

# Ontario's mobility revolution

Risks and benefits accompanying  
autonomous and electric vehicles



# Contents

**01****Introduction** **3****Part 1 AV/EV trends in Ontario** **4****02****Part 2 Risk complexities in AV/EV** **8****03****Part 3 Underwriting and loss control considerations** **12**

Data-driven risk control 15

Positive impacts of AV 16

Benefits of AV technology in crash notification and claims 17

**04****Part 4 Evolving liability in mobility** **18****Conclusion** **21**

# Introduction

The age of autonomous vehicles (AV) and electric vehicles (EV) is here and developing rapidly in Ontario. The provincial government has set a goal of producing 400,000 electric and hybrid vehicles by 2030. As research and development continue, vehicles with high levels of autonomous and connected operations will become increasingly common on Ontario's roadways. In turn, the technology innovations will bring AV manufacturers, suppliers, and operators new benefits — and new risks. Changes are ahead, not just for Canada's mobility sector, but for the insurance industry that serves it.

The Ontario Ministry of Transport defines autonomous vehicles as “capable of detecting the surrounding environment using artificial intelligence, sensors and Global Positioning System coordinates.” In practice, vehicle autonomy currently ranges from crash prevention systems and cars that can park themselves to vehicles that rely on a human driver only to perform a few tasks, such as acceleration and braking. By 2030, however, vehicles are forecast by many to reach full autonomy — able to operate and navigate with no driver required.

Ontario plays a prominent role in mobility innovation, not only as a leading center of automobile production, but also as North America's second-largest hub of information technology. Combined with Canada's abundant natural resources, the province's ability to attract world-class talent in artificial intelligence, cybersecurity, and vehicle manufacturing means Ontario is poised to contribute even more to the mobility sector in both AV and EV.

In this report, Marsh explores key mobility trends and accompanying risks. We look at the evolving challenges and opportunities facing Ontario's transportation network, which are transforming both the mobility automotive and insurance sectors.

# 1 AV/EV trends in Ontario

Electric and hybrid vehicles — that is, those powered by a combination of batteries and internal combustion — are growing exponentially worldwide, and Canada is no exception. Driven largely by the transition to a low carbon future, by 2030 EVs are expected to account for more than 25% of all vehicles sold.

AVs are a disruptive technology that is changing the concept of mobility, the nature of road and driving safety, and all manner of business models. EVs are approaching a turning point due to changes in government policy, battery range and economics, and fossil fuel supply and price volatility driven by geopolitical unrest in Europe.

In addition, as vehicles become increasingly connected, the data they capture and share will unlock new pricing and commercial advantages, as well as challenges for customers, car manufacturers, high-tech giants, and new entrants active in the mobility value chain.

Ontario, already a sizable hub for EV and battery production, is beginning to see the launch and growth of start-ups focused on AV technology. Engineers and entrepreneurs working on AV projects are tackling several problems, including:



Sustainability, particularly with the development of autonomous EVs.



Employment, creating more jobs and investment in Ontario's transportation and technology sector.



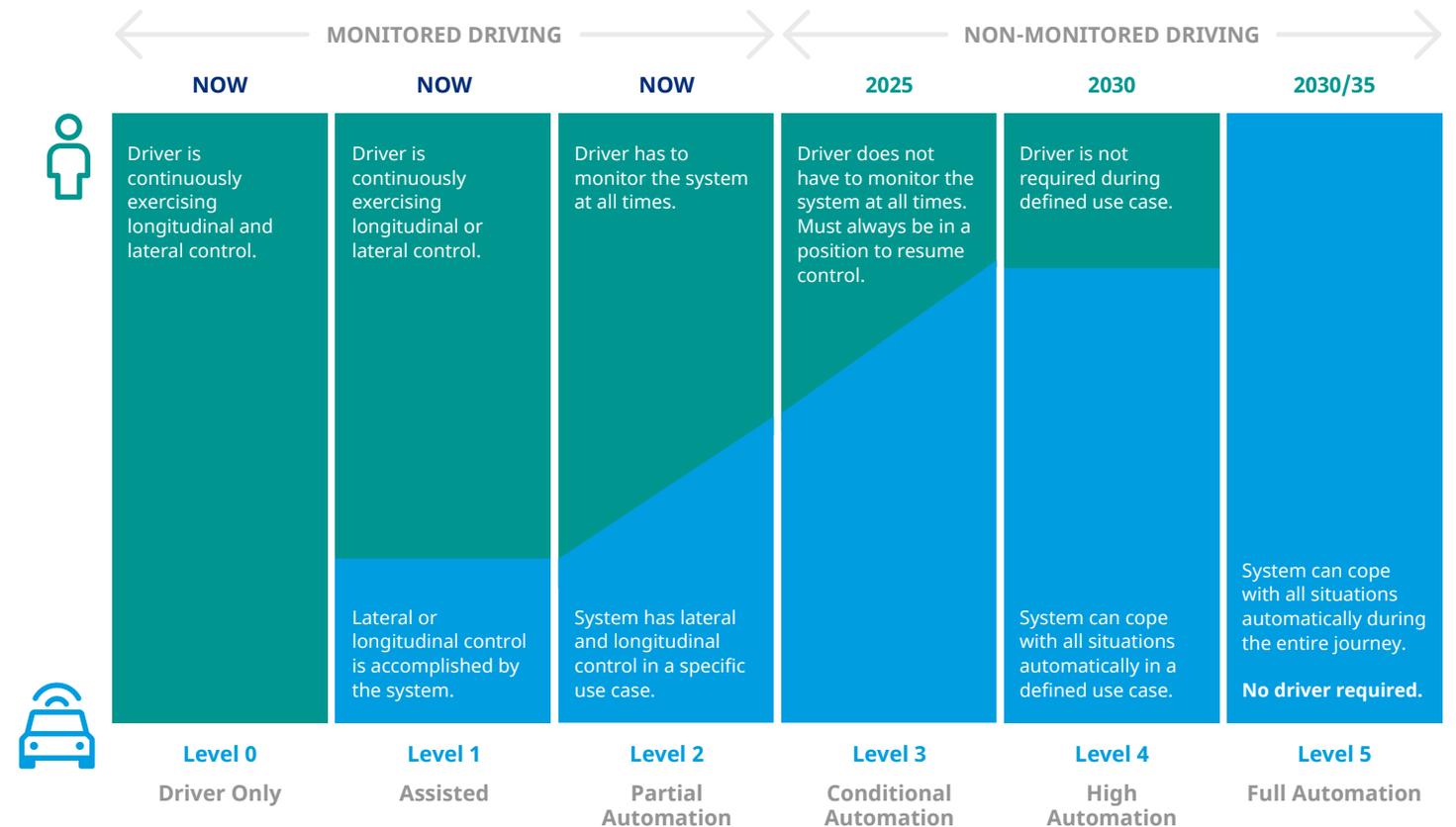
Solutions for driver shortages that impact supply chains, and ultimately the cost of goods.



Although numerous pilot projects are underway in Ontario and other provinces, AV technology is in the early stages. The Society of Automotive Engineers has classified vehicle autonomy into six distinct levels. Vehicles currently on Ontario's roads are those deemed Level 0, 1, 2, or 3 (see Figure 1). Higher-level autonomous capabilities are in development, but not expected to be available until 2025, with full autonomy envisioned by 2030.

- Level 0 requires a human driver to operate the vehicle continuously.
- Level 1 describes assistive technology that can exercise partial longitudinal and lateral control of the vehicle.
- Level 2 offers partial automation of specific functions, such as parallel parking or automated braking to avoid front-end collisions.
- Level 3 is conditional automation, in which the driver need not monitor the vehicle systems at all times, but must be able to resume control.
- Levels 4 and 5 involve higher autonomy and do not require a driver to monitor the vehicle operation.
- Full autonomy does not require a driver to be present at all.

## 01| Autonomous vehicles continue to evolve





Achieving higher-level autonomy and greater use of electric vehicles depends not just on the available technologies, but on acceptance by regulatory authorities and the public. In Ontario, support is growing for AV and EV pilot projects. In November 2021, the provincial government and the Ontario Centre for Innovation [launched a program](#) to help expand the autonomous, electric, and connected vehicle sector.

Ontario has long been an important center of conventional automotive production and economic value. In 2019, the province produced 1.9 million vehicles, with 85% exported, generating more than \$70 billion in automotive exports, according to Ontario government data. Because Ontario also has emerged as the second-largest IT region in North America, after California's Silicon Valley, the province is likely to generate significant talent, innovation, and new business in AV and EV production well into the future.

In December 2021, the [Ontario government announced](#) a \$56.4 million investment in OVIN for research and development in Ontario's autonomous, electric, and connected vehicle sector. This flagship R&D program supplements provincial legislation introduced in 2020 to increase sustainability strategies and policies with the public and private sectors, [according to a report](#) compiled by Deloitte and the Ontario Vehicle Innovation Network (OVIN), which was formerly known as the Autonomous Vehicle Innovation Network (AVIN).

Putting autonomous, electric, and connected vehicles on the road requires technology, the infrastructure to support it, and a public policy framework. In addition, public acceptance of AV and EV is critical to their wider adoption.

Ontario can maintain a competitive advantage in the mobility sector if the province's diverse stakeholders collaborate to integrate and adopt cross-sector emerging technologies, according to the Deloitte/OVIN report. Innovations across five major focus areas will provide important foundations for growth in Ontario's automotive and mobility ecosystem:

- Facilitating ecosystems.
- Public adoption and experience enablement.
- Development and manufacturing.
- Infrastructure enablement.
- Mobility management.

As a result, automobile manufacturers and experts expect eventually to commercially launch fully driverless vehicles, equipped with advanced driver assistance systems (ADAS) — ideally developed in Ontario — that can be implemented with large-scale enterprises in the automotive, public, manufacturing, energy, and transportation sectors globally.



# Risk complexities in AV and EV technology



AV and EV technology is ushering in a new and more complex era of risk management for manufacturers, technology suppliers, operators, drivers, and transportation regulators. Based on highly sophisticated engineering, AVs and EVs require specialized infrastructure to support their operations. As a result, they introduce dynamic risks in the driving environment, manufacturing, and maintenance.

A [global survey](#) found the main barriers preventing consumers from adopting AVs are: vehicle security against hackers, system security from hackers, and self-driving vehicles getting confused by unexpected situations.

Expansion of the EV space will require technology development and risk management in areas including:

### **Energy infrastructure**

A low number of charging stations and relatively limited range for many current EVs may suppress consumer demand, while a greater reliance on energy infrastructure could mean that power outages would have an adverse impact on mobility.

### **Battery technology**

Battery performance is a critical enabler for EV growth. Two challenges are the capacity to recharge quickly and to resist temperature extremes. Low temperatures can reduce an EV's effective range, while high temperatures shorten both range and battery life. EV battery technology continues to advance, but incidents involving spontaneous combustion of lithium batteries have led to safety concerns.

### **Cybersecurity**

Reliance on connected sensors and systems brings up concerns about cybersecurity and prevention of inadvertent system failure or cyberattacks.

### **Physical damage or system defects**

The complexity of AV and EV systems poses a challenge to suppliers of replacement components and repair services in restoring these vehicles to full functionality. Maintenance work on autonomous, electric, and connected vehicles will require labor with specialized knowledge and skills, to make sure the vehicles can resume safe operation.



For the insurance industry, the arrival of AVs and EVs introduces both “good” and “bad” risks. Good risks include more efficient use of natural resources, reduced carbon emissions over time, and connected vehicles’ ability to improve driving safety. Bad risks include the potential for increases in bodily injury, property damage, and legal liability.

The risks arising from AV and EV are not limited to private passenger automobiles. A growing number of complex transportation programs involving commercial trucking, service fleets, and public transportation are making use of autonomous and electric vehicles in Canada and the US. For example, several pilot programs are testing driverless vehicles for delivering groceries and other goods.



## 3

# Underwriting and risk control considerations

- **Data-driven risk control**

---
- **Positive impacts of AV**

---
- **Benefits of AV technology in crash notification and claims**

---

There is some movement in society away from individually owned automobiles to car sharing, which could eventually include sharing AVs. Should the shift gain speed, the automotive and insurance industries will need to adapt the way they view risk.

Ultimately, the traditional approach to auto liability will likely give way to product-related liability coverage and address a question that challenges even conventional auto coverage: Who is at fault?

Vehicles that do not require continuous monitoring or operation by a human driver raise questions of safety for users and others sharing the road. This connects to an emerging insurance risk in AVs: liability. Who bears responsibility in the event of an accident if a driver is present, but the vehicle is operating in autonomous mode?

For highly autonomous vehicles, some will likely argue that drivers can't be at fault and that any collisions that occur are the result of product failures. A limiting factor in how quickly this position will be adopted by insurers in Canada is the lack of significant case law and claim data for incidents involving autonomous vehicles.

Just as autonomous vehicles' navigation depends on sensors that capture and analyze large volumes of data, the insurance industry will need more data to underwrite AV risks and implement loss control strategies. The rise of electric and connected vehicles represents additional opportunities for recording and transmitting vehicle data. As a result,

conventional underwriting and loss control methods will evolve as application programming interfaces (APIs) enable data gathering and analytics in real time.

Although the insurance industry in Ontario has yet to implement APIs for connected cars, the potential exists for an enhanced policyholder experience when buying automobile insurance, with straight-through processing of applications and automated verification and policy issuance. Digital insurance solutions, such as Marsh's Bluestream, can deliver streamlined access to insurance products through an API ecosystem.

In the US and Canada, the transportation and trucking sector is adopting electronic logging devices (ELDs) to comply with legislation to capture driver performance data. Canada began enforcing its ELD mandate for all commercial motor vehicles in June 2022.

The insurance industry can adopt a similar data-driven approach to real-time insights on AV and other connected vehicles. Underwriting AV and EV risks requires more data than conventional vehicles. Autonomous and connected vehicles, however, offer several advantages that can improve loss control and reduce accidents.

**Vehicles that do not require continuous monitoring or operation by a human driver raise questions of safety for users and others sharing the road.**

One reason that insurers need more data to underwrite AV and connected vehicle risks involves recent advances in AI. Over the past eight years, AI speech recognition programs have improved, as has the ability to recognize objects and visual cues in images and videos.

As an example, AI-based systems may be able to process behavioral patterns on smartphone applications and then tweak the user experience to enhance effectiveness of the application. A fleet of vehicles with drivers could deploy a synthetic AI "shadow" or "digital twin" during driving. This approach is used for building information modeling (BIM), in which contractors can compare actual construction to a virtual copy of the building design. With AI, a fleet owner could, for example, compare a driver's yearly performance against the virtual driving-decision system.

Automobile insurers have traditionally relied on a handful of data to underwrite fleet risks, including a driver's motor vehicle records, goods carried, distance, and disposition during transit. With AV and AI-equipped fleets, underwriters now have additional items to consider, including:



Driver consent to AI monitoring



Cybersecurity



Embedding AI into performance reviews



Privacy concerns



Third-party vendor contracts review



Telematics



## DATA-DRIVEN RISK CONTROL

Underwriters are keen to enhance loss control efforts, to prevent injuries and deaths, and to reduce the cost of claims. AI offers the ability to strengthen loss control through telematics and dashboard cameras, which can record incident data and help in accident reconstruction. Such data can be useful in specific claims, and also aggregated to improve loss prevention in general.

Video telematics, through the use of dash cams, offer insurers and drivers an opportunity to see the full picture of risk on the road, including the root causes of collisions. In addition, data on driving behaviors can help insurers in risk selection and pricing accuracy.

For example, a fleet owner might see a pattern in loss costs stemming from collisions involving other vehicles struck from behind, accidents in intersections, or hitting objects other than vehicles. Telematics could record behaviors prior to such collisions and help establish a root cause for each incident, including handheld distractions, following too closely, speeding, harsh braking, and unsafe lane changes.

Dash cams can be useful in analyzing accidents and informing decisions about loss control and safe driving practices. Most Ontario insurers, however, don't mention dash cams at all in policy documents or on their websites. This is a missed opportunity for loss control, especially when an AV manufacturer embeds AI-powered dash cam technology in its products.

## AV insurance model strategy and operations after incubation from OVIN

A Marsh client, an AV technology start-up incubated by OVIN, is redefining short-haul logistics in the US and Canada. Before its official market launch, the company needed a holistic insurance and risk consulting strategy. With a tight timeline, the company faced significant pressure to fully operationalize the business.

Marsh colleagues in Canada and the US enabled the company to accelerate its business readiness by providing advisory work for its operations in Ontario. In three project phases, Marsh helped the company define its overall insurance strategy for various business scenarios, including loss control benchmarking for first- and last-mile delivery.

The company was able to expand its operations into grocery delivery in Canada and retail delivery in the US. The holistic insurance and loss control strategy helped the company develop internal compliance guidelines. The company has since incorporated its AV technology into a major US retail logistics organization and expanded its Canadian fleet. Marsh also provided insurance for the delivery of a new unit for its fleet by leveraging its digital cargo application.

Currently, the level of automation in Ontario is at level 1 (driver assistance) and 2 (partial automation). The risk consulting framework that Marsh created for this company has provided a foundation for it to quickly move to the next level of automation for one of its units in Ontario after it receives the Ministry of Transportation's approval.

## POSITIVE IMPACTS OF AV

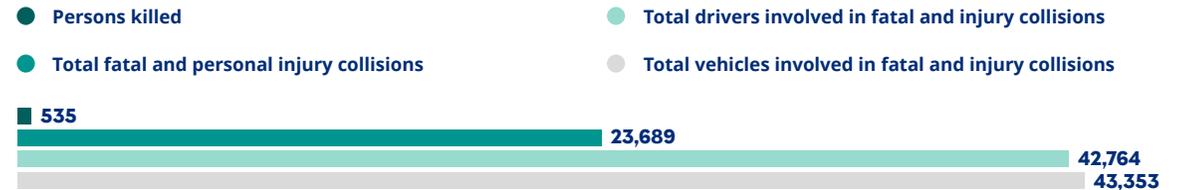
Several developments in accident frequency and severity are forecast as AVs become more common, including:

- It is widely expected that total annual auto insurance premium could drop as a result of significant improvements in safety from AVs.
- As vehicles become more advanced and connected, fraud detection becomes more powerful and reduces the propensity for fraud to occur.
- Human error in driving is assumed to decrease with automation in vehicles.
- Auto repair costs are assumed to increase as cars become more complex and require high-value technology.
- Accident severity is assumed to decrease for certain coverages, such as accident benefits and bodily injury.
- If automatic braking can reduce speed at impact, force on the driver will be reduced.

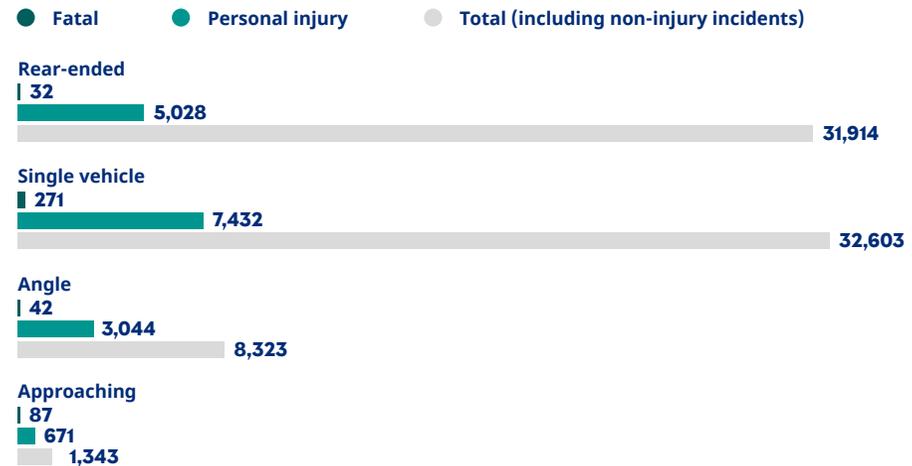
For Ontario, autonomous and connected vehicles could significantly reduce the number of casualties on the province's roads. With more than 23,000 fatal and personal injury collisions in 2020 alone, the technology could help save lives (see Figure 2).

### 02| More than 500 people died due to vehicle accidents in Ontario in 2020

#### Ontario collision statistics 2020



#### Initial impact type



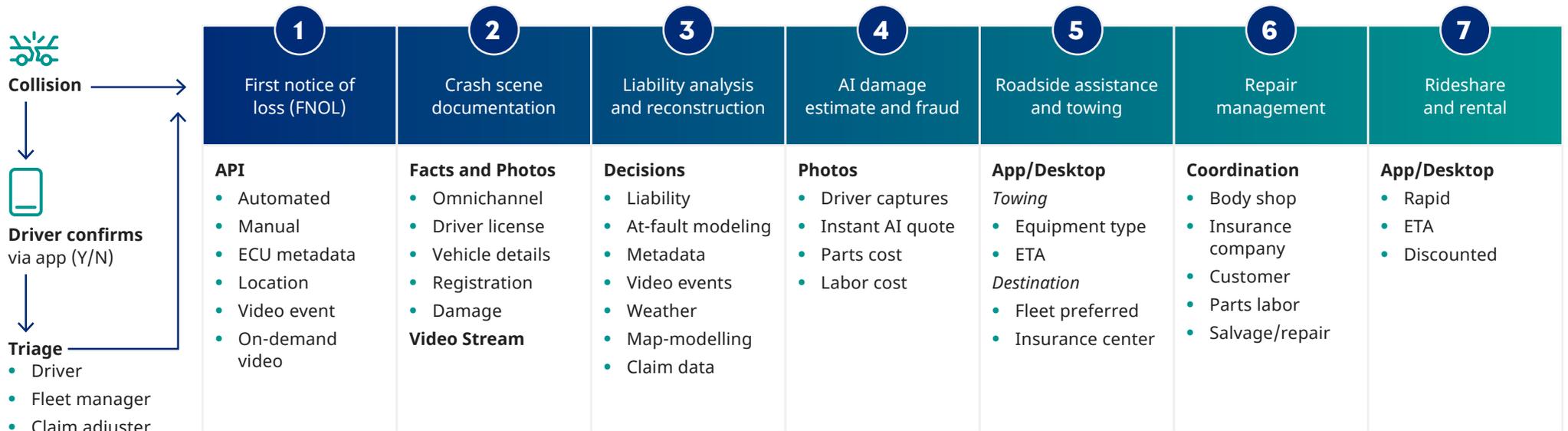
Source: [Preliminary 2020 Ontario Road Safety Annual Report](#)

## BENEFITS OF AV TECHNOLOGY IN CRASH NOTIFICATION AND CLAIMS

Aftermarket telematics devices connected to the vehicle engine control unit (ECU) typically access collision data that data scientists use to model and create collision reconstruction dashboards and reports in claim investigations. AVs can record significantly more information related to vehicle performance and positioning, which can be particularly helpful in assessing accidents and other incidents. For example, GPS can show precisely where an accident occurred, a speed profile can illustrate how fast the vehicle was moving before an accident, and an engine data profile can show both the force and direction of acceleration and braking. Combined, these data sets can offer a clearer picture of driver behaviors and collisions.

Another advantage of AV technology is its ability to support benchmarking and a connected claims environment (see Figure 3). The data captured by AV sensors can assist in loss control, accident reconstruction, and analysis of drivers' safety performance. When linked to an insurance claims system, AV technology can streamline areas including first notice of loss, damage assessment, roadside assistance, and repair.

### 03| AV accelerates connected claim services





# **Evolving liability in mobility**

Greater adoption of automation in personal and commercial vehicles will force an evolution in the automobile liability system. The less a driver is involved in the operation of a vehicle, the more liability for accidents will shift to other sources — the vehicle manufacturer and its technology providers becoming principal targets for responsibility. As a result, insurers will likely increase the emphasis on such coverages as product liability, general liability, technology errors and omissions, and cyber.

A [report by Deloitte](#) estimates a major shift in automobile insurance premium volume in the coming decades. By 2040, total annual auto premiums may fall by 30% due to safety improvements introduced by AV. Deloitte notes that approximately 94% of auto accidents are the result of human error. To the extent that AV technology reduces such errors, accident frequency and severity, as well as driver liability, are also likely to decrease.

The Casualty Actuarial Society has proposed that AV manufacturers, technologists, government policymakers, risk managers, insurers, and others collaborate to consider differing perspectives about AV risks. Because AV use affects many different stakeholders, more discussion and changes in laws, regulations, and insurance products will be needed to address uncertainty.





In January 2021, the Canadian Council of Insurance Regulators (CCIR) issued a paper discussing the impact of connected and automated vehicles on the auto insurance market. Over the long term, when AV technology is fully adopted, the CCIR said driver liability is “likely to be transferred in whole or in part to automobile manufacturers, which may change how vehicles are insured and by whom.” In a [survey of its members](#), the CCIR found regulators divided on who should be held responsible in an accident involving an autonomous vehicle. Most respondents said “more than one party,” while others indicated responsibility should lie with the vehicle owner, the driver, the AV manufacturer, or the software provider.

Ontario and Quebec were the first Canadian provinces to approve on-road AV testing, and they continue to promote investment in the sector. On April 1, 2022, the Ontario government announced a five-year plan to invest in innovative automotive technology to accelerate the commercialization of such intellectual property for economic growth.

These provinces, therefore, may become the first jurisdictions to see the adoption of AVs and the insurance products designed to address related risks.

Current pricing of auto liability insurance is based on an individual’s role in an accident. AV technology adds uncertainty, because in some circumstances, AV products could directly or indirectly lead to an accident. Therefore, a shift to product liability from personal liability will necessitate a rethinking of current insurance and risk management practices.

# Conclusion

Ontario's insurance industry is waiting for more data before it draws conclusions about insurance products and pricing for autonomous, electric, and connected vehicles.

Changes to auto insurance underwriting and loss control will be an iterative process that depends on updates in regulations and to AV and EV technology. Consumer and commercial support for AV adoption is another necessary step, followed by successful data collection that can differentiate AV risks. From there, the insurance industry can better develop actuarial pricing models.

The advent of AVs brings new risks and opportunities for improvement in loss control and safety. Continuous innovation, infused with and supported by strong risk management practices, is a smart way for Ontario to achieve the full benefits of AV technology.

If you have questions or would like more information about AV and EV risks, please contact your Marsh representative.



## About Marsh's Sharing Economy and Mobility Group

Marsh's Sharing Economy and Mobility Group has leadership and expertise hubs in Canada, United States, United Kingdom, Continental Europe, Asia, and Pacific. In the United Kingdom, our team is composed of over 50 experts advising clients ranging from trials and start-ups through to major listed global technology conglomerates.

## About Marsh

Marsh is the world's leading insurance broker and risk advisor. With around 45,000 colleagues operating in 130 countries, Marsh serves commercial and individual clients with data-driven risk solutions and advisory services. Marsh is a business of Marsh McLennan (NYSE: MMC), the world's leading professional services firm in the areas of risk, strategy and people. With annual revenue nearly \$20 billion, Marsh McLennan helps clients navigate an increasingly dynamic and complex environment through four market-leading businesses: Marsh, Guy Carpenter, Mercer and Oliver Wyman. For more information, visit [marsh.com](http://marsh.com), follow us on [LinkedIn](#) and [Twitter](#) or subscribe to [BRINK](#).

Marsh is a business of Marsh McLennan.

This document and any recommendations, analysis, or advice provided by Marsh (collectively, the "Marsh Analysis") are not intended to be taken as advice regarding any individual situation and should not be relied upon as such. This document contains proprietary, confidential information of Marsh and may not be shared with any third party, including other insurance producers, without Marsh's prior written consent. Any statements concerning actuarial, tax, accounting, or legal matters are based solely on our experience as insurance brokers and risk consultants and are not to be relied upon as actuarial, accounting, tax, or legal advice, for which you should consult your own professional advisors. Any modelling, analytics, or projections are subject to inherent uncertainty, and the Marsh Analysis could be materially affected if any underlying assumptions, conditions, information, or factors are inaccurate or incomplete or should change. The information contained herein is based on sources we believe reliable, but we make no representation or warranty as to its accuracy. Except as may be set forth in an agreement between you and Marsh, Marsh shall have no obligation to update the Marsh Analysis and shall have no liability to you or any other party with regard to the Marsh Analysis or to any services provided by a third party to you or Marsh. Marsh makes no representation or warranty concerning the application of policy wordings or the financial condition or solvency of insurers or re-insurers. Marsh makes no assurances regarding the availability, cost, or terms of insurance coverage.