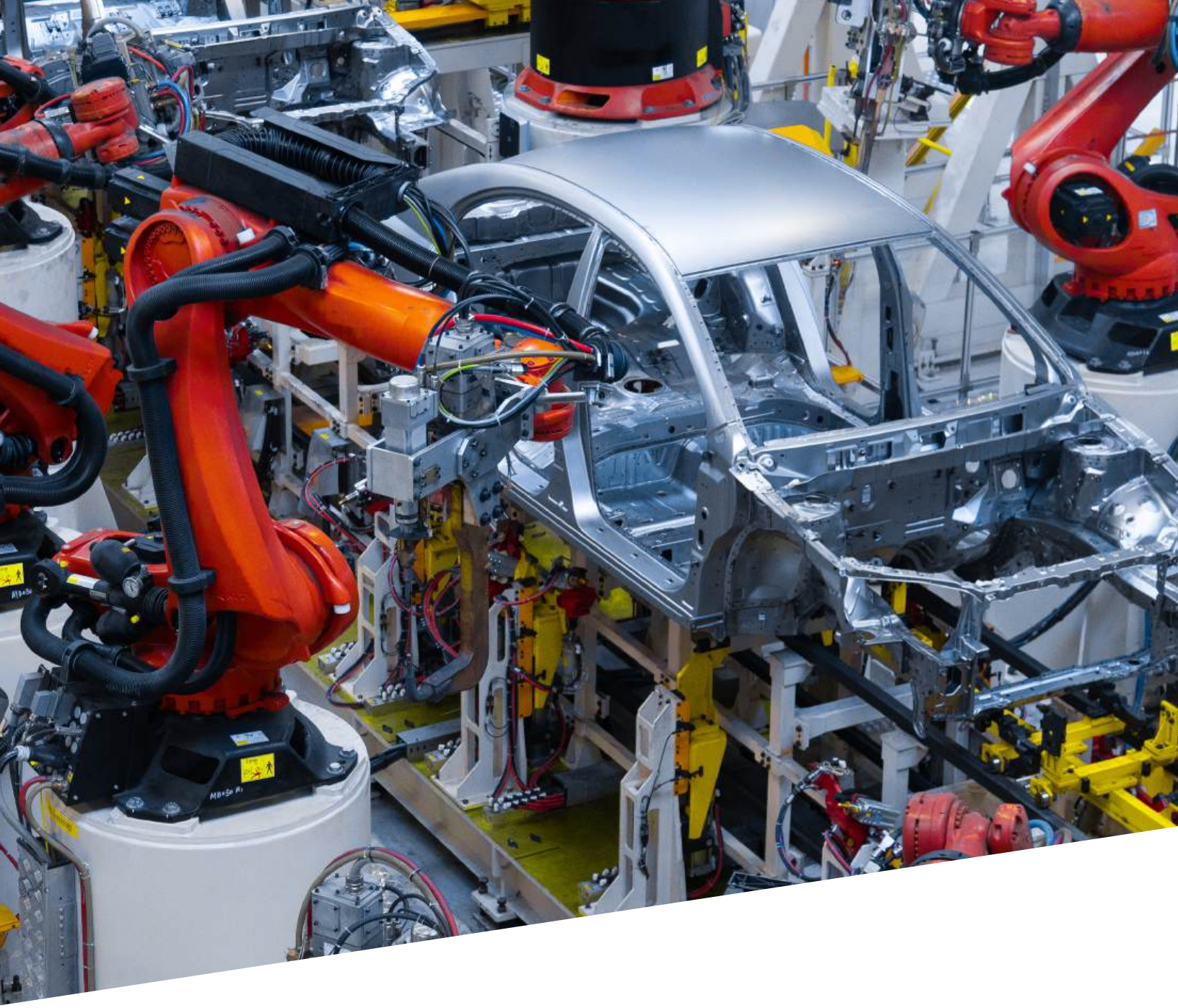

# CANADA'S AUTOMOTIVE MANUFACTURING INDUSTRY

## 2019 - 2023

NOVEMBER 2024

APRC
Automotive Policy Research Centre

# ABOUT THE APRC

The Automotive Policy Research Centre (APRC) conducts research and disseminates knowledge about the role of public policy in supporting Canada's globally competitive automotive industry.

The APRC was formed in 2012 as a collaborative research partnership funded by a grant from Automotive Partnership Canada (APC). Between 2012 and 2018, the APRC engaged university-based researchers, policymakers, and industry stakeholders from Canada and abroad in a variety of research collaborations, resulting in dozens of publications, presentations, and events.

In 2018, the APRC became a not-for-profit organization that maintains partnerships with policymakers, industry stakeholders, government, and university-based researchers, one that continues to pursue multi-disciplinary research related to the role of public policy in supporting the automotive industry in Canada.

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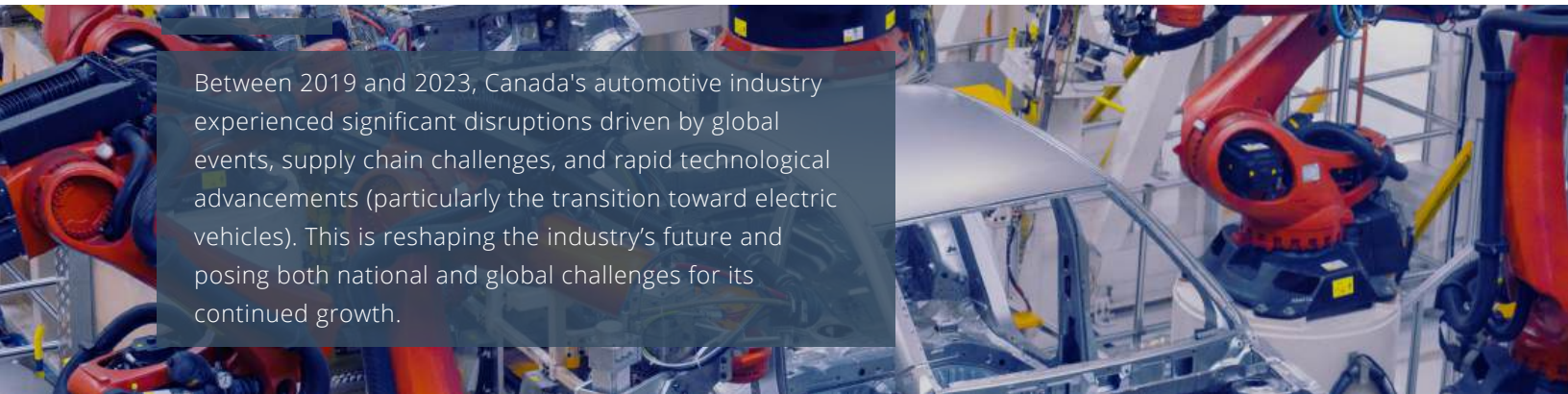
## INTRODUCTION

In a 2017 report published by the APRC, the period between 2012 and 2016 was described as a period of "modest growth and relative stability" for Canada's automotive industry.[1] The past five years were not quite the same for the industry and its supply chain. Between 2019 and 2023, Canada's automotive industry experienced significant changes and disruptions which were influenced by major global events, supply chain disruptions, and technological changes. These disruptions were primarily caused by the COVID-19 pandemic, which led to temporary manufacturing facility closures, exacerbated labour shortage challenges, and resulted in a decline in consumer demand. The global supply chain was also impacted by the pandemic, which resulted in critical shortages of key components, most notably semiconductors, leading to delays in vehicle assembly and delivery. More recently, advancements in vehicle technology and the accelerating shift towards vehicle electrification have been reshaping the future of automotive manufacturing and its supply chain, driving the focus of new investments and strategic initiatives.

It is also anticipated that over the upcoming few years, Canada's automotive industry, as most of its counterparts globally, will be facing numerous evolving challenges. While some challenges will be specific to the Canadian context, others will be relevant at the regional or global level. For example, as a result of the transition to electric vehicle (EV) production, the automotive industry and its supply chain are going through the most significant restructuring of the century. This is particularly true as non-traditional suppliers, such as battery and chemical manufacturing companies, gain a more prominent role in the automotive supply chain, while some traditional suppliers, such as internal combustion engine parts suppliers, become less prominent.[2] Other vehicle and manufacturing technologies are also playing a role in the future of this industry as Original Equipment Manufacturers (OEMs) and supplying companies navigate their integration in transformed production processes or final product.[3]

Economic, geopolitical, and policy challenges have also been affecting the industry's output. Key issues affecting the industry's performance and future include trade agreements like the United States-Mexico-Canada Agreement (USMCA), attracting foreign investment, global supply chain disruptions, rising international tensions, and economic downturn concerns. Additionally, challenges more specific to the Canadian industry include the looming labour shortage and the absence of a national strategy to guide the industry's transition toward zero-emission technologies.

This report is one of a series of reports and publications by the APRC which profile and track statistics and trends in Canada's automotive manufacturing industry. It places the industry's performance within the context of the performance of its North American and global counterparts. The report also provides an overview of the most recent and relevant manufacturing and policy developments in the industry, and describes issues and challenges which have been having an impact on the industry's output and performance.



Between 2019 and 2023, Canada's automotive industry experienced significant disruptions driven by global events, supply chain challenges, and rapid technological advancements (particularly the transition toward electric vehicles). This is reshaping the industry's future and posing both national and global challenges for its continued growth.

## MACRO PRODUCTION STATISTICS

Table 1 presents North American and global vehicle production data from 2019 to 2023. Prior to the COVID-19 pandemic, automotive production was stable. However, North American production was significantly affected, declining by over 20% to nearly 13.5 million vehicles in 2020—5 percentage points more than the decline in global vehicle production. Since then, global vehicle production has rebounded and surpassed its pre-pandemic levels, while North America's recovery has been relatively slower.

In March 2020, nearly all North American automotive manufacturing operations were halted for approximately six weeks due to the rapidly spreading COVID-19 pandemic.[4] Despite most OEMs resuming production by May 2020, vehicle production in Canada continued to decline and has been slow to recover. Relative to 2019 production levels, Canada experienced the steepest drop in production at 28.2%, producing 1.12 million vehicles in 2021, while the United States (US) saw the smallest decline at 18.9% in 2020. While Canada's vehicle production levels have not yet reached 2019 levels, vehicle production in the US has almost recovered by the end of 2023, and Mexico's vehicle production has exceeded pre-pandemic levels.

**TABLE 1.** VEHICLE PRODUCTION IN NORTH AMERICA ('000 UNITS)

| | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| **Canada** | 1,917 | 1,377 | 1,115 | 1,229 | 1,553 |
| **US** | 10,880 | 8,822 | 9,167 | 10,060 | 10,612 |
| **Mexico** | 3,987 | 3,176 | 3,146 | 3,509 | 4,002 |
| **USMCA** | 16,784 | 13,375 | 13,428 | 14,798 | 16,167 |
| **Global** | 91,786 | 77,662 | 80,146 | 85,017 | 93,546 |

*SOURCE: OICA PRODUCTION DATA*

In Canada, multiple factors and changes between 2019 and 2023 contributed to the decline in vehicle production levels. This includes the closure of the General Motors (GM) Oshawa plant around the end of 2019, the disruptions as a result of the pandemic, and changes in production shifts and products assembled at Ford, Stellantis, GM, and Toyota (discussed later in this report). Given Canada's relatively smaller number of automotive assembly facilities compared to the US and Mexico, production disruptions, changes in the vehicle models produced, facility retooling, and shift changes lead to a more significant impact on the country's overall vehicle output and production share (discussed in the section below).

### *Automotive Production Share*

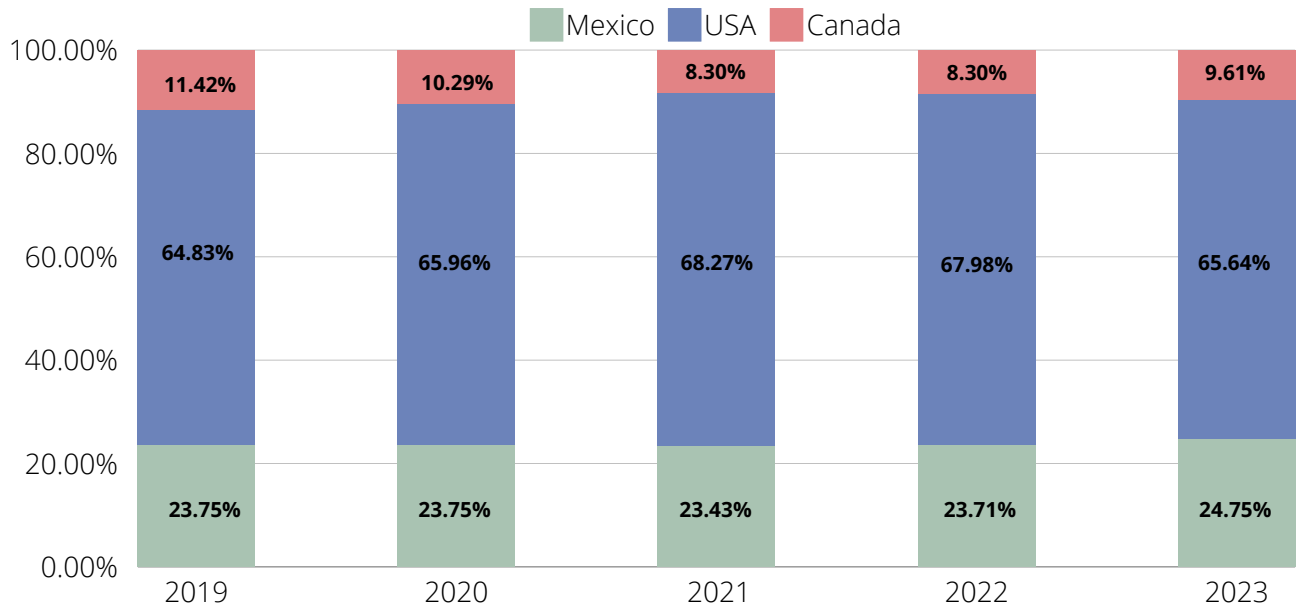
Figure 1. presents the US, Mexico and Canada's (USMCA) vehicle production shares between 2019 and 2023. Between 2019 and 2022, the US share of North American automotive production increased from around 65% to 68%, while that of Mexico remained the same for the most part. Canada's share of the North American vehicle production declined from 11.42% in 2019 to 8.30% during the same period. The growth in the share of the US is actually due to the less steep drop in US vehicle production during the pandemic compared to that of Mexico and Canada.

Canada's vehicle production share of 8.3% in 2021 and 2022 is its lowest in more than five decades

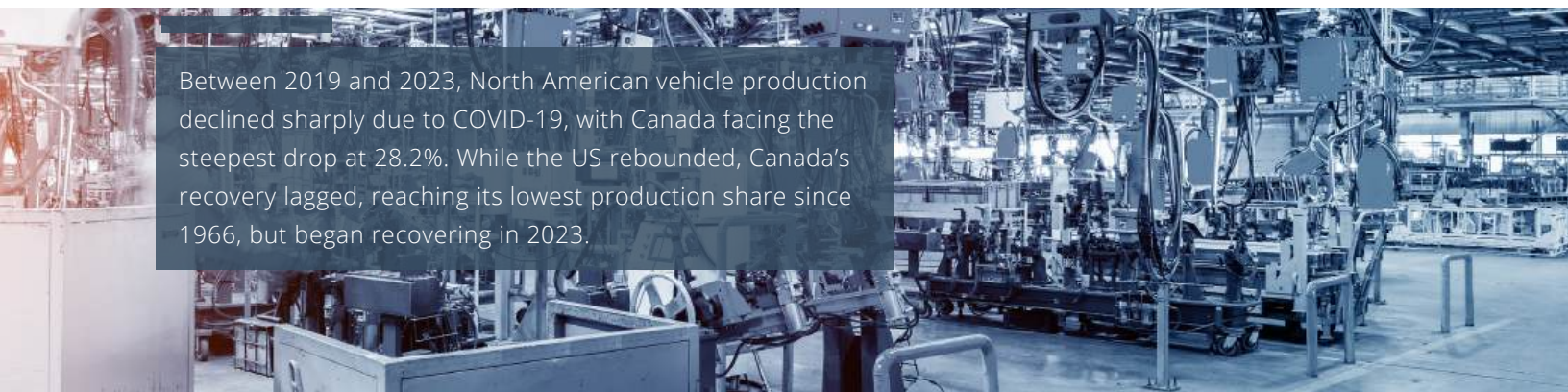
(lowest North American share since 1966, just one year after the Canada-US Auto Pact was signed). One significant factor that led to US automotive shares increasing while Canada's decreased during the pandemic was the greater access to microchips during global shortages. Demand for other products that utilize microchips, such as laptops, gaming systems, and appliances surged during the pandemic leaving the auto industry unable to source semiconductors for its vehicles. US automakers strategically shifted production to focus on higher margin vehicles to adapt to chip availability which enabled them to sustain production levels and profits despite supply chain issues.[6,7] The impact was more significant for Canadian OEMs, whose lower margin vehicles like minivans sedans were deprioritized. Canadian plants bore the brunt of the shortage, experiencing more frequent production disruptions than their US counter parts.

During the period of 2022 to 2023, the Canadian automotive industry saw an increase from 8.3% to 9.6% of USMCA auto shares, producing the most vehicles it has done since 2020.[8] This can in part be understood by several factors in Canada including the reopening of several plants, major investments into pre-existing plants, and reestablishment of supply chains following the global pandemic.

**FIGURE 1.** SHARE OF VEHICLE PRODUCTION IN NORTH AMERICA, 2019 - 2023




*SOURCE: OICA PRODUCTION DATA*



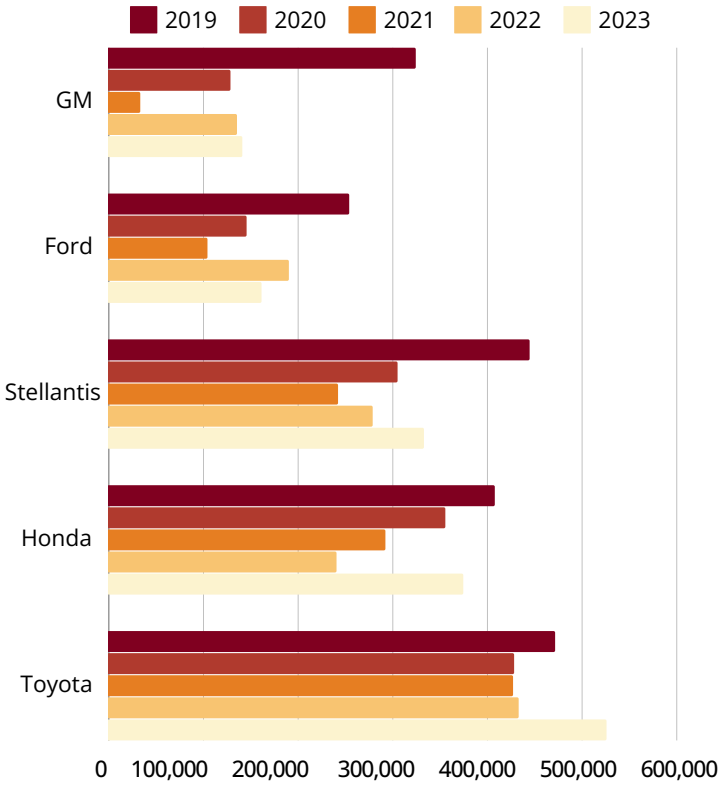
Between 2019 and 2023, North American vehicle production declined sharply due to COVID-19, with Canada facing the steepest drop at 28.2%. While the US rebounded, Canada's recovery lagged, reaching its lowest production share since 1966, but began recovering in 2023.

## CANADIAN VEHICLE ASSEMBLY

Between 2019 and 2021, vehicle production by all Canadian OEMs declined as a result of disruptions from the pandemic. Production in almost all facilities recovered in 2022 and 2023, most of which saw a significant increase relative to 2021 volumes. Production volumes of the five OEMs between 2019 and 2023 are presented in Figure 2. The decline in production between 2019 and 2021 at Japanese OEMS was relatively slower (decline of 9.4% at Toyota and 28.3% at Honda) compared to that at the American OEMs (decline of 89.8% at GM, 59.0% at Ford, and 45.5% at Stellantis). Between 2019 and 2023, on average, Toyota produced the most vehicles annually (approx. 457,100 vehicles on average), followed by Honda, Stellantis, Ford and GM. Of the 1.54 million vehicles produced by the five OEMs in Canada in 2023, 24.3% were medium, large, executive, and luxury vehicles, 57.2% were SUVs, 8.3% were minivans, and 8.9% were pick-up trucks.[9]

The steep decline in production at GM is due to several announcements and changes made by the OEM between 2018-2021. In November 2018, GM announced that the last vehicle would roll of the GM Oshawa assembly line near the end of 2019.[10] The OEM was then producing the Chevrolet Impala, the GMC Sierra, and the Cadillac XTS at the plant. Operations at the facility were shut down in December 2019. GM's increase in production since 2021 is in part due to the Oshawa plant reopening after being retooled to produce the Chevy Silverado in 2021.[11] In the same year, GM announced that production of the Equinox at its

**FIGURE 2.** ANNUAL PRODUCTION OF CANADA'S FIVE AUTOMOTIVE OEMS, 2019 - 2023 (UNITS)




*SOURCE: MARKLINES AUTOMOTIVE DATA*

CAMI plant would end in 2022 in order to convert the plant to make the BrightDrop electric commercial van. Production of the Equinox was moved to two plants in Mexico.[12] Despite production resuming at both GM plants in Ontario, it is unlikely that volumes will return to pre-2019 levels, given the type of vehicles currently assembled at these facilities, unless new vehicle models are added to the production lineup in the future.

Production volumes at other facilities were also affected by changes in models produced. For example, Ford ended the production of the Flex

and the Lincoln MKT models in 2019.[12] Toyota also moved the production of its Corolla to Mexico in 2019, expanding the production of RAV4 at the Cambridge facility.[13] Additionally, work shifts were adjusted at various automaker facilities to accommodate changes in vehicle production volumes.

In 2022, Stellantis announced an investment of C$3.6 billion to retool its Brampton and Windsor facilities to produce EVs.[14] As part of this transition, Stellantis ended the production of the Dodge Challenger and Charger at the Brampton facility in 2023. The Brampton plant is currently undergoing retooling to begin manufacturing the Jeep Compass crossover in 2025 and to support the production of both internal combustion engine and battery electric vehicles. At the same time, the Windsor facility will continue its production of the Pacifica while adding the next generation of Dodge muscle cars to its lineup starting in 2025.

### *Vehicle Assembly Employment*

As of the end of 2023, the five OEMs employed more than 32,500 people in their automotive assembly operations, a decrease of roughly 3,000 compared to 2019 employment levels.[15] The largest employer, Toyota, had approximately 10,000 employees at its Cambridge and Woodstock plants. Stellantis, the second largest, employed 6,400 people in vehicle assembly operations at its Brampton and Windsor plants. GM followed with 6,250 employees, nearly double the 3,200 people it employed in 2021. This increase was driven by GM's investments in its Ingersoll and Oshawa plants to retool both facilities. The remaining two OEMs, Ford and Honda, employed 5,200 and 4,700 people, respectively, in 2023.

Employment at both Stellantis and Toyota dropped by around 2,000 between 2019 and 2023. In comparison, Honda and Ford experienced smaller decreases in employment over the five years, losing approximately 800 and 600 jobs, respectively.

### *Investment and New Production*

Between 2019 and 2023, Canada's five automotive OEMs, along with other automakers and manufacturing companies, committed around C$6 billion to retooling, and upgrading vehicle assembly operations across Canada.[16] The rest of the investments by OEMs was directed toward establishing battery manufacturing operations, as well as developing essential capabilities within the battery supply chain, including battery material manufacturing, processing, and mining (discussed in the next section). A portion of the investment was also allocated to expanding and enhancing research and development (R&D) activities, particularly in vehicle electrification and battery technology. Among the notable announcements in vehicle assembly over the past five years is Stellantis's C$3.6 billion investment to retool its Windsor and Brampton plants to support the production of electrified vehicles.[14] Similarly, GM committed C$1 billion to converting its CAMI plant in Ingersoll into Canada's first large-scale EV production facility, dedicated to manufacturing electric commercial vans.[17]

Despite the multiple EV investment announcements between 2019 and 2023, concerns about slowing EV adoption have resulted in delays, pauses, or changes to some of the projects and plans announced. The softening demand may underscore the need to make assembly facilities flexible enough to simultaneously build ICEVs, HEVs, PHEVs and BEVs.

Between 2019 and 2023, Canada's automotive industry faced production declines due to pandemic-related disruptions, plant closures, and supply chain issues. Recovery focused on significant retooling investments for EV production.

## BATTERY MANUFACTURING INDUSTRY

As the automotive industry shifts to vehicle electrification and zero-emission technologies, it is important that the statistics and trends in the battery manufacturing industry are tracked across North America, and globally. Moving forward, battery manufacturing and its related activities will be an anchor of automotive production, and investment in this industry will be a key indicator of how the automotive manufacturing industry takes shape over the upcoming decades.

As of the end of 2023, the US has captured the biggest share of battery production capacity in North America with a total announced battery production capacity of around 950 GWh, followed by Canada at 115 GWh. Mexico has not secured any major battery production operations as of the end of 2023.[18]

It is important to note that the majority of the OEM-announced battery production operations across North America were in the form of a joint ventures between the OEMs and one of the major battery manufacturing companies. This presents a new automotive supply chain dynamic where, (1) new non-traditional automotive companies have become core contributors in the automotive manufacturing industry, replacing more traditional supplying segments such as internal combustion engine (ICE) component manufacturers and exhaust parts suppliers; and (2) OEMs have to outsource the technology and the production of a core component of the vehicle through partnering with global battery manufacturing companies. It is still unclear whether the OEMs will have full ownership or control over the battery manufacturing operations moving forward.

In Canada, multiple battery manufacturing investment announcements were made between 2021 and 2023. In 2021, Lion Electric, StromVolt and Britishvolt revealed plans to build EV battery manufacturing plants in Québec. However, Britishvolt scrapped its plans later in 2022 due to financial difficulties and changing market conditions. In 2022, Stellantis announced a $5 billion joint venture with LG Energy to establish a 49.5 GWh battery plant in Windsor, Ontario which is set to start production in 2024.[19] In 2023, Volkswagen revealed a $7 billion battery cell manufacturing facility investment in St. Thomas, Ontario. The plant is expected to be one of the largest EV battery manufacturing facilities in North America, with an annual production capacity of up to 90 GWh.[20]

Other announcements have also been made around the developing battery manufacturing supply chain. For example, GM and POSCO Chemical are partnering to build a Cathode Active Material (CAM) plant in Bécancour, Québec which is planned to open in 2025.[21] Similarly, Ford has announced a partnership with SK On and EcoProBM to develop a cathode manufacturing facility in Bécancour, Québec.[22] In 2023, Umicore announced the construction of a battery materials production facility in Loyalist, Ontario. This plant is set to manufacture cathode active materials (CAM) and precursor materials, and will be capable of processing 35 GWh equivalent battery materials.[23]

In total, between 2019 and 2023, nearly C$15 billion was invested in establishing battery manufacturing operations, primarily focused on battery cell and module production, with most of the investments concentrated in Ontario and Québec.[15]

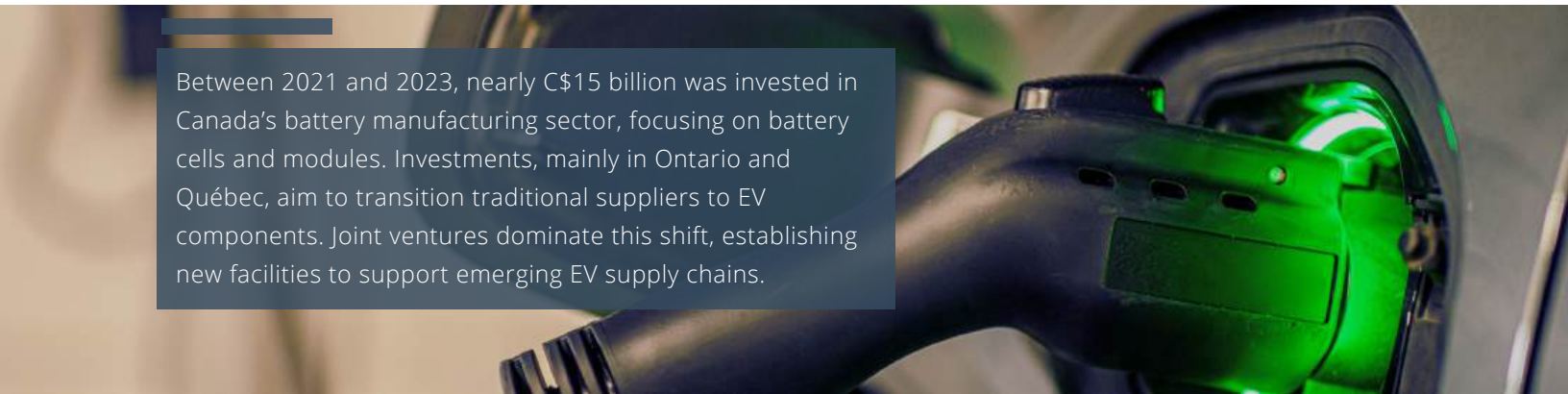
It is also expected that, over the upcoming years, the majority of Canadian parts suppliers will gradually transition their operations to produce EV-specific parts and components. While some parts will become obsolete with the shift to EV production, demand for new parts and components will create new market opportunities within the automotive manufacturing industry. The transition in the automotive parts manufacturing industry may involve retooling existing facilities to produce EV and battery components or establishing new facilities that contribute to the Canadian and North American EV supply chains.

Some suppliers in Canada have already begun their transition. For example, Magna plans to manufacture battery enclosures in Ontario, and DongShin Motech is establishing a new manufacturing facility in Windsor to supply the NextStar Energy battery plant with aluminium battery casings.[15] It is anticipated that this transition across the parts manufacturing companies will gradually accelerate as more EVs are planned for and built in Ontario assembly plants. However, in 2024, multiple battery manufacturing projects were put on hold or cancelled due to concerns of slowing market demand for EVs.

In Figure 3, vehicle assembly plants, along with many newly announced battery manufacturing plants, are mapped within the provinces of Ontario and Québec —where the most significant investments in automotive and battery manufacturing have been concentrated. Battery manufacturing stages are detailed in Appendix A.

**FIGURE 3.** VEHICLE ASSEMBLY, BATTERY MANUFACTURING AND MINING IN ONTARIO AND QUÉBEC


*SOURCE: APRC DATABASE, ACCELERATE ZEV SUPPLY CHAIN MAP, NATURAL RESOURCES CANADA MINERALS AND MINING MAP*



Between 2021 and 2023, nearly C$15 billion was invested in Canada's battery manufacturing sector, focusing on battery cells and modules. Investments, mainly in Ontario and Québec, aim to transition traditional suppliers to EV components. Joint ventures dominate this shift, establishing new facilities to support emerging EV supply chains.

## VEHICLE PARTS MAUFACTURING

In 2023, Canada had a total of 1,030 automotive parts manufacturing facilities, as per APRC's Automotive Database. This list includes manufacturers which do not self-identify as automotive parts manufacturers, even though they directly supply parts and components to the automotive parts manufacturing and vehicle assembly industries. Figure 4 provides an overview of the distribution of these manufacturers across 14 product and process categories.

The largest segment is metal manufacturing, which includes operations such as stamping, die casting, machining, and welding. This segment is followed by tooling & automation, primarily consisting of metal stamping dies and plastic mould manufacturing facilities. Other notable segments include plastic manufacturing, powertrain & transmission manufacturing, and coating. With the growing shift towards vehicle electrification, electric and hybrid manufacturing is expanding, and this segment is expected to grow further as new EV and battery manufacturing operations are established.

In 2023, nearly 88% of Canada's automotive parts manufacturing facilities were located in Ontario, with 8.7% in Québec, and the remainder in British Columbia and Manitoba.

According to APRC's database, the industry employed approximately 150,000 people in automotive parts manufacturing in 2023 (employment distribution shown in Figure 5). Including vehicle assembly and automotive technology operations, the sector employs a total of 200,000 workers.

**FIGURE 4.** DISTRIBUTION OF AUTOMOTIVE PARTS MANUFACTURERS IN CANDA, 2023

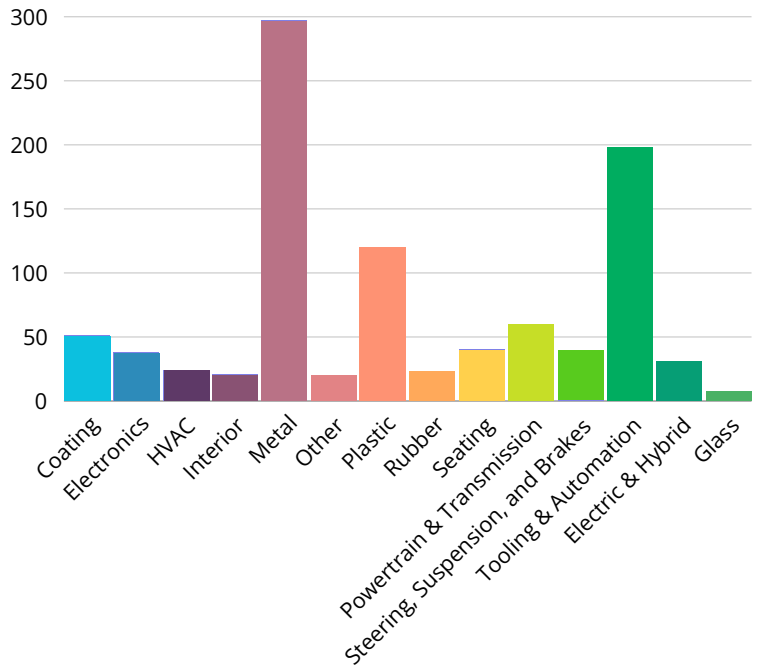
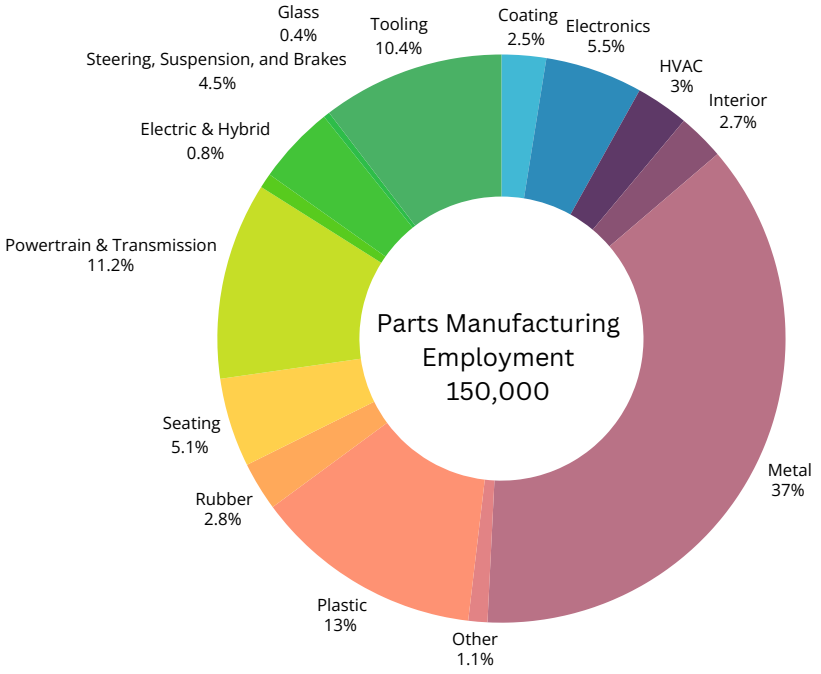



**FIGURE 5.** EMPLOYMENT DISTRIBUTION BY AUTOMOTIVE PARTS INDUSTRY IN CANADA, 2023




SOURCE: APRC DATABASE

In 2023, Canada had 1,030 automotive parts manufacturers, which employed 150,000 workers. Vehicle electrification is driving growth in electric and hybrid segments in this industry.

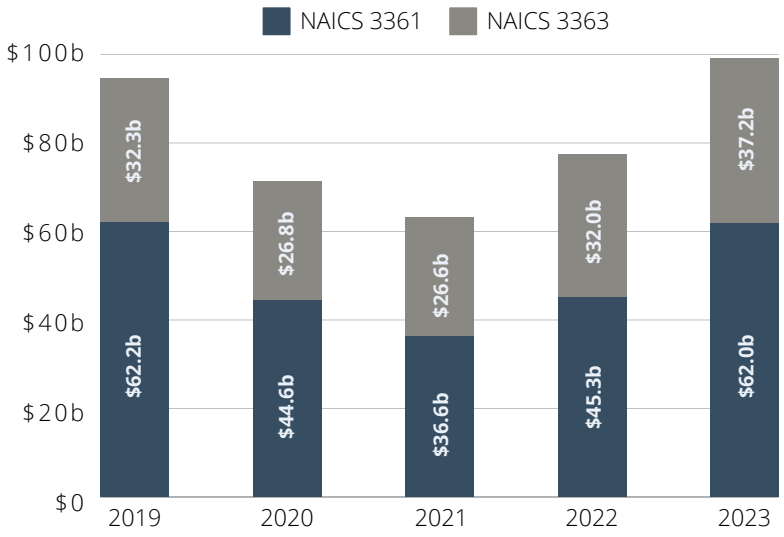
## Industry Economic Indicators

In this section, we present the performance of the Canadian automotive manufacturing industry as reported by Statistics Canada through North American Industry Classification System (NAICS) codes. There are two main 4-digit NAICS codes which are used to classify the automotive manufacturing industry: NAICS 3361 (Motor Vehicle Manufacturing) and NAICS 3363 (Motor Vehicle Parts Manufacturing). While these two NAICS codes are at the core of the automotive manufacturing industry, other parts of the industry (more specifically, companies and facilities which do not self-identity primarly under NAICS 3361 and NAICS 3363, but are nevertheless part of the automotive manufacturing supply chain) are not included in the collected statistics of these two NAICS codes. Despite this limitation, industry data for NAICS 3361 and NAICS 3363 are among the most accurate indicators of the industry's performance. In this section, industry economic indicators such as the total industry output, contribution to GDP, employment, and trade are presented.

### *Output and GDP Contribution*

Figure 6 illustrates the output of the automotive manufacturing industry from 2019 to 2023. Prior to the onset of the COVID-19 pandemic in 2020, the industry's output was stable, with a combined output of C$94.5 billion in 2019 across the vehicle assembly and parts manufacturing industries. However, the pandemic's disruptions, along with changes in production at OEM facilities, significantly impacted industry output between 2020 and 2022. From 2019 to 2021, output declined by 33.1%, reaching its lowest point in

**FIGURE 6.** OUTPUT OF AUTOMOTIVE MANUFACTURING IN CANADA, 2019 - 2023

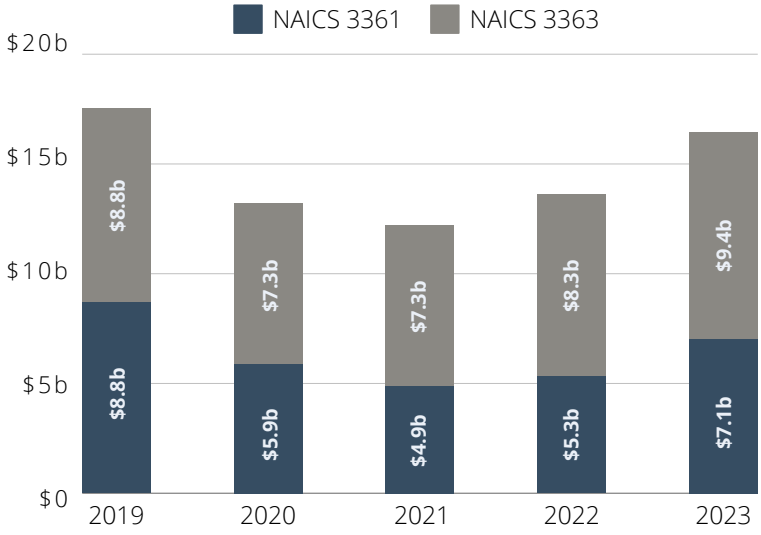



*SOURCE: STATISTICS CANADA - TABLE 16-10-0047-02*

2021 at C$36.6 billion for vehicle assembly and C$26.6 billion for parts manufacturing. Production halts in 2021, caused by the global microchip shortage and various other supply chain disruptions, along with reduced consumer demand, further suppressed output. By 2023, the industry experienced a rebound, with vehicle manufacturing output rising to C$62 billion and parts manufacturing reaching C$37.2 billion, resulting in a combined output of C$99.2 billion.

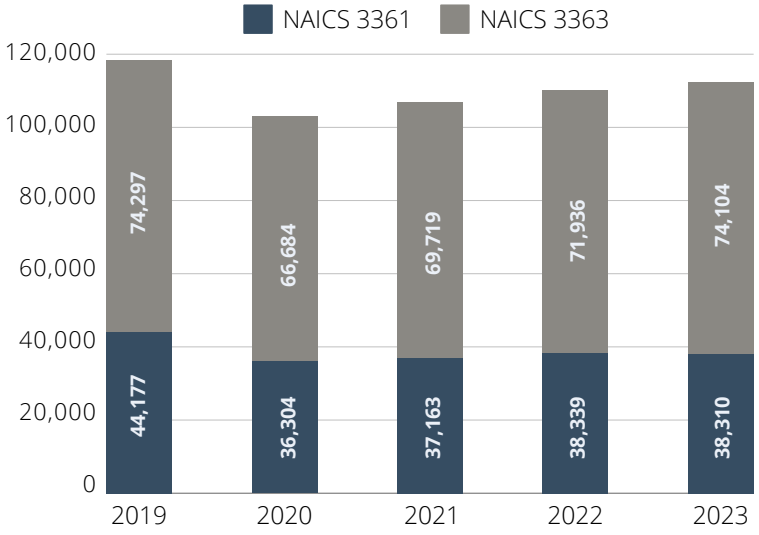
A similar trend can be observed in the contribution of automotive manufacturing to Canada's GDP (Figure 7, next page). In 2019, prior to the pandemic, the industry contributed C$17.6 billion to GDP, but this figure dropped to a low of C$12.2 billion in 2021 during the pandemic. By 2023, the GDP contribution had rebounded to C$16.5 billion. However, despite the automotive output in

**FIGURE 7.** GDP CONTRIBUTION OF AUTOMOTIVE MANUFACTURING IN CANADA, 2019 - 2023




*SOURCE: STATISTICS CANADA - TABLE 16-10-0047-02*

**FIGURE 8.** EMPLOYMENT IN VEHICLE ASSEMBLY AND PARTS MANUFACTURING, 2019 - 2023




*SOURCE: STATISTICS CANADA - TABLE 14-10-0220-02*

2023 exceeding that of 2019, the overall GDP contribution of automotive manufacturing declined by approximately C$1 billion compared to 2019.

## *Employment*

In 2019, both vehicle assembly and parts manufacturing industry employed nearly 118,500. As shown in Figure 8, this dropped to nearly 103,000 in 2020, and rebounded to more than 112,000 in 2023. However, the employment trends were somewhat different for each of these two industries. Pre-pandemic employment in 2019 was over 44,000 in vehicle assembly and over 74,000 in vehicle parts manufacturing. During the pandemic, employment in vehicle assembly dropped to roughly 36,300 in 2020 (a decrease of 17.8%), while parts manufacturing employment fell below 66,700 (a decrease of 10.2%). Although both industries saw gradual recovery, vehicle assembly employment reached roughly 38,300 by 2023, still below pre-pandemic levels, whereas parts manufacturing rebounded to its pre-pandemic levels.

As discussed in the previous section, total employment in automotive manufacturing exceeds the employment accounted for by both automotive manufacturing NAICS, as employment in some parts of the automotive manufacturing supply chain is not included under either automotive NAICS codes.

## *Trade*

In 2018, Canada's assembled vehicle imports exceeded its vehicle exports for the first time in several decades (except for 2009).[27] As shown in Table 2 (next page), Canada's automotive assembly industry has experienced continuous annual trade deficits since then, reaching C$ 23.5 billion in 2023. As for motor vehicle parts, Canada's trade deficit

from 2019 to 2021 declined from C $26.0 billion (in 2019) to C $14.8 billion (in 2021). This decline (Figure 10) was the result of declining vehicle production in Canada during the pandemic, which in turn led to lower imports of motor vehicle parts. By the end of 2023, the trade deficit in the vehicle parts manufacturing industry grew to C $25.5 billion as vehicle production gradually increased.

Between 2019 and 2021, Canada's vehicle exports (Figure 9) decreased as a result of the significant drop in production and the decline in consumer demand during the pandemic. Starting in 2021, Canada started importing significantly more assembled vehicles than it exported compared to previous years.

**TABLE 2.** CANADIAN AUTOMOTIVE TRADE BALANCE, 2019 - 2023

| | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| NAICS 3361 | -$2.6b | -$4.6b | -$19.6b | -$29.3b | -$23.5b |
| NAICS 3363 | -$26.0b | -$18.6b | -$14.8b | -$18.3b | -$25.5b |

*SOURCE: IMPORT, EXPORT, AND INVESTMENT - INDUSTRY CANADA*

**FIGURE 9.** CANADIAN VEHICLE IMPORTS AND EXPORTS, 2019 - 2023

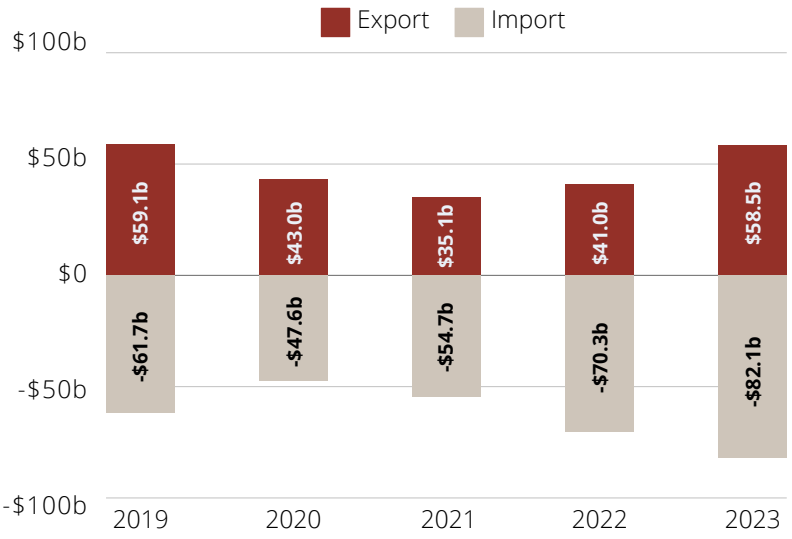
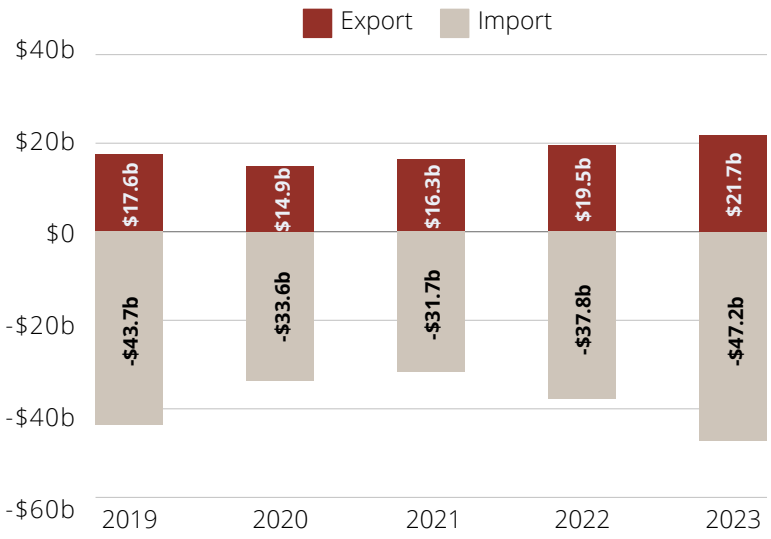



**FIGURE 10.** CANADIAN VEHICLE PARTS IMPORTS AND EXPORTS, 2019 - 2023




*SOURCE: IMPORT, EXPORT, AND INVESTMENT - INDUSTRY CANADA*

In 2023, Canada's automotive manufacturing industry achieved a combined output of close to C$100 billion. Exports of vehicles and parts reached approximately C$83.5 billion. Despite the shifts towards electrification and technological upgrades, employment in vehicle assembly and parts manufacturing sectors remained steady.

## Canadian Automotive Industry Timeline

In the following section, we present a timeline of Canada's automotive industry, covering the most significant announcements and events between January 2019 and December 2023.

**February 2019:** The last Corolla produced by Toyota at Cambridge plant, making way for the expansion of RAV4 production.

**February 2019:** The Government of Ontario announces first phase of *Driving Prosperity* automotive plan.

**May 2019:** GM Canada announces C$170 million to transition Oshawa assembly plant to stamping, sub-assembly, and autonomous vehicle testing.

**July 2020:** The USMCA trade agreement comes into effect.

**October 2020:** Ford announces a C$1.8 billion investment to bring EVs production to Oakville assembly plant (plan cancelled in 2024).

**October 2020:** Stellantis lays out a plan to invest C$1.5 billion to assemble EVs in Windsor.

**November 2020:** GM Canada announces the Oshawa plant reopening with C$1.3 billion investment.

**January 2021:** GM Canada brings BrightDrop EV600 to CAMI Ingersoll with a C$1 billion investment.

**March 2021:** Lion Electric announces a battery manufacturing plant and innovation centre in Québec.

**September 2021:** GM Canada brings BrightDrop EV400 to CAMI Ingersoll.

**October 2021:** StromVolt announced plans to invest in a battery cell manufacturing plant with a projected capacity of 10 GWh. However, no subsequent updates or developments have been publicly reported.

**October 2021:** Britishvolt reveals plans for 60GWh Canadian battery cell factory, cathode and anode production, and R&D centre. Britishvolt cancelled the plan later in 2022 citing financial challenges and shifting market conditions.

**November 2021:** GM Oshawa reopens.

**November 2021:** The Ontario government introduces the second phase of the *Driving Prosperity* automotive plan.

**March 2022:** Stellantis and LG Chem announce a joint venture to build a C$5.1 billion 45 GWh battery manufacturing plant in Windsor.

**March 2022:** GM and POSCO Chemical Co. Construction reveal plans to build CAM facility in Québec with a C$500-million price tag to supply Ultium battery factories.

**May 2022:** Stellantis announces a C$3.6 billion investment to retool its assembly plants in Windsor and Brampton, converting them to produce electric vehicles and supporting research and development initiatives.

**October 2022:** GM Canada begins construction of its Ultium CAM battery materials facility in Bécancour, Québec, in partnership with POSCO Chemical.

**December 2022:** GM officially begins production at Canada's first full-scale EV manufacturing plant in Ingersoll, Ontario, which builds the BrightDrop Zevo electric delivery van.

**April 2023:** Volkswagen and PowerCo SE announce plans to build a 90 GWh EV battery manufacturing plant in St. Thomas, Ontario.

**May 2023:** The Government of Canada and Stellantis announces an agreement to resume construction of the Windsor battery plant following a temporary halt over funding negotiations.

**August 2023:** Ford, EcoPro BM, and SK On announce plans for a C$1.2-billion cathode manufacturing facility in Bécancour, Québec, to supply EV battery materials. Ford announced it is exiting the project in 2024, but EcoPro BM and SK On proceed with construction.

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## APPENDIX A

In this appendix section, the key steps involved in battery manufacturing for electric vehicles are detailed and described:

*Mining & Exploration*
The process begins with extensive geological surveys to identify viable deposits of raw materials like lithium, cobalt, nickel, and manganese. Establishing a mining operation can take several years, with extraction methods including traditional mining techniques and newer approaches like lithium brine extraction.

*Materials Filtering & Processing*
Once extracted, these raw materials undergo refining processes to achieve the required purity levels. Lithium is typically converted into lithium carbonate or hydroxide, while cobalt and nickel are purified through various chemical treatments, such as leaching and electrolysis.

*Battery Materials Manufacturing (CAM & AAM)*
Refined materials are then transformed into cathode active material (CAM) and anode active material (AAM). The CAM manufacturing involves a series of chemical reactions and heat treatments, whereas AAM typically consists of graphite applied to copper foil.

*Battery Cell Manufacturing*
This stage involves assembling the fundamental electrochemical units by stacking the anode, cathode, and separator into a casing filled with an electrolyte. Maintaining a cleanroom environment is crucial to prevent impurities that could affect performance or safety.

*Battery Module Manufacturing*
Individual battery cells are grouped into modules, which may include sensors or voltage regulators to manage the cells' environment and performance.

*Battery Pack Assembly*
Modules are integrated into a battery pack enclosure in the final stage. This enclosure houses cooling systems and a Battery Management System (BMS) to regulate and monitor the battery's operation, preparing it for integration into EVs during vehicle assembly.

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