

TRANSPORTATION

Light-duty Vehicles



8.1 LIGHT-DUTY VEHICLES (LDVs)

Function	Mobility for work, shopping, social activities, recreation.
GHG emissions	11.4% of Canadian emissions in 2023 (78.2 Mt CO ₂ e)[215].* Represents 41% of transportation emissions; additional emissions associated with production of gasoline.
Options for decarbonization	Decarbonization pathway: Battery electric vehicles. Bridge pathway: Plug-in hybrid vehicles. Potential niche pathway: Hydrogen fuel cell vehicles. Enabling pathways: Modal shift, shared mobility models, vehicle right-sizing.
Stage of transition	Diffusion: Battery electric vehicles. Emergence: Fuel cell.
Nature of the problem today	Structural dependence of the transportation system on private vehicle ownership; uneven charging/refuelling infrastructure; slow fleet turnover with long vehicle lifetimes (10-15 years); policy and market uncertainty; supply side challenges in scaling electric vehicle production.
Other systemic issues	Air and noise pollution; traffic congestion; car-dependent land-use patterns; automotive industry manufacturing, workforce and service ecosystem transition.
Strategic opportunities and concerns	Opportunities: Electric vehicles (EVs) offer lower fuel and maintenance costs and total cost of ownership; reduced air pollution; Canada holds strategic advantages in critical minerals, clean electricity, and existing manufacturing capacity that could anchor a domestic battery and EV value chain. Concerns: Without sufficient investment in EV manufacturing and supply chains, existing Canadian auto sector jobs and industrial capacity are at risk; loss of competitiveness to global leaders; range anxiety, cold-weather performance, charging times, high voltage and fire risks, and increased dependence on original equipment manufacturers for maintenance and servicing.
Priorities for action	Subsidies and incentives for EV purchases; infrastructure investment for home, depot, and corridor charging including in multi-unit residential buildings; government fleet and procurement standards; support for domestic EV and battery manufacturing and value chain development; enable shared mobility and modal shift; consumer education on EV costs and performance; workforce training and reskilling for mechanics and service technicians.
Longer-term issues	Managing grid integration, complementary technologies, smart charging, and vehicle-to-grid; integration with connected and autonomous vehicles; end-of-life recycling/disposal; EV and battery supply chain concentration risk.
Indicators of progress	Share of zero-emissions vehicle sales and fleet; rate of fleet turnover; availability and accessibility of charging infrastructure; domestic EV and battery production capacity and value chain development; and growth of independent aftermarket service ecosystem.

* All noted references can be found in the full Playbook document.

8.1.1 Current Status

The global auto industry has been a pillar of economic development for more than a century and plays two distinct but interrelated roles in Canada's economy. First, it is the backbone of personal mobility, with roughly 89% of Canadian households relying on at least one car or light-duty truck (SUVs, pickups, vans)[216]. Second, it is a major industrial sector, directly employing more than 125,000 workers and contributing \$16.8 billion to GDP. [217] Its role in mobility has evolved gradually with the expansion of mass transit and changing travel patterns, but its role as an economic engine is poised for a fundamental transformation in the coming decades.

On the mobility front, light-duty vehicles (LDVs) play a major role in Canada's transportation system. Between 2008 and 2024, the vehicle population grew by 37% (from 19.6 million to 26.8 million), with light-duty trucks making up the fastest-growing segment.[218,219] Today, more than 80% of Canadian commuters rely on a personal vehicle to get to work, underscoring the central role of LDVs in Canada's transportation system.[220]

In addition to its large share of personal transport, Canada has a substantial auto manufacturing sector that is a major economic driver. Five multinational companies (Stellantis, Ford, GM, Honda and Toyota) operate vehicle assembly plants, supported by a network of parts suppliers, machine tool and electronics firms, and testing and R&D facilities.

The fundamentals of this industry have changed drastically over the past two decades. In the early 2000s, production was dominated by a relatively stable cohort of North American, European, and Japanese manufacturers

competing primarily on brand, features, and incremental improvements within an internal combustion engine (ICE) system. Back then, Canada was assembling roughly 2.9 million vehicles per year, accounting for about 17% of North American output.[221]

Canada's position in the global market has been in steady decline since then. By 2024, assembly had fallen to approximately 1.3 million units—a decline of more than half. Over the same period, Canada's share of North American production dropped by more than eight percentage points, as Mexico overtook Canada as the continent's lowest-cost producer.[222] The shift to electric powertrains is moving the centre of industrial value to battery supply chains which Chinese firms now dominate. In fact, China went from producing roughly 2 million vehicles in 2000 to over 31 million by 2024.[223]

This decline in manufacturing comes at a time when supply chains are reorganizing around electrification of LDVs. The five Canadian assemblers are all legacy ICE-oriented manufacturers, and incumbent automakers across North America and Europe have struggled with this transition. U.S.-based automakers have been particularly hard hit in recent years. They belatedly began to invest heavily in EV production under the Biden administration, which provided subsidies for EV purchases and generous support for battery plants and EV assembly facilities. With the election of President Trump, the policy environment was reversed. The removal of production and consumption incentives for electrification, as well as the tariff and trade-related disruptions to the integrated North American auto market, caused billions of dollars in losses for legacy automakers.[224]

For the Canadian industry, the trade issue is existential, with the U.S. threatening to end or dramatically re-write the Canada-U.S.-Mexico free trade agreement (CUSMA), potentially robbing the export-oriented Canadian industry of access to its critical market.[225] The automotive industry provides the country's second-largest export. Most motor vehicles and parts go to the United States (94% in 2024).[226] This leaves the sector highly exposed to shifts in U.S. trade policy, continental industrial strategy, and cross-border supply chain dynamics at precisely the moment when the global industry is being reorganized around electrification and new centres of competitive advantage.[227]

In Canada, zero-emission vehicles (ZEVs) reached 18.3% of new vehicle registrations in 2024, falling back to 11.2% in 2025. These dynamics—the pace of electrification, the concentration of battery supply chains, and the repositioning of major producers—are increasingly shaping vehicle availability, costs, and competitiveness in the Canadian market.

8.1.2 Nature of the Problem

GHG emissions from LDVs are a central decarbonization challenge in Canada as they make up 11.4% of the national emissions (78.2 Mt). 41% of Canadian transportation emissions overall are from LDVs.[215] Almost all LDVs run on gasoline (95% of LDV energy consumption); the remaining 5% run on diesel, propane, electricity and natural gas.[228]

Over time, the fuel efficiency of internal combustion engine (ICE) vehicles has improved, mainly due to strict air pollution regulations.[229] Though these measures have lowered GHG emissions per vehicle, total annual LDV emissions have not declined

significantly.[230] This reflects both growth in the vehicle fleet and a shift toward larger, less efficient vehicles—particularly SUVs and pickup trucks, which now dominate the market.[231,232]

The core challenge is therefore structural. Canada's transportation system is highly dependent on personal vehicles, and the existing vehicle population is overwhelmingly powered by ICEs. Vehicles also have long lifetimes, often 10–15 years or more, meaning that emissions reductions depend not only on new vehicle sales, but on the gradual turnover of the existing fleet.

Decarbonizing the LDV sector requires a system-wide transition to ZEVs, alongside supporting infrastructure and policy. Several key challenges remain:

- **Charging:** Infrastructure is expanding but remains uneven, especially in rural and remote areas and for residents of multistory buildings; access, cost, and charging time remain barriers.[233]
- **Grid capacity and infrastructure readiness:** Large-scale electrification will require significant expansion and coordination of electricity systems.
- **Affordability of ZEVs:** Higher upfront costs remain a barrier, particularly for high-demand vehicle segments such as pickup trucks and SUVs.[234]
- **Technology perceptions:** Concerns about range, cold-weather performance, and safety persist, though they are diminishing.
- **Policy and market uncertainty:** Changing ZEV sales mandates, consumer incentives, and trade measures create uncertainty for consumers and investors.

- **Workforce and service ecosystem transition:** Electrification reduces mechanical complexity and shifts maintenance needs, increasing dependence on original equipment manufacturers (OEMs) and requiring reskilling of mechanics and service workers.

The battery supply chain that underpins the new industrial architecture is concentrated in China, not North America. The window for Canada to build a meaningful position in EV and battery production is narrowing. If it closes, the long-running erosion of Canada's auto sector will accelerate as the global transition gathers pace. The problem is particularly acute in the absence of a home-grown OEM.

8.1.3 Net-Zero Pathways

Decarbonizing Canada's LDV sector requires transforming both vehicle technologies and the broader transportation system.

LDV decarbonization

There are two main technological routes to decarbonize power trains in vehicles: electrification or the use of alternative fuels. Electric vehicles are largely seen as the better solution and, therefore, the focus of this section. For an evaluation of the difficulties with alternative fuel approaches—such as blending ethanol with gasoline, switching to renewable natural gas, biofuel vehicles, or synthetic (non-fossil-derived) gasoline—see the assessment table below.

The movement to net-zero GHG emissions requires a fundamental shift in vehicle design away from ICEs. Battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs, which have auxiliary gasoline motors), hybrid-electric vehicles (HEVs, with gasoline engines and battery storage charged from regenerative braking), or hydrogen fuel cell electric vehicles (FCEVs) are alternatives. BEVs offer lower

lifetime vehicle costs (reduced operating and maintenance costs), improved performance, and elimination of tailpipe air pollutants (i.e. particulate matter, nitrogen oxides, VOCs). HEVs, without plug-in capabilities, are not discussed further, as they are a dead-end pathway, not a bridge between gasoline and electric vehicles. They require gasoline to operate and do not drive the buildout of charging infrastructure required by BEVs.

BEVs are in the diffusion phase and are the dominant ZEV design. Vehicle functionality has improved, and producers are benefiting from improved economies of scale, infrastructure rollout, complementary innovations, and favourable regulatory and policy frameworks.[77] PHEVs are also in diffusion, offering a bridge pathway between ICE and fully electric powertrains. FCEVs remain in the emergence phase with limited infrastructure and niche applications.

The total cost of ownership for BEVs is now often lower than that of ICE vehicles, driven in part by global battery pack prices dropping 25% compared to 2023 levels.[235] While EVs experience only slightly greater range reductions in cold weather than ICE vehicles (14%–39% versus 12%–28%), performance in low temperatures can be a concern. That said, cold-weather performance and overall vehicle range (both major consumer concerns) have steadily improved over time.[236–238]

The deployment of charging infrastructure has expanded significantly across Canada, from 313 chargers in 2019 to close to 40,000 in 2024, but remains uneven across regions, particularly in rural and remote areas (Figure 22).[151,233]

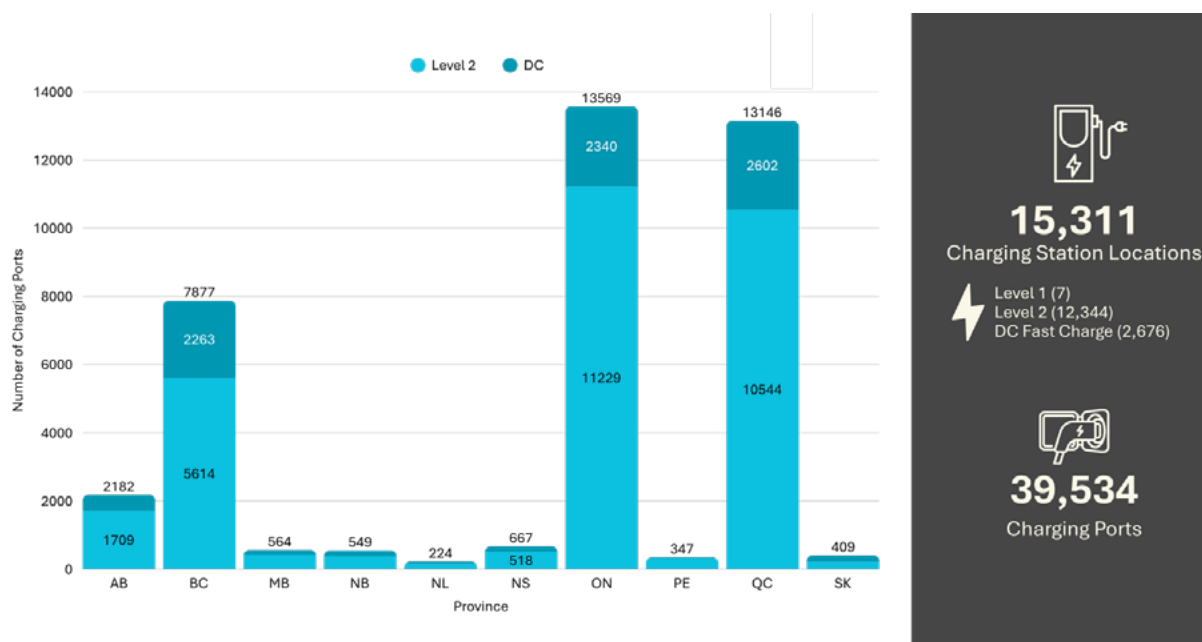


Figure 22. Total number of EV charging station locations and charging ports by province and charger type
Source: Natural Resources Canada, 2024. Electric Charging and Alternative Fuelling Stations Locator.[151]

Broader transportation system changes

Electrification alone will not achieve net-zero emissions. Reducing demand and shifting travel behaviour are also essential.

Modal shift: Increasing the share of trips made by public transit, active transportation (walking and cycling), and shared mobility (carpooling) can significantly reduce per-capita emissions, particularly in urban areas.[239]

Shared mobility services: The growth of car-sharing platforms, ride-hailing, micromobility and other mobility-as-a-service models can reduce vehicle ownership and increase utilization rates, lowering total vehicle numbers over time.[240–242]

Vehicle efficiency and right-sizing:

Encouraging smaller, more efficient vehicles (particularly in urban contexts) can reduce energy demand even as electrification progresses.[243]

Efficient land-use planning: Compact, transit-oriented development can reduce reliance on personal vehicles, shorten or consolidate trip distances, and support lower-emission travel behaviours.[243]

Automotive industry transformation

Over the past decade, international EV production has ramped up to exceed 17 million in 2024, with over 70% of that production taking place in China.[244] Globally, EVs make up about 22% of car sales but have taken a larger share in a few lead markets (Norway 92%, Sweden 58%, Denmark 56%, Finland 50%, and China and the Netherlands 48%).[245] The balance of sales between types of EVs in 2024 was dominated by BEVs with 86% of sales. PHEVs made up 14%, and FCEVs remained negligible.[245]

While early innovation in modern electric vehicles was driven by new entrants such as Tesla, the current phase is characterized by the rise of Chinese manufacturers.[246] Firms such as BYD, SAIC, and Geely now lead in scale, cost competitiveness, and speed of innovation, supported by deep integration across battery supply chains, critical minerals processing, and manufacturing ecosystems. China accounts for the majority of global EV production and sales, and in 2025, BYD overtook Tesla as the world's largest EV manufacturer.[247]

In North America, the pace and structure of the transition to electric vehicles have been increasingly shaped by trade and industrial policy disruption. U.S. tariffs on vehicles, steel, and auto parts have placed significant pressure on Canada's auto industry. In response, Canada has adjusted elements of its regulatory approach, reducing the EV sales target to 75% in 2035, and developing new vehicle emissions standards. Canada has also recently announced strategic partnerships with South Korea and China that aim to strengthen domestic EV manufacturing and position Canada within a more diversified global market.[248–250] EV adoption is proceeding gradually in Canada reflecting a smaller market scale, less mature supply chains, and evolving policy and trade conditions.

Automobile production in Ontario is today based almost entirely around ICE vehicles. As the global transition in this sector gathers pace, existing manufacturing jobs face growing long-term uncertainty. Expanding EV market share and strengthening domestic industrial capacity are essential to a competitive Canadian auto industry.

While the direction of travel with vehicle electrification is clear, the pace of change remains very much in question. Breakthrough technologies rarely progress in a smooth line. The automobile's original century-long rise was punctuated by plateaus and dips that, with hindsight, look like minor ripples. The message for EVs is clear: short-term setbacks in cost, infrastructure, or supply chains are normal features of the diffusion curve—not signs that the transition is stalling.

Canada's advantage in electric vehicles lies in its potential to develop an integrated battery and automotive value chain anchored in critical minerals, clean electricity, and existing automotive manufacturing capacity. Canada holds significant reserves of key battery inputs (i.e. nickel, cobalt, lithium, and graphite) and has an established mining sector, but current analysis shows that much of the value in global supply chains is captured downstream in refining, battery materials, and cell production. Federal benchmarking highlights that while Canada has activity across the battery ecosystem, midstream capacity—such as battery-grade chemicals, cathode and anode materials, and cell manufacturing—remains limited, representing both a gap and a strategic opportunity.[251]

Canada cannot expect to be a first-rank player in the global automotive industry (like Germany, China, or the United States), but even a second-tier position with a strong presence in particular niches could generate substantial economic value. Attracting foreign partners can speed up development. It is not clear that incumbent auto makers will dominate EV production in the future. New entrants are joining the sector, and battery and drive-chain technologies are still at the beginning of their development curves. If Canada is to have a place in this future, governments must take an active role to chart a path forward, build capacity, attract capital, and support training and R&D.

8.1.4 Priorities for Action

Ensure affordability and broaden access to EVs

Currently, federal and provincial governments offer a range of incentives to encourage light-duty EV purchases, and initial investments have been made in vehicle charging networks. As of the beginning of 2026, the federal government has launched a five-year EV affordability program with purchase or lease incentives up to \$5,000 for BEVs and \$2,500 for PHEVs. This incentive prioritizes vehicles under \$50,000 and Canadian-made EVs.[248] Provincial incentives for light-duty EVs are additive to federal incentives, constantly evolving, and vary considerably by province or territory.

Purchase incentives will remain necessary in the near term but should evolve to become more targeted and efficient. Policy actions include:

- Maintaining time-limited, declining purchase incentives to bridge the upfront cost gap until parity is reached.
- Expanding support for used EV markets (i.e. tax credits, financing tools, and certification programs).
- Targeting incentives toward segments with high emissions or financial need (i.e. high-mileage drivers, fleets, rural or remote users, low and middle-income households, small business operators).
- Expanding access to lower-cost ZEV models (i.e. the recent allowance of Chinese EVs in the Canadian market).[249]

Build a targeted charging ecosystem

Infrastructure remains a major barrier, but the issue is not simply the total number of chargers. Canadian and international experience point to the need to be strategic in charging build-out. Most charging happens at home, but future adoption will increasingly depend on access in multi-unit residential buildings (MURB) and along inter-city corridors. A recent Canadian infrastructure analysis found that meeting future demand will require major retrofits in multifamily buildings and policy changes to ensure new housing is EV-ready.[252] Though the government is investing \$1.5 billion into building out charging and hydrogen fuelling infrastructure, Canada still lacks a clear roadmap for infrastructure expansion. [248,253,254]

Priority actions, therefore, include:

- Prioritizing **home and depot charging**, where most charging occurs.
- Accelerating deployment in **MURBs** through building codes, retrofit incentives, and regulatory changes.[255,256]
- Building out **fast-charging corridors** to support inter-city travel and reduce range anxiety.
- Targeting **rural, remote, and underserved regions** where private investment is less likely.
- Enabling **private-sector investment models** (utilities, charging networks, real estate developers).
- Integrating charging rollout with **grid planning and demand management** (smart charging, time-of-use pricing, “vehicle to grid” energy storage applications) to ensure sufficient grid capacity.

Provide stable policy signals and align supply with demand

A coherent and durable policy framework is essential to support both consumer adoption and industry investment. Though ZEV sales are growing, Canada lacks a time-phased roadmap that coordinates vehicle, infrastructure, and market policies. Providing long-term emissions standards, charging investments, procurement signals, aligned provincial and federal policies, and consumer incentives while avoiding abrupt stop-start changes will ensure consumer confidence and manufacturer investment. Public procurement and government fleet commitments can also play a useful anchoring role by creating predictable demand.[248,257–259]

Link consumer transition to industrial strategy and battery value chains

For Canada, the LDV transition is not only about reducing emissions from vehicles already on the road; it is also about whether the country captures economic value from the shift to electrification. The 2026 federal auto strategy explicitly links EV adoption to a broader industrial agenda, including investment support for manufacturing, tax incentives for zero-emission technology manufacturers, worker reskilling, and efforts to diversify trade relationships.[248] Priority actions should therefore support the buildout of battery and EV value chains in ways that move Canada beyond the role of raw materials supplier. This includes refining and processing capacity, battery materials, cell production, pack assembly, electric and autonomous vehicle manufacturing, and second-life battery applications and battery recycling, along with research, commercialization, and workforce development.[260,261]

Enable system-level shifts in mobility and vehicle use

Electrification alone will not fully offset emissions growth driven by increasing vehicle numbers, larger vehicles, and car-dependent land-use patterns. Actions should focus on encouraging modal shift to public transit or active transport, promoting vehicle right-sizing particularly in urban areas, enabling shared mobility models (carsharing, ridesharing, mobility-as-a-service), and integrating transportation with land-use planning to reduce travel demand and private vehicle dependence.

Build public awareness, confidence, and market readiness

Consumer perceptions remain a significant barrier, particularly around cost, range, charging access, and performance in Canadian conditions. Priority actions include:

- Implementing public information campaigns on EV costs, performance, and benefits.
- Working with dealerships, utilities, and municipalities to improve consumer education and engagement.

Prepare the workforce

Priority actions should include training for mechanics and technicians to work safely with high-voltage systems, support for independent repair and aftermarket service capacity, and measures to reduce overdependence on OEM-controlled servicing. A stronger local maintenance and repair ecosystem would improve consumer confidence, support employment, and help ensure that EV adoption does not create new service bottlenecks.

 Fails to meet criteria Meets in some respect
 Not promising Potentially meets criteria
 Meets criteria

8.1.5 LDVs Pathways Table

				Economic		Technical			Social		
PATHWAY ELEMENTS	ROLE IN NET-ZERO SYSTEM	SIGNAL TO DECISION-MAKERS	ALIGNMENT WITH CARBON NEUTRALITY	ECONOMIC VIABILITY	ECONOMIC DEVELOPMENT OPPORTUNITY	MATURITY	OPERATIONAL FIT	INFRA-STRUCTURE AND SUPPLY CHAIN SUITABILITY	SOCIAL ACCEPTABILITY	RELEVANCE TO STAKEHOLDERS	RELATED BENEFITS AND COSTS
Battery Electric	Priority Decarbonization Pathway Backbone of LDV decarbonization.	Deploy Mass deployment now. Scale charging infrastructure.	Zero tailpipe emissions. Dependent on decarbonizing grid electricity and supply chain (net-zero lifecycle vehicles).	Purchase cost still higher than ICE vehicles but improving. Total cost of ownership often at or below ICE with lower fuel/maintenance.	Strategic opportunity: batteries/critical minerals and assembly. Links to autonomous vehicle development.	Mass market deployment, battery range continues to increase as costs fall. Future technological improvements possible.	Works across Canada. Winter range and multi unit home charging remain serious operational constraints.	Rapidly expanding public charging. Grid planning underway. Some regional disparities in grid readiness and charger deployment.	No particular concern.	Compelling to emerging producers. Alignment among governments and utilities with sales targets. Some opposition from incumbents.	Air quality and health gains. Vehicle-to-to-grid energy storage potential. Prepared for connection with autonomous technologies. Lifecycle emissions and pollution associated with battery production and disposal.
Plug-in Hybrid Electric	Bridge Pathway Useful in the near term to facilitate transition to battery electric. Good for long trips/cold regions when charged frequently. Not a fully decarbonized solution.	Deploy Deploy PHEVs. as a complementary option for BEVs. Scale charging infrastructure.	Meaningful reductions only with high electric miles share. Complements transition to BEVs but not compatible with net zero.	Competitive total cost of ownership in some use cases. Lower upfront cost than BEVs but higher than ICE.	Targeted value in engineering, dealerships, and service. Limited incremental manufacturing advantage vs. BEVs.	Fully commercial across segments. Extensive Canadian availability.	Works with today's fuelling plus home/workplace charging. Ideal for rural/long distance drivers who can plug in.	Compatible with existing retail fuel network and Level 2 charging. Minimal new infrastructure required.	Pragmatic. Acceptance drops when real world emissions underperform. Helps accustom consumers to vehicle charging and eases range anxieties.	Automakers and some provinces use PHEVs to meet near term ZEV targets. Crediting is bounded in the federal standard.	Mixed: benefits depend on charging behaviour. Fewer local air quality gains if driven mostly on gasoline. Lifecycle emissions and pollution associated with battery production and disposal.
Hybrid Electric (gasoline engine with battery and regenerative braking)	Dead-End Pathway Small GHG cuts but retains gasoline lock in. Absent from credible net-zero LDV end state.	Dismiss End support. Prioritize support for BEVs and PHEVs.	Limited emissions reduction and slows transition to better alternatives. perpetuates fossil fuel use.	Competitive with ICE vehicles.	Not relevant in a decarbonizing world.	Fully commercial.	Works with today's fuelling and improves vehicle acceleration.	Compatible with existing retail fuel network.	No particular concerns.	Less relevant to government and producers than BEVs and PHEVs as they are not compatible with net zero.	Continued reliance on fossil fuels. Doesn't address air quality concerns. Slows transition to better alternatives.

PATHWAY ELEMENTS	ROLE IN NET-ZERO SYSTEM	SIGNAL TO DECISION-MAKERS	ALIGNMENT WITH CARBON NEUTRALITY	Economic		Technical			Social		
				ECONOMIC VIABILITY	ECONOMIC DEVELOPMENT OPPORTUNITY	MATURITY	OPERATIONAL FIT	INFRA-STRUCTURE AND SUPPLY CHAIN SUITABILITY	SOCIAL ACCEPTABILITY	RELEVANCE TO STAKEHOLDERS	RELATED BENEFITS AND COSTS
Hydrogen Fuel Cell	<i>Potential Niche Pathway</i> Applicable in regions or remote areas where very long range is required, or local hydrogen infrastructure is well established.	Don't Prioritize Very niche applications (remote or robust hydrogen infrastructure).	Achieves zero emissions when supplied with low- carbon hydrogen.	Vehicles and hydrogen costs are high in most locations. Dependent on hydrogen cost reduction and policy support.	Could help drive local hydrogen economy growth and spur jobs in hydrogen production, refuelling, and fuel-cell manufacturing.	Some models exist. Focus is on developing medium- and heavy-duty vehicles.	Good for long-range vehicles or where hydrogen infrastructure is present. Most LDV applications are better suited for BEVs.	Need new, large-scale hydrogen fuelling network which must be built alongside vehicle adoption to overcome infrastructure and supply challenges.	Supported in regions with hydrogen build out or remote areas. Broad acceptance hinges on fuelling infrastructure, costs, and safety.	Most stakeholders backing BEVs and PHEVs for LDVs. Some interest from provincial or municipal governments where hydrogen is present or electrical infrastructure is lacking.	No air pollution. Supports renewable integration, and enables broader hydrogen use across sectors.
FUELS											
Ethanol-Blended Gasoline	Dead-End Pathway Small lifecycle GHG cuts but retains combustion lock in. Absent from credible net zero LDV end state.	Dismiss Phase out. Focus efforts on other solutions with net-zero alignment and more economic opportunity.	Delivers modest GHG reductions via blending but can't fully decarbonize LDVs.	Low incremental cost increase for E10. Viability tied to feedstock prices.	Targeted gains for farm regions and existing biorefineries. Limited growth vs. ZEV supply chains. Not relevant in a decarbonizing world.	Fully commercial and ubiquitous in Canada.	Drop in up to E10 across existing vehicle fleet. Higher blends need engine compatibility.	Uses current storage, pipelines, and retail fuelling. No new networks required.	Mixed. seen as lower carbon but concerns persist on land use and air toxins. Acceptance is context specific.	Supported by fuel producers and some provinces. Peripheral for long term LDV decarbonization.	Continued air pollution. Limited co benefits. Upstream land/water impacts can offset gains unless strong safeguards are applied.
Synthetic gasoline	<i>Potential Dead-End Pathway</i> No Canadian deployments, and outcomes hinge on scarce, costly clean power and captured CO ₂ .	Don't Prioritize May be relevant in the future in very remote applications. No action currently until maturity and economics improve.	Can be very low carbon when produced with clean hydrogen, electricity, and CO ₂ , suited for remote niches.	Production costs much higher than conventional gasoline with viability dependent on high, long-term subsidies and very cheap renewable power.	Could generate niche projects but scale is very uncertain.	Novel solution in R&D phases, no commercial supply.	Works in all current gasoline vehicles with no retrofits. Fuelling, maintenance, and driver practices remain unchanged.	Downstream distribution is compatible. Upstream supply chains are nascent and require significant new investment and coordination.	Public awareness is low. Acceptance will depend on framing. Conceptually attractive as a "drop-in" net-zero fuel.	Refineries, fuel suppliers, and some OEMs to preserve combustion assets.	Benefits are offset by large energy losses. Net benefits materialize only in narrow circumstances (i.e., no electrification option).

			ALIGNMENT WITH CARBON NEUTRALITY	Economic		Technical			Social		
PATHWAY ELEMENTS	ROLE IN NET-ZERO SYSTEM	SIGNAL TO DECISION- MAKERS		ECONOMIC VIABILITY	ECONOMIC DEVELOPMENT OPPORTUNITY	MATURITY	OPERATIONAL FIT	INFRA- STRUCTURE AND SUPPLY CHAIN SUITABILITY	SOCIAL ACCEPTABILITY	RELEVANCE TO STAKEHOLDERS	RELATED BENEFITS AND COSTS
TRANSPORTATION SYSTEMS											
Modal Shift (to public transit or active mobility)	Enabling Pathway Reduces car dependence and associated emissions, applicable mostly to urban areas.	Deploy Continue to improve and build out well-designed transit systems. Provide education, incentives, and policy support to encourage modal shift.									
			Proven to reduce car trips and emissions when paired with better service.	Urban infrastructure construction and operational funding for transit poses financing challenges.	Supports service expansion and economic productivity.	Mature.	Strongest in dense cores with viable transit alternatives.	Mass transit and bicycle infrastructure investments required for urban centres.	Acceptance grows post-implementation as benefits materialize.	Cities, provinces and utilities use these to meet goals.	Traffic, safety, air-quality gains. Equity improves with targeted discounts.
Shared Mobility Models	Enabling Pathway Reduces vehicle ownership; associated with significant life-cycle emissions reductions, especially when integrated with autonomous vehicles.	Deploy Integrate with existing transit systems. Provide education on use of digital platforms.									
			Reductions depend on methods chosen, vehicles used, and integration with automation.	Reduced necessity for personal car ownership comes with significant household savings.	Growth in service-based economy. Increases transit efficiency. Benefits concentrated to urban regions.	Commercial. Ride-hailing, car-sharing, and micro mobility used today. Profitability and integration with public transit still evolving.	Strong fit in urban contexts with some changes to transit coordination, use of digital platforms, and travel behaviours. Operations more difficult in rural or low-demand areas.	Largely compatibility with existing infrastructure with modest digital, fleet, or road upgrades.	Generally accepted due to convenience and cost saving. Access and equity issues in smaller communities.	Relevant to urban locations, transit providers, and private stakeholders. Automakers have taken note. Engagement strongest in cities.	Reduced vehicle ownership, congestion, and parking demand. Can improve transportation accessibility. Some concerns with transit replacement if not integrated.