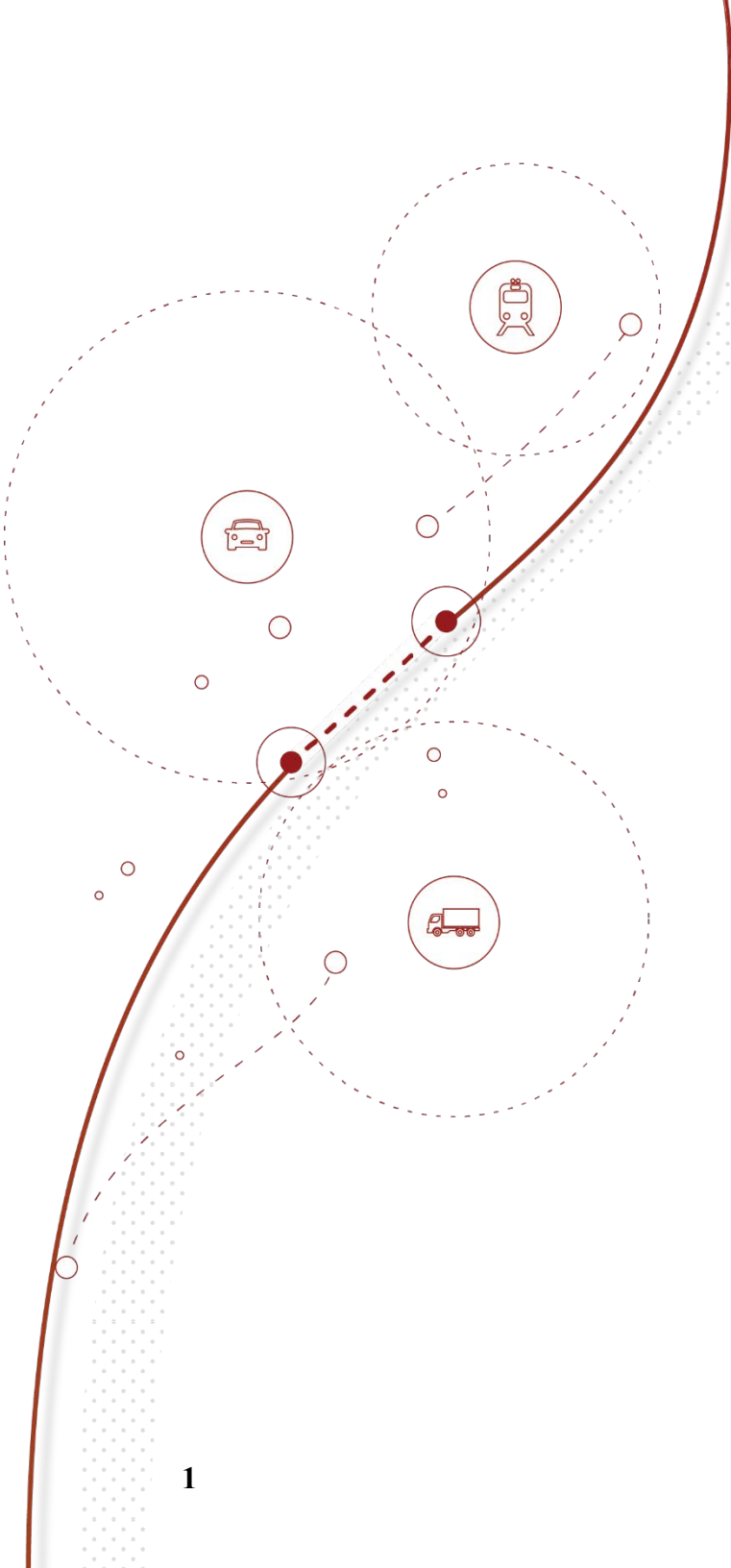


Executive Summary Connecting the Dots for Cross-Border Automotive and Smart Mobility Strategies

Quarterly Specialized Report



"This pioneering collaboration illustrates the combined strengths of Ontario and Michigan as innovation partners at the leading edge of electric, connected, autonomous and mobility technologies. This forward-looking approach is essential to ensure our region remains at the forefront of a global industry that is fiercely competitive and continually subject to the forces of technology disruption."

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



Executive Summary

The cross-border movement of people and goods is a key driver of economic growth. Canada's ports of entry play a major role in cross-border movement, facilitating both international trade and tourism. As trends towards globalization continue and advances in transportation encourage movement, effective cross-border processes and infrastructure will be increasingly important for ensuring the safe and efficient movement of people and goods.

Canada collaborates closely with other jurisdictions to manage mobility at border crossings. Several ongoing partnerships between national agencies and between subnational jurisdictions endeavour to improve the cross-border movement of people and goods while maximizing social, economic, and environmental benefits. Ontario's and Canada's strong cross-border partnerships are complemented by a burgeoning internal ecosystem of research, testing and piloting focused on connected and autonomous vehicle (CAV) technology for cross-border movement.

This report provides an overview of Ontario's existing cross-border initiatives and presents several opportunities to further improve the cross-border movement of people and goods. The opportunities—which include a range of operational and technological enhancements and physical and digital infrastructure—can be championed by border agencies, infrastructure operators, and organizations like the Ontario Vehicle Innovation Network (OVIN). The opportunities are grouped into three categories—people movement (the movement of private vehicles, transit, cyclists, and pedestrians), goods movement (the movement of commercial trucks), and enhanced collaboration (increased coordination between jurisdictions on both sides of the border)—in reflection of the key areas of operation they aim to improve.

Existing cross-border initiatives

Canada has strong ties to its North American partners, the United States and Mexico. Linked both culturally and economically, a significant amount of people and goods move across the countries' borders each year. The countries' strong economic ties have been formalized through trade agreements such as the Canada-United States-Mexico Agreement and its predecessor, the North American Free Trade Agreement. These agreements have contributed to the creation of a stable commercial environment that benefits manufacturers, producers, investors, and consumers.

The Canada Border Services Agency and United States Customs and Border Protection operate several joint programs to improve the cross-border flow of people and goods. Subnational cooperation is common amongst North American provinces and states as well, as exemplified by the longstanding collaboration between Ontario and Michigan. In 2016, Ontario and Michigan signed a memorandum of understanding (MOU) to bolster the competitiveness of the Great Lakes automotive industry. In 2021, cooperation between the jurisdictions was expanded further when Michigan and Ontario signed a MOU to explore the creation of a cross-border testing environment for new mobility technologies. More recently, Ontario and Michigan announced a feasibility study to examine the potential for a drone corridor across the border. OVIN also signed a MOU with the Federal Bridge Corporation Limited to identify and adopt technologies to improve cross-border movement.

Ontario's cross-border partnerships with various jurisdictions and organizations are complemented by a strong internal ecosystem of research, testing and piloting. Examples include new test tracks for cross-border technology at the Invest WindsorEssex Virtual Reality CAVE, and a \$5M investment by TELUS to create a 5G connected campus and lab at the University of Windsor which will consider how 5G can be used to help connected vehicles at border crossings.

North American cross-border trade

Cross-border trade plays a major role in Canada's economy by enabling access to new resources and markets for Canadian companies. The United States and Mexico are among Canada and Ontario's largest trading partners, making efficient movement of goods to and from these countries particularly important.

\$961B CAD

total **U.S. – Canada**
trade in 2022

\$50B CAD

total **Mexico – Canada**
trade in 2022

\$231B

2022 Ontario–U.S. imports

\$177B

2022 Ontario–U.S. exports

\$31B

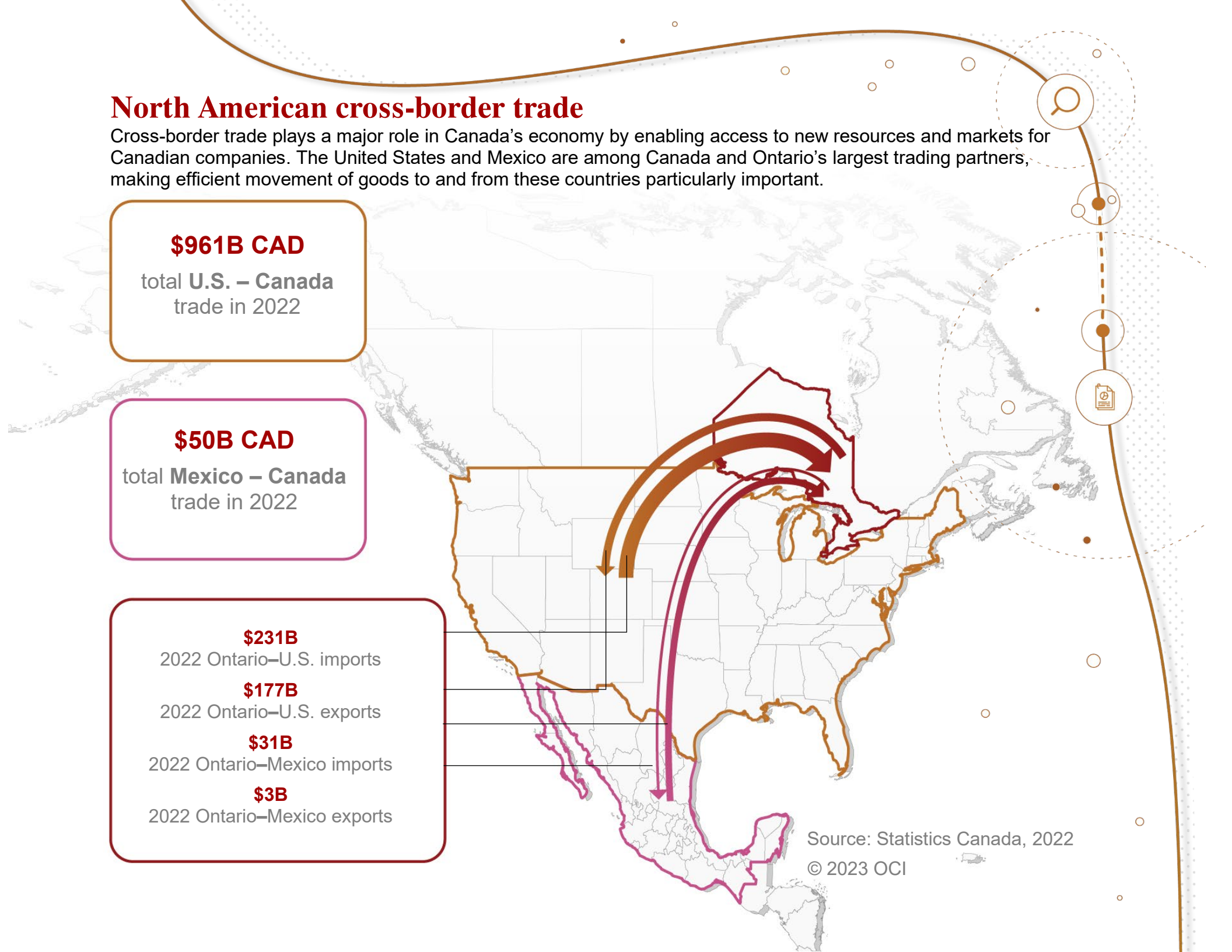
2022 Ontario–Mexico imports

\$3B

2022 Ontario–Mexico exports

Source: Statistics Canada, 2022

© 2023 OCI





Ontario-Michigan bridges and tunnels

The remainder of this report focuses on cross-border initiatives between Ontario and Michigan, due in part to the longstanding collaboration between these two jurisdictions. The map below summarizes the key characteristics of the existing and under-construction cross-border infrastructure between Ontario and Michigan, all of which provide essential connections that support cross-border goods and people movement.

Detroit-Windsor Tunnel

Type:

Constructed: 1930

Length: 1.5 km

Modes:

Cross section:

Connects: USA

Ambassador Bridge

Type:

Constructed: 1929

Length: 2.3 km

Modes:

Cross section:

Connects: CAN & USA

Gordie Howe International Bridge

Type:

Constructed: Under construction

Length: 2.5 km

Modes:

Cross section:

Connects: CAN & USA

Sault Ste. Marie International Bridge

Type:

Constructed: 1962

Length: 4.5 km

Modes:

Cross section:

Connects: CAN & USA

Blue Water Bridge

Type:

Constructed: 1938 west, 1997 east

Length: 1.9 km

Modes:

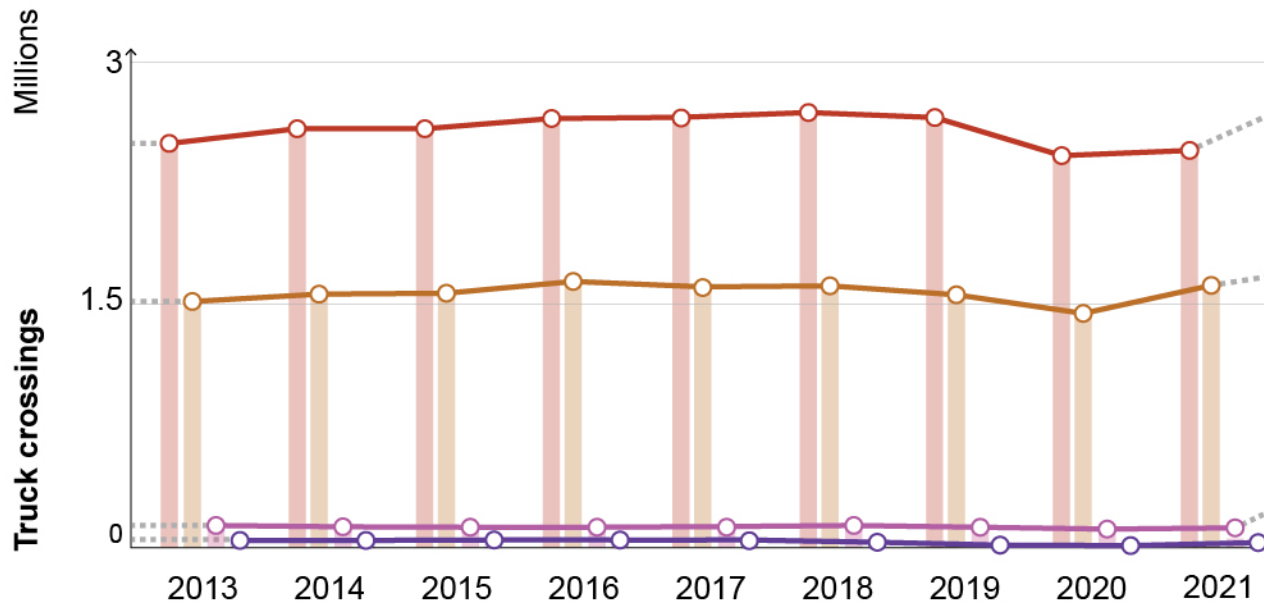
Cross section:

Connects: CAN & USA



Ontario-Michigan goods movement

The graph and figures below illustrate the relative importance for goods movement of each of the existing bridges and tunnels between Ontario and Michigan.



* Decline in border crossings in 2020 due to the COVID-19 pandemic

■ Ambassador Bridge ■ Blue Water Bridge
■ Detroit-Windsor Tunnel ■ Sault Ste. Marie International Bridge

57%

of truck crossings at the Ontario-Michigan border used the Ambassador Bridge in 2021

41%

of truck crossings at the Ontario-Michigan border used the Blue Water Bridge in 2021

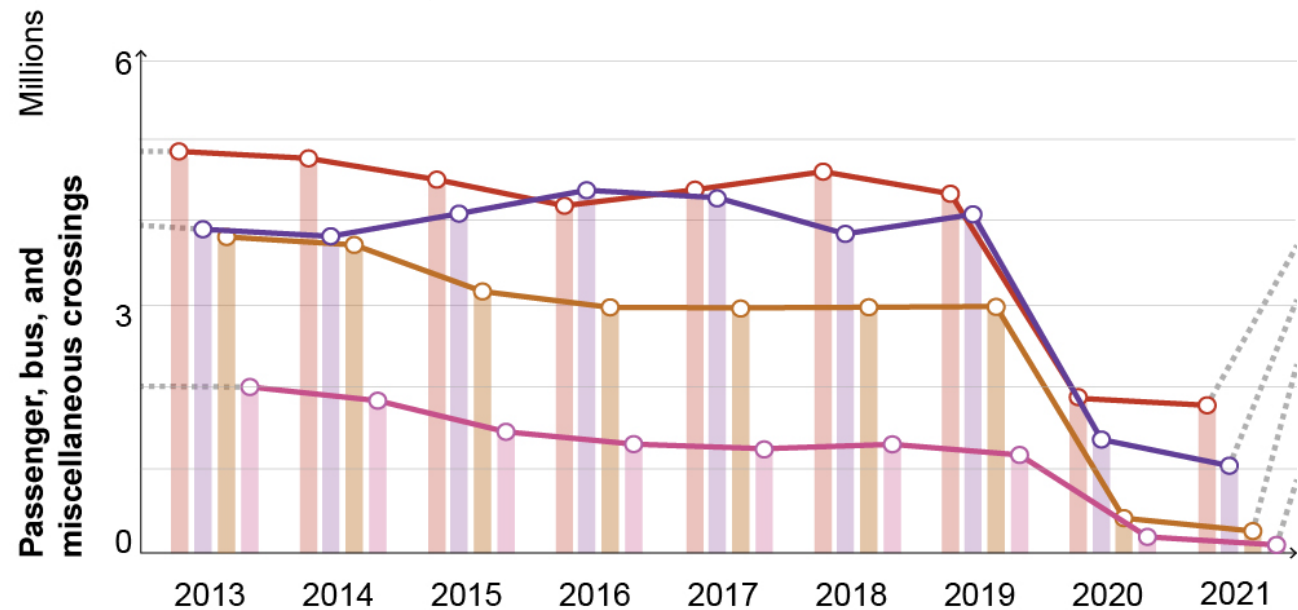
2%

of truck crossing at the Ontario-Michigan border used the Detroit-Windsor Tunnel or the Sault Ste. Marie International Bridge in 2021

Source: Bridge and Tunnel Operators Association

Ontario-Michigan people movement

The graph and figures below illustrate the relative importance for people movement of each of the existing bridges and tunnels between Ontario and Michigan.



* Decline in border crossings in 2020 due to the COVID-19 pandemic

Ambassador Bridge Blue Water Bridge
Detroit-Windsor Tunnel Sault Ste. Marie International Bridge

54%

of passenger, bus & miscellaneous crossings at the Ontario-Michigan border used the Ambassador Bridge in 2021

31%

of passenger, bus & miscellaneous crossings at the Ontario-Michigan border used the Detroit-Windsor Tunnel in 2021

15%

of passenger, bus & miscellaneous crossings at the Ontario-Michigan border used the Blue Water Bridge or the Sault Ste. Marie International Bridge in 2021

Source: Bridge and Tunnel Operators Association



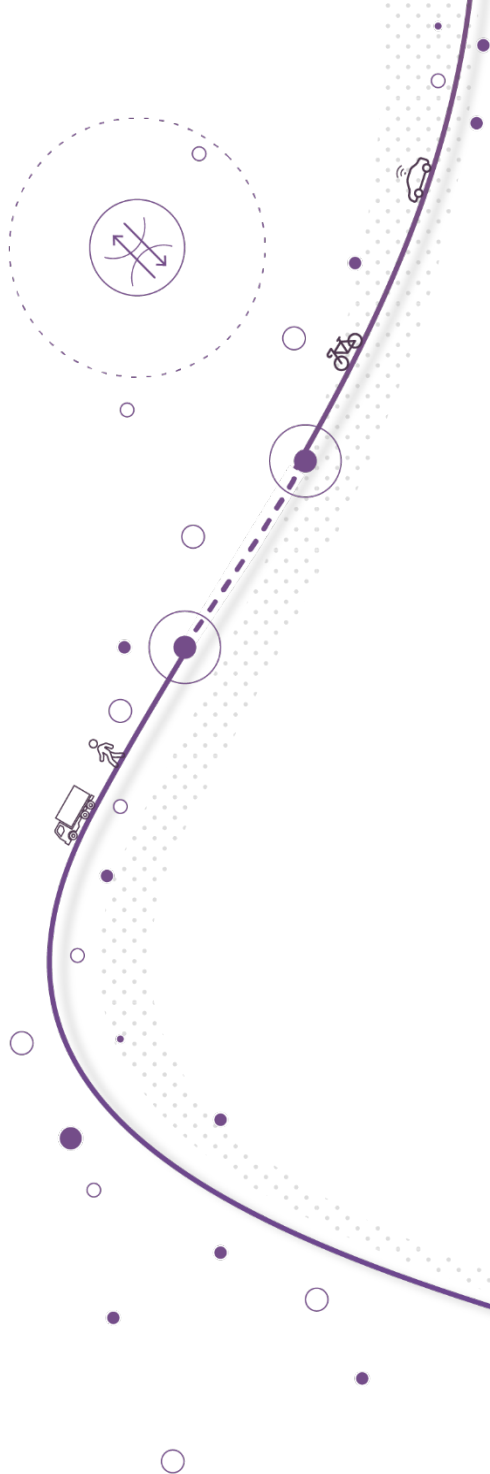
Opportunities for future development

Current state

Maintaining and improving the cross-border relationship between Canada and the United States is important for economic growth in both countries. Cross-border infrastructure such as bridges and tunnels play an essential role in enabling the import and export of goods and facilitating international tourism. However, there are several existing constraints that reduce the efficiency of existing cross-border infrastructure and present opportunities for improvement.

Delay is one of the major constraints currently impacting cross-border movement of people and goods. Additional factors reducing efficiency at the border include the lack of harmonized Intelligent Transportation Systems (ITS), integrated traffic management systems, and border-crossing wait-time estimates.

The existing border-crossing constraints emphasize the need for extended collaboration between border jurisdictions, innovative technological solutions, and increased investment. Several opportunities for addressing existing constraints at Ontario-Michigan border crossings are identified and organized around three themes of people movement, goods movement, and enhanced collaboration.



People movement

Harmonization of wait-time estimates, pre-crossing check-in, and integrated traveller information systems (TIS) would generate societal and economic benefits. These initiatives would help manage demand at border crossings by, for example, distributing the number of people using each bridge or tunnel.

Enhanced collaboration

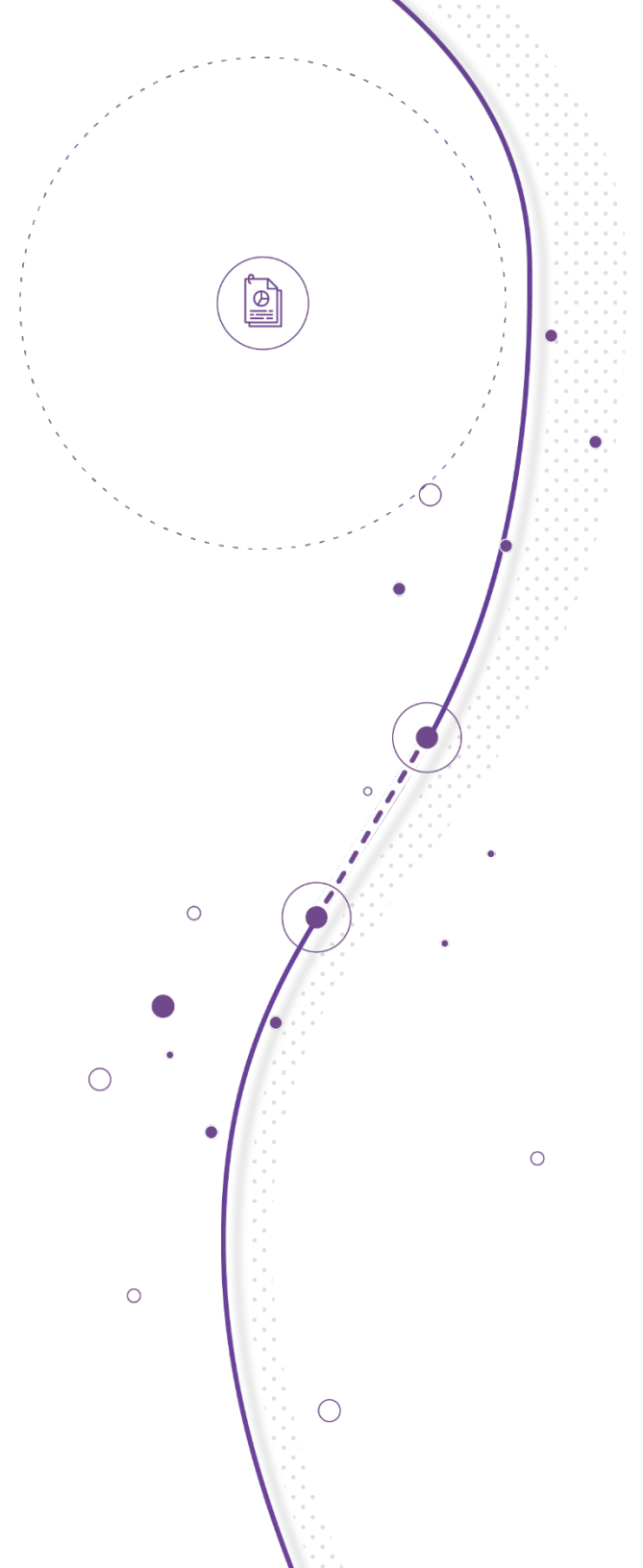
A focus on enhanced collaboration could enable improved coordination and communication between infrastructure operators, border agencies and travellers. A collaboration platform for managing incidents could be implemented to support effective cross-border coordination during incidents or major events. Additionally, standardization of the calculation and dissemination of border wait-time estimates would provide travellers with better information for trip planning purposes. Ultimately, this information could be shared with connected vehicles and traveller information systems for route optimization purposes. Well-coordinated piloting efforts also present an opportunity to increase the speed with which new cross-border technologies are tested and commercialized.

Goods movement

The use of dynamic lane assignment can be leveraged to direct traffic to lanes based on vehicle type, thereby streamlining truck movement. Border crossings can also be upgraded to support autonomous vehicles (AVs) and truck platoons by implementing dedicated lanes for these vehicles. In the long-term, the implementation of supporting infrastructure for AVs and truck platoons at border crossings could encourage use of these vehicles. Increased use of AVs and truck platoons would facilitate a reduction in labour costs.

"Advancements in transportation technology have the potential to make the way we travel and transport goods safer, more efficient and environmentally friendly. By working together to explore and advance new and innovative mobility technologies, we're taking steps to ensure Ontario and Michigan stay at the forefront of the evolving transportation industry."

- The Honourable Caroline Mulroney, Ontario Minister of Transportation



About OVIN

The Ontario Vehicle Innovation Network (OVIN) is a key component of Driving Prosperity, the Government of Ontario's initiative to ensure that the automotive sector remains competitive and continues to thrive. The Government of Ontario has committed \$56.4M for OVIN over four years to support research and development (R&D) funding, talent development, technology acceleration, business and technical support, and testing and demonstration sites. OVIN programs support small- and medium-sized enterprises (SMEs) to develop, test, and commercialize new automotive and mobility products and technologies, and cultivate the capacity of a province-wide network to drive future and green mobility solutions, reinforcing Ontario's position as a global leader.

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



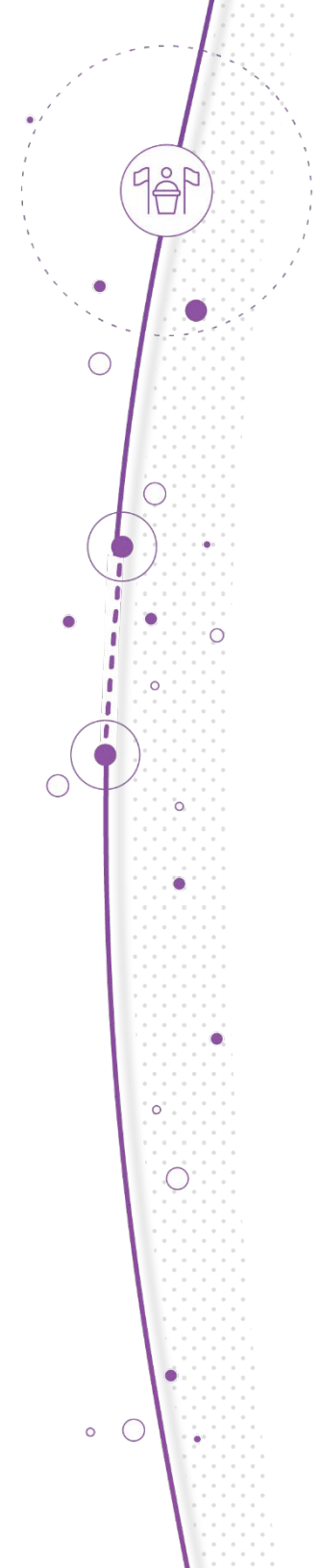
Drive innovation and collaboration among the growing network of stakeholders at the convergence of automotive and technology



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



Meet the OVIN Team



Raed Kadri

Vice President, Strategic Initiatives, and Head of the Ontario Vehicle Innovation Network at OCI.

rkadri@oc-innovation.ca



Mona Eghanian

Director. Strategy and Programs. Automotive and Mobility.

meghanian@oc-innovation.ca



Amanda Sayers

Director. Skills, Talent, and Workforce Development.

asayers@oc-innovation.ca



Shane Daly

Portfolio Manager. Automotive and Mobility.

sdaly@oc-innovation.ca



Christine Stenton

Project Lead. Talent Initiatives.

cstenton@oc-innovation.ca



Kathryn Tyrell

Manager. Automotive and Mobility Strategy.

ktyrell@oc-innovation.ca



John George

Sector Manager. Electric Vehicles.

jgeorge@oc-innovation.ca



Asad Farooq

Director. Sector and Cluster Development.

afarooq@oc-innovation.ca



Maruk Ahmed

Innovation Strategy Specialist.

mahmed@oc-innovation.ca



Shannon M. Miller

Project Lead. Strategic Partnerships.

smiller@oc-innovation.ca



Natalia Lobo

Project Manager.

nlobo@oc-innovation.ca



Natalia Rogacki

Portfolio Manager. Automotive and Mobility.

nrogacki@oc-innovation.ca



Ghazal Momen

Manager. Implementation and Delivery.

gmomen@oc-innovation.ca



Alèque Juneau

Project Lead. Workforce Development.

ajuneau@oc-innovation.ca



Rodayna Abuelwafa

Project Lead. Skills Development.

rabelwafa@oc-innovation.ca

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 April 26, 2022, 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.

This report contains general information only, and by means of this communication, OCI is not rendering professional advice or services. Accordingly, readers are cautioned not to place undue reliance on this report and to perform their due diligence, investigations, and analysis before making any decision, relying on the report, or taking any action that may affect readers’ finances or business.

No representations, warranties, or undertakings (express or implied) are given as to the accuracy or completeness of the information in this report. OCI shall not be liable or responsible for any loss or damage arising directly or indirectly in connection with any person relying on this report.

Copyright images cannot be used without explicit written consent and must be treated as general illustrations only and not relied upon to accurately describe the scheme.

© 2023 OCI. All rights reserved.

