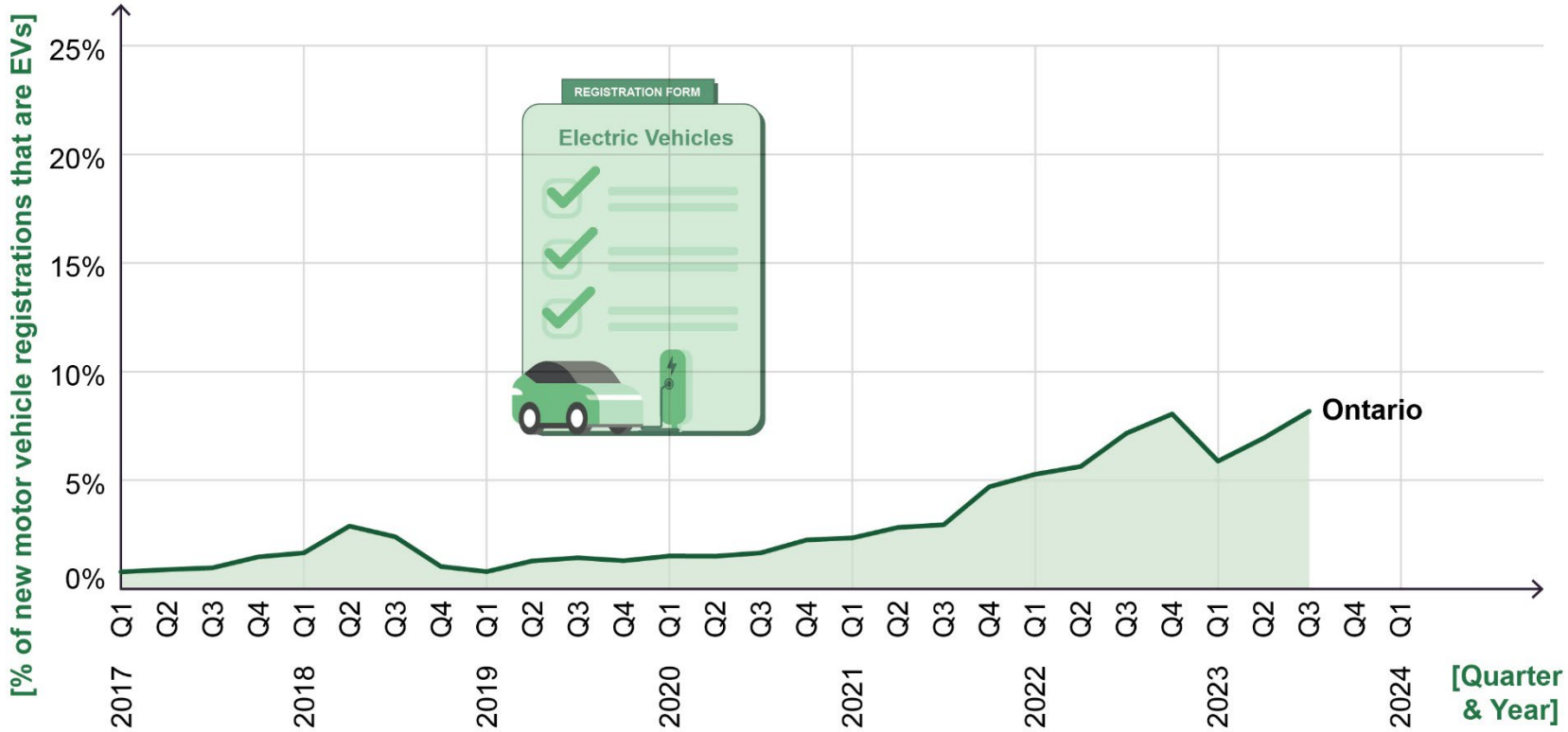
The number of EVs in circulation in Canada is expected to increase substantially over the coming years, from around 1.02M in 2025 to over 31M in 2050.



New EV registrations

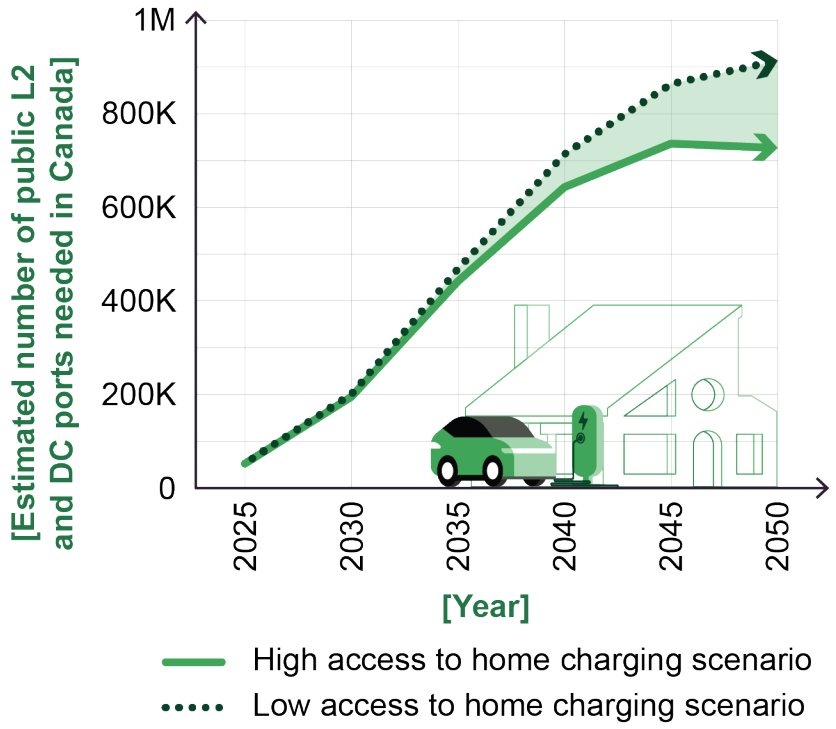
In line with the increase in EV chargers, Canada has seen an increase in new motor vehicle registrations that are EVs across all provinces since 2017, and these numbers are expected to continue to rise.

Between 2017 and 2023, the percentage of new motor vehicle registrations that are EVs increased in Ontario from approximately 1% to approximately 8%.



Estimated charger need

Based on a scenario where people across Canada have a high level of access to home charging, it is anticipated that the number of public Level 2 and DC charging ports will need to increase from around 52K in 2025 to around 727K in 2050. Under a scenario where there is a low level of access to home charging for people across Canada, these numbers would be higher – from 53K in 2025 to 914K in 2050.



Federal policies

Across Canada, several policies and programs have been put in place to further the uptake of EVs and make charging more accessible. A selection of these is outlined below:

- Zero Emission Vehicle Infrastructure Program (ZEVIP)
- Incentives for Zero Emission Vehicles Program (iZEV)
- Incentives for Medium- and Heavy-Duty Zero Emission Vehicles Program (iMHZEV)
- Canada's Electric Vehicle Availability Standard
- Measurement Canada kWh Billing Temporary Dispensation

Network expansions

There has already been a substantial amount of investment across Canada to develop the EV charging network, with plans in place to invest significantly more to develop the network further.

In May 2023, the federal government announced a partnership with the United States government to designate a binational EV charging corridor. This corridor is planned to extend between Kalamazoo, Michigan and Quebec City, Quebec, with Level 3 fast chargers approximately every 80 km.

In Ontario, the government of Ontario launched the EV ChargeON program in 2023, which will enable thousands of new charging stations to be built across the province.

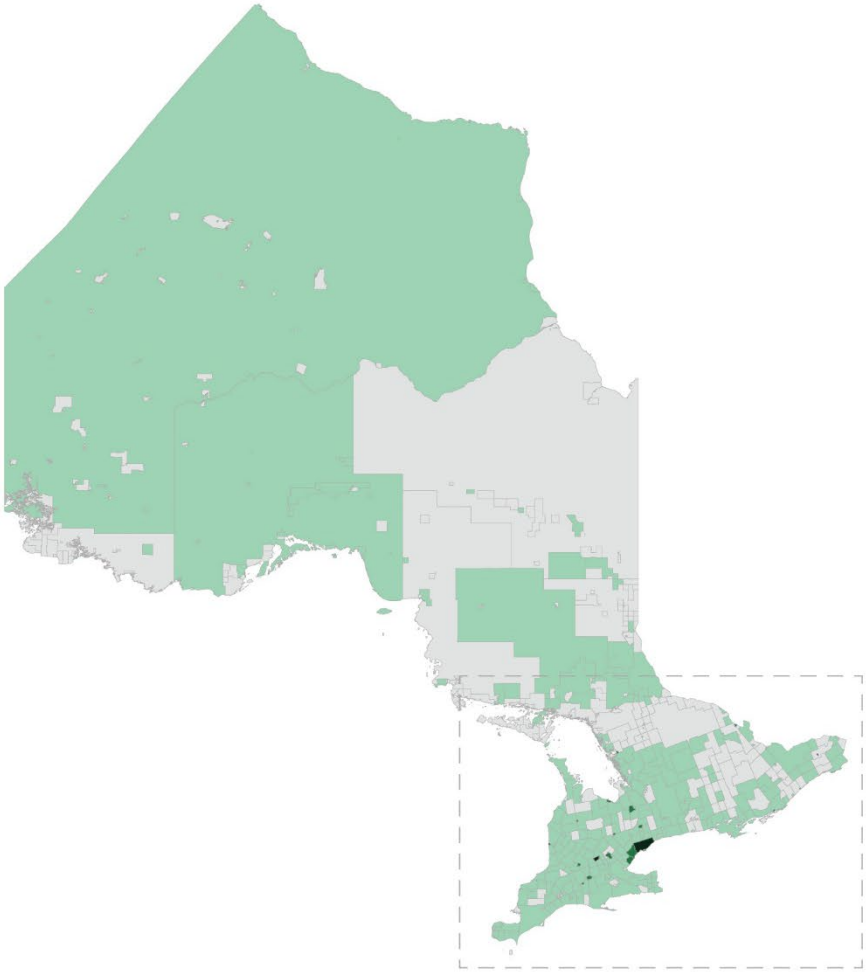
Ontario's Unique Position in the EV Charging Industry

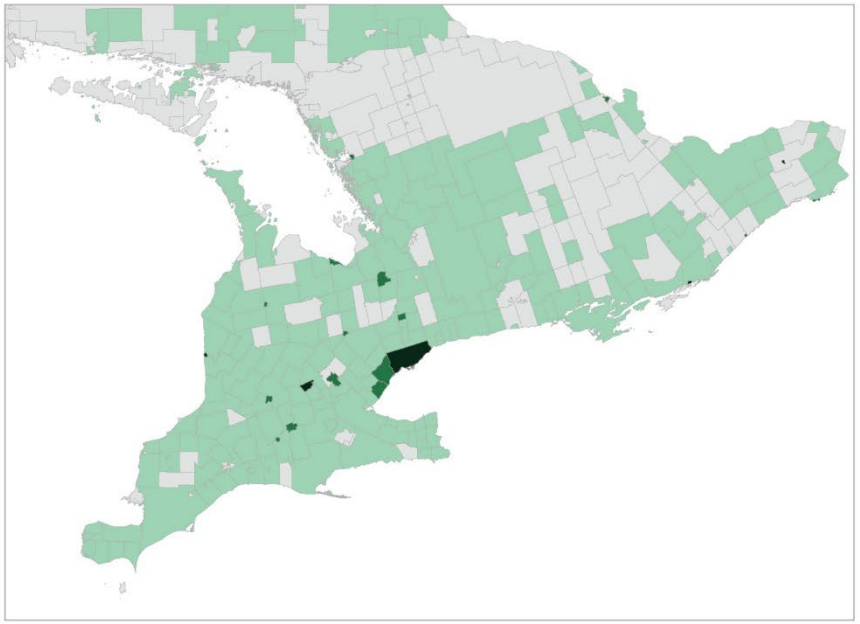
Ontario is at the forefront of the EV charging industry, supported by its significant history as a leader in the automotive market. The province has a robust and well-connected ecosystem – including leading Original Equipment Manufacturers (OEMs), manufacturers, service providers, and research institutions – which is driving the implementation of standardized and efficient EV charging solutions, providing significant advantage in the EV revolution.

State of play

There are approximately 135,000 EVs registered in Ontario, and the Ontario government estimates that there will be more than 1M by 2030. As of December 2023, there were more than 3K public charging stations in the province, with over 7K Level 2 charging ports, and over 1K Level 3 fast charging ports. Ontario's network of public chargers is currently concentrated in higher density, urban areas such as Toronto, with a smaller network distributed throughout more rural, lower density areas. There is potential to expand the network throughout much of northern Ontario.

Chargers in Ontario





Level 2 and Level 3 chargers per square km

- 0 chargers
- Less than 1 charger
- Between 1 and 2 chargers
- Over 2 chargers

OVIN Advanced Charging and V2G R&D Partnership Fund Stream

The Ontario Vehicle Innovation Network (OVIN) has launched a new Advanced Charging and V2G Stream under its R&D Partnership Fund. Through OVIN, the Ontario Government will provide small- and medium-sized enterprises (SMEs) up to $1M to develop advanced charging and V2G technologies and solutions that are critical to electrification and the transition to EVs. This new investment in Ontario's SMEs is essential to support the province's adoption of EVs while driving economic growth and exporting solutions across the globe. This stream includes technologies in the following Priority Areas:

- Advanced charging technologies, including wireless charging, high-speed charging, bidirectional charging, dynamic charging, and smart charging.
- V2G technologies, including technologies to support interoperability and scalability. Examples include vehicles equipped with bidirectional charging technology that enables EVs to discharge energy back into the grid when not in use, supporting grid stability and managing fluctuations in energy supply and demand.
- Energy demand and grid management systems. Examples include time-of-use pricing, off-peak charging, and smart charging software.
- Zero-emissions technologies relating to the integration of renewable energy within charging infrastructure, to potentially enhance the reliability and sustainability of the grid, such as solar, wind, small-scale hydroelectric systems and geothermal power technologies.
- Technologies that support system operability across the grid, vehicle and charging infrastructure, including cybersecurity solutions (e.g. network security and device authentication), connectivity and smart device solutions (e.g. anomaly detection, network management and preventative maintenance), and blockchain solutions (e.g. access management and transaction systems).
- Energy storage and transmission technologies relating to energy management and grid capacity. Examples include batteries for grid storage applications, hydrogen storage technologies including compressed hydrogen for grid integration, pumped hydro storage systems for large-scale and long-duration storage, and flywheels for rapid response times.

This program is structured to achieve multifaceted objectives for eligible projects, applicants, and partners. It aims to facilitate the commercialization of Ontario-made technologies and demonstrate them to potential customers, fostering relationships with researchers to extend company R&D efforts. Additionally, it seeks to promote marketable solutions and technologies, particularly in the realms of advanced charging and energy management systems, while fostering public/private partnerships. Beyond the immediate stakeholders, the program also aims to benefit society at large by promoting cleaner transportation, reducing environmental and carbon footprints, and realizing efficiencies and cost-savings in energy systems and infrastructure.

Spotlight:
EV ChargeON

The Ontario Ministry of Transportation (MTO) EV ChargeON program – a $91M investment program – opened for applications in October 2023. A significant number of applications were received. Funding decisions will be announced in spring 2024. OVIN is working with MTO to support and promote this initiative. The program's Community Sites Stream provides grant funding to eligible private and public sector entities to build thousands of new EV charging stations in communities with less than 170K people, as well as in any Indigenous community.

In conversation with MTO[1]

A key focus for MTO in delivering this program is reliability, and taking a cautious and considered approach to ensure the right solutions are applied in the right settings. Reducing range anxiety for Ontarians living in rural, remote, and northern communities was identified as a key area of focus. MTO hopes that the program will result in increased confidence for consumers.

MTO sees a key opportunity for Ontario in the innovation and testing of cold weather technologies and in developing a holistic, sustainable EV supply chain through its access to ethically sourced critical minerals within the province, via the Critical Minerals Strategy. MTO will be taking lessons from the delivery of EV ChargeON and is committed to exploring opportunities for future EV charging programs.

"Our government is paving the way towards an electric future by building the infrastructure needed to support the electrification of transportation across Ontario."

- The Honourable Todd Smith, Ontario Minister of Energy

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[1] Interview conducted with Mike DeRuyter and Tori Prouse, Ontario Ministry of Transportation

Provincial policies

There are a number of policies unique to Ontario which are helping to shape the EV charging industry and encourage uptake of EVs. These include:

- Driving Prosperity Phase 1 and Phase 2
- Green Licence Plate Program
- Ontario Job Creation Investment Incentive
- Reserved Parking for Electric Vehicle Act 2019

Key players in Ontario

There are a number of organizations providing EV charging products and services which are based in Ontario. A selection of these is outlined below.

- Jule
- Autochargers.ca
- Gbatteries
- SWTCH
- Daymak
- BluWave-ai
- Stromcore Energy Inc
- metroEV
- TROES
- Ettractive Inc.

Ontario's network

Ontario's charging network has grown significantly over recent years, with plans in place to continue its development. Hydro One and Ontario Power Generation (OPG) further developed the existing Ivy Charging Network – a fast charging network with 150 chargers across over 60 locations – by installing Level 3 chargers at all 20 renovated ONroute stations along the 400 and 401 highways. Additionally, in October 2023, the government of Ontario launched the EV ChargeON program. This program provides funding to build thousands of new EV charging stations in small and medium-sized communities.

Research in Ontario

Ontario is at the forefront of research and development (R&D) in the EV charging domain. Key research centres include the University of Toronto EV Research Centre (UTEV) and the Ontario Tech University Automotive Centre of Excellence (ACE). Additionally, the University of Windsor and McMaster University have both conducted research around the cybersecurity of charging infrastructure, and early detection of cyberattacks on fast charging stations. McMaster University's Institute for Transportation and Logistics (MITL) also has a research area focused on EVs.

Innovation in Ontario

Ontario is leading the way in EV charging technology advances, with numerous pilot projects and innovations taking place in the province. A selection of these is outlined below:

- **Blackstone Energy Services vehicle-to-grid (V2G) pilot** – working in partnership with Natural Resources Canada, this Toronto based organization is testing the V2G concept, which will enable EV drivers to get paid for sharing power from their EV battery with the facility they are parked at during peak electricity demand. They have bi-directional test chargers across the province, located at Fanshawe College, Brock University, and Georgian College.
- **eLeapPower** – based in Toronto, this tech company delivers a range of power conversion solutions to the mobility industry. In 2021, with support from OVIN, eLeapPower held a successful project demonstration of their wireless charging technology.
- **BluWave-ai and Hydro Ottawa EV Everywhere pilot** – in 2022, with support from the Independent Electricity System Operator (IESO) and the Ontario Energy Board (OEB), this Ottawa-based pilot used an AI software platform – EV Everywhere – to manage EV charging during peak demand periods.
- **TTC and PowerON Energy Solutions eBus charging pilot** – in 2023, Toronto Transit Commission (TTC) announced the installation of 10 eBus charging pantographs as part of a proof of concept at its Birchmount Garage in Scarborough. Delivered in partnership with the Ontario Power Generation subsidiary PowerON Energy Solutions, the pantographs enable overhead charging for the eBus fleet.
- **Blockchain-based EV charging pilot** – delivered in partnership between SWTCH Energy and Opus One Solutions, this demonstration involved two office buildings in downtown Toronto being used as a testing ground for two technologies – turning EVs into a power source for building residents and tracking energy usage and billing with blockchain technology.
- **HydroOne heavy-duty truck charging pilot** – in 2021, HydroOne received $4.95M via Natural Resources Canada's Green Infrastructure – EV Infrastructure Demonstration Program to develop a heavy-duty electric truck charging station pilot project. The aim of this pilot was to establish a model that could be used by other utilities and businesses.
- **Stromcore e-forklift charging investment** – the federal government invested $4.8M in Stromcore to launch two new products, including Turbo Bank – an advanced AI-powered charger with improved efficiency – and Electric Cart – a low-emission e-forklift. Both products have a fast-charging capability and the ability to work in cold environments.
- **Toronto Hydro Smart Charging Pilot Program** – in 2022 Toronto Hydro launched a pilot for residents of Toronto, in partnership with Plug'n Drive and Elocity Technologies Inc. Participants were given a free Hyper Integrated Electric Vehicle (HIEV™) EVPlug smart charging device, allowing them to control their EV charging schedule using a smartphone app. The overall goal of this pilot was to understand EV charging patterns and behaviours in Toronto, including duration, frequency, and time of charging.

Spotlight: Peak Drive V2G Pilot

In 2019, Peak Power delivered a large V2G pilot project in downtown Toronto. The demonstration featured 21 bidirectional chargers and Nissan LEAF vehicles in three commercial office buildings. The pilot used EVs and energy storage systems to reduce buildings' demand charges. The project found that there could be an estimated $8K in energy savings per EV per year.

In conversation with Peak Power[2]

V2G can support neighbourhood electricity grids, keeping them up and running and providing back up power in case of a power outage. Peak Power sees a role for V2G in alleviating the need for infrastructure in places that may not be connected to the grid, through a vehicle-to-building or vehicle-to-home model.

Range convenience was also raised as a key concept, whereby charging your EV becomes second nature, rather than having to plan ahead and identify locations with chargers. By improving the reliability and accessibility of the network, convenience for drivers can be improved.

From Peak Power's perspective, Ontario has a unique position in this field due to its leading role in automotive manufacturing, the availability of a local supply chain for battery production, and the presence of an electricity and clean tech sector that is supportive of startups, innovation, and pioneering new technologies.

[2] Interview conducted with Mabel Fulford, Peak Power Inc.

Spotlight: OVIN's Durham RTDS

OVIN's Durham Regional Technology Development Site (RTDS), namely Ontario Tech University's ACE, collaborated with Jule (previously known as eCamion) to develop end-to-end energy storage and fast charging technology. The Durham RTDS provided Jule with the ability to test battery and power electronics performance under a multitude of conditions, such as extreme temperatures, humidity, and icy conditions.

In conversation with Ontario Tech University[3]

New charging technologies are imminent, and so they need to undergo thorough research and development, and a rigorous testing phase. The Durham RTDS provides a crucial opportunity for the university to work closely with industry partners to test the effectiveness, efficiency, and practicality of charging methods – as demonstrated through the project with Jule.

Some of the key factors considered by the university – in close collaboration with industry partners – include charging speed, customer convenience, safety, and cost effectiveness. It was noted that a key aim is to ensure that research and findings are relevant and applicable to the current market landscape. The university sees reliability as foundational to the uptake of EVs, with a need for reliable, robust EV charging and battery technology.

From the university's perspective, Ontario is in an excellent position to be a world leader in the development of EV charging.

[3] Interview conducted with Prof. Sheldon Williamson, Ontario Tech University

OVIN supported project

Jule: Fast Charging System for Autonomous Vehicles

Through the OVIN Talent Development Internship/Fellowship Program, OVIN supported Jule in its efforts to increase its intake of electrical / software engineers in order to continue the production development and rollout of Autonomous Vehicle (AV) Fast Charging stations. This project supported the growth of the EV charging industry for AVs in Ontario.

eLeapPower: Wireless AV / EV Charging Project

As part of another Talent Development Internship/Fellowship Program, OVIN sponsored eLeapPower to explore the potential for accelerating electric connected vehicle (CV) and AV growth and market entry for advanced CV / AV technology. This project focused on the last mile infrastructure challenge associated with electric commercial vehicles, enabling EVs to charge wirelessly and autonomously.

SWTCH: Smart EV Charging for Multi-unit Residential Buildings

OVIN is currently supporting SWTCH, through the Talent Development Internship/Fellowship Program, to enable development of an innovative EV charging platform. This platform allows for intelligent EV charging management in multi-unit residential buildings, whilst managing EV charging loads to improve grid efficiency.

TROES and Day & Night Solar: Validation and Demonstration of Transportable EV Charging Station

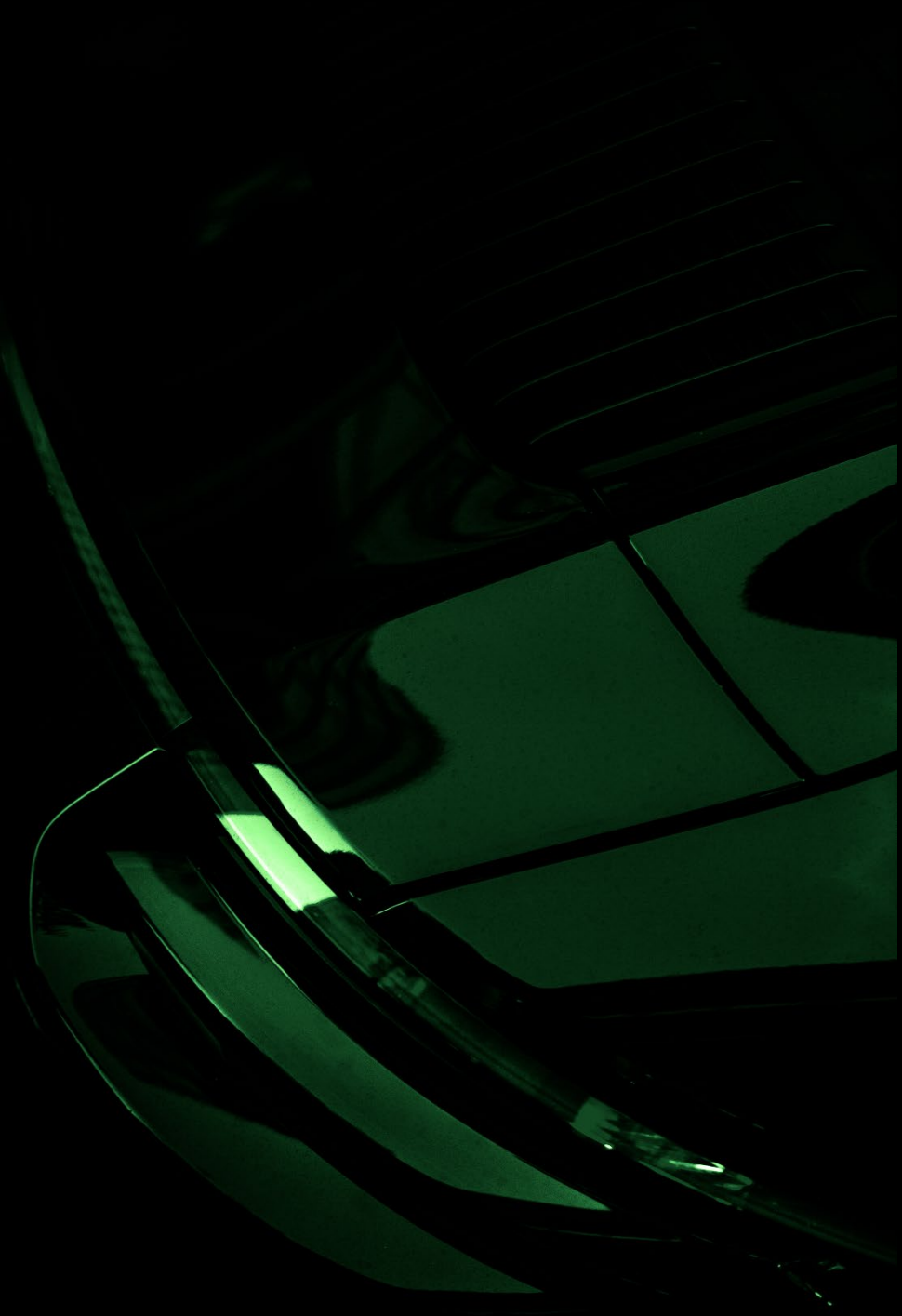
Delivered via OVIN's R&D EV Stream fund by TROES and Day & Night Solar – an American company – this project is developing a new type of high-capacity, fully portable, DC fast charging station, with batteries recharged from a 60 kilowatt (kW) solar array. The Battery Energy Storage System (BESS) collapses to the cubic size of a standard 53-foot flatbed trailer and is designed to stay within road weight limits, and the microgrid controller will operate through an algorithm that will manage the optimal power flow of the system. The proposed system can be in fast DC fast charging service as soon as it arrives at its site; it can also be grid tied for grid support and charging.

SmartONE, Conqora Capital and SWTCH: Smart EV Charging in Multi-Family Communities

Working in partnership, SmartONE Solutions Inc. (an Ontario-based company which specializes in smart buildings), Conqora Capital Partners Inc. (a private equity firm headquartered in Toronto), and SWTCH are delivering this project at the newly developed 16 Hamilton rental community in Ottawa, via OVIN's R&D EV Stream funding. They are combining technologies to develop a smart EV charging solution that will address the unique demands of multi-family developments. The smart charging feature will be made available through the SmartONE community app, where residents can actively view and manage the charging of their vehicle. In addition, the community will be equipped with charging stations which can be shared by residents and offered to visitors.

Future Opportunities

The EV charging industry is still in its early stages, continuing to grow and develop, hence there are many opportunities for governments and organizations to play a role in shaping its future. This not only includes through technological development, but also through improving the customer experience, increasing accessibility, and managing demand.



Continue to encourage technological development and commercialization

Ontario is in a prime position to leverage it's influence in the EV charging industry, particularly through the OVIN RTDS network and programs, including the advanced charging and V2G stream of the R&D partnership fund. The RTDS network supports SMEs to develop, test and prototype advanced technologies and leverage expertise around key focus areas, such as EV charging.

Additionally, Ontario can leverage the tech, battery, and EV focused organizations that call it home. As noted in the previous chapter, there are several companies doing important work in the EV charging sphere – conducting research and running pilots. Ontario can continue supporting these organizations in bringing their concepts and products to market and becoming commercially viable.

Simplify charging payment technologies

Consumers don't only want faster charging technology; they also want a simplified, consistent charging and payment experience. Currently a typical EV driver has to navigate a range of apps, cards, and accounts to use public chargers in different locations. Plug and Charge technology has begun to gain momentum as the solution to this, but there needs to be agreement between a range of actors – from OEMs to electricity networks, and EV station owners – before it can be universally adopted.

Ontario has the opportunity to promote, and make a reality, EV roaming – allowing EV drivers to access a wide range of public charging stations using their preferred payment method.

Ensure equitable distribution

EV charging networks tend to be concentrated in urban areas, meaning those living in more remote, rural areas do not have the same level of access to infrastructure. There is an opportunity for Ontario to bridge this gap, by installing more charging stations across the province, ensuring that all residents – no matter how remote their home is – have access to a public EV charger. Steps have already been made to address this issue with the ChargeON program offering a Community Sites Stream of funding.

Expand guidance and incentives

In order to ensure that a range of charging types are available and to encourage technological innovation, there is an opportunity for governments to encourage the implementation of desired forms of public and private charging infrastructure. This could include, for example, incentives for public sector organizations that encourage the installation of fast public chargers or for homeowners to install smart private chargers. In addition to incentivizing different technologies, there is also an opportunity to create guidance which promotes the adoption of best practice or streamlines implementation.

Manage demand on the grid

More broadly, considering the impact increased levels of EV charging is expected to have on the electricity grid, there are opportunities to expand clean energy provision and manage demand. Ontario can promote flexible demand and energy efficiency through leveraging technology such as smart and bidirectional charging.

About OVIN

OVIN is a key component of Phase Two of Driving Prosperity, the Government of Ontario's ambitious plan that positions Ontario as a North American leader in developing and building the car of the future through emerging technologies and advanced manufacturing processes. The Government of Ontario has committed an additional $56.4 million, for a total investment of over $141 million to date, through OVIN's innovative programming to support research and development (R&D) funding, talent development, technology acceleration, business and technical supports, and testing and demonstration.

OVIN, led by Ontario Centre of Innovation (OCI), is supported by the Government of Ontario's Ministry of Economic Development, Job Creation and Trade (MEDJCT) and Ministry of Transportation (MTO).

The initiative comprises five distinct programs and a central hub. The OVIN programs are:

- Research and Development Partnership Fund
- Talent Development
- Regional Technology Development Sites
- Demonstration Zone
- Project Arrow

The OVIN Central Hub is the driving force behind the programming, province-wide coordination of activities and resources, and Ontario's push to lead in the future of the automotive and mobility sector globally. Led by a dedicated team, the Central Hub provides the following key functions:

- A focal point for all stakeholders across the province;
- A bridge for collaborative partnerships between industry, post-secondary institutions, broader public sector agencies, municipalities, and the government;
- A concierge for new entrants into Ontario's thriving ecosystem; and
- A hub that drives public education and thought leadership activities and raises awareness around the potential of automotive and mobility technologies and the opportunities for Ontario and for its partners.

To find out the latest news, visit www.ovinhub.ca or follow OVIN on social media @OVINhub

OVIN Objectives

	Foster the development and commercialization of Ontario-made advanced automotive technologies and smart mobility solutions.
	Showcase the Province of Ontario as the leader in the development, testing, piloting and adoption of the latest transportation and infrastructure technologies
	Drive innovation and collaboration among the growing network of stakeholders at the convergence of automotive and technology
	Leverage and retain Ontario’s highly skilled talent, and prepare Ontario’s workforce for jobs of the future in the automotive and mobility sector
	Harness Ontario’s regional strengths and capabilities, and support its clusters of automotive and technology

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Disclaimers

This report was commissioned by the Ontario Centre of Innovation (OCI) through a Request for Proposals titled “Ontario Vehicle Innovation Network (OVIN) – Annual Comprehensive Sector Report & Quarterly Specialized Reports,” dated August 25, 2023, and has been prepared by Arup Canada Inc. It is one of five reports covering an analysis of Ontario’s automotive technology, electric vehicle and smart mobility landscape while incorporating implications for the sector’s skills and talent landscape.

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