REPORT OF THE

Expert Advisory Council *to the* Minister of Conservation & Climate

Recommendations for a Green Transportation Strategy for Manitoba

JUNE 2021

List of Abbreviations

EAC	Expert Advisory Council
YAC	Youth Advisory Council
SWG	Sector Working Group
CSA	Carbon Savings Account
HDV	Heavy Duty Vehicle
EV	Electric Vehicle
ZEVs	Zero Emission Vehicles

Table of Contents

Letter to the Minister of Conservation & Climate

Dear Minister,

We are pleased to present you with the second advisory report of the Expert Advisory Council (EAC) established under Section 7 of The Climate and Green Plan Act. This report contains our recommendations and advice to you for a future Green Transportation Strategy pursuant to the January 6, 2020 Mandate Letter that you provided to the EAC.

The importance of the transportation sector in Manitoba is clear. With our central position in the country, Manitoba is a transportation hub for people and products moving across Canada, into the United States, as well as to international markets though the port of Churchill by sea or over the arctic circle by air. This expertise in transportation logistics is an advantage that Manitoba can leverage and continue to build on to become a globally recognised leader. The transportation sector in Manitoba also contributes almost 40% of our total greenhouse gas emissions. It is with these considerations in mind that we present our report and advice on the establishment of a green transportation strategy.

We offer this independent advice based on extensive research and stakeholder engagement. We have spoken to stakeholders representing municipalities, private businesses, industry and resource development sectors, environmental groups, community associations, civil society organizations, and others. We have dedicated significant effort to consider all input to provide recommendations that reflect the best interests and opportunities for the province and its citizens.

Our advice centres on critical areas in the transportation sector and related infrastructure. These recommendations provide the first step in establishing a green transportation strategy for Manitoba. We believe that, by accepting the recommendations and associated advice herein, your government will continue to be on a solid path towards becoming the cleanest, greenest and most climate resilient province in Canada.

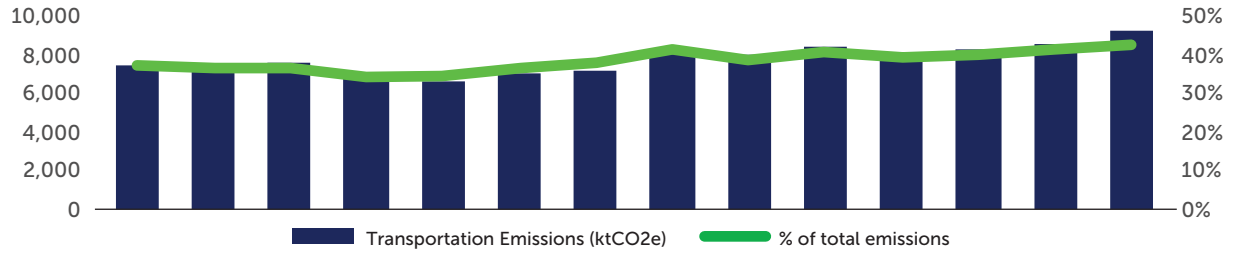
Sincerely,

Original signed by EAC Members

1. Introduction

In 2017, the Made-in-Manitoba Climate and Green Plan set a vision for Manitoba to become the cleanest, greenest, most climate resilient province in Canada. With almost 40% of Manitoba's emissions coming from transportation, a targeted strategy is needed to reduce emissions in this sector. Based on almost three years of research, expert presentations, and consultations with expert stakeholders, we have found that the types of vehicles and related infrastructure in use across the province has an enormous influence on whether or not Manitobans are able to reduce transportation emissions. The vehicles and infrastructure in use by Manitobans have evolved to enable, and sometimes dictate, the choices of citizens, consumers, and businesses in how they move around the province or deliver materials and goods. Reducing transportation emissions will require more than a well-meaning intention to make low carbon choices. It will also require increasing access to low and zero carbon modes of transportation, more efficient, convenient, and safe travel corridors, and a greater level of awareness of the opportunities and benefits associated with green transportation. These will support and enable the firm decisions that our province must take to realise a cleaner, greener transportation sector.

Trend in Transportation Emissions & Share of Total Provincial Emissions (%), 2005-2018



Data Source: 2020 National Inventory Report

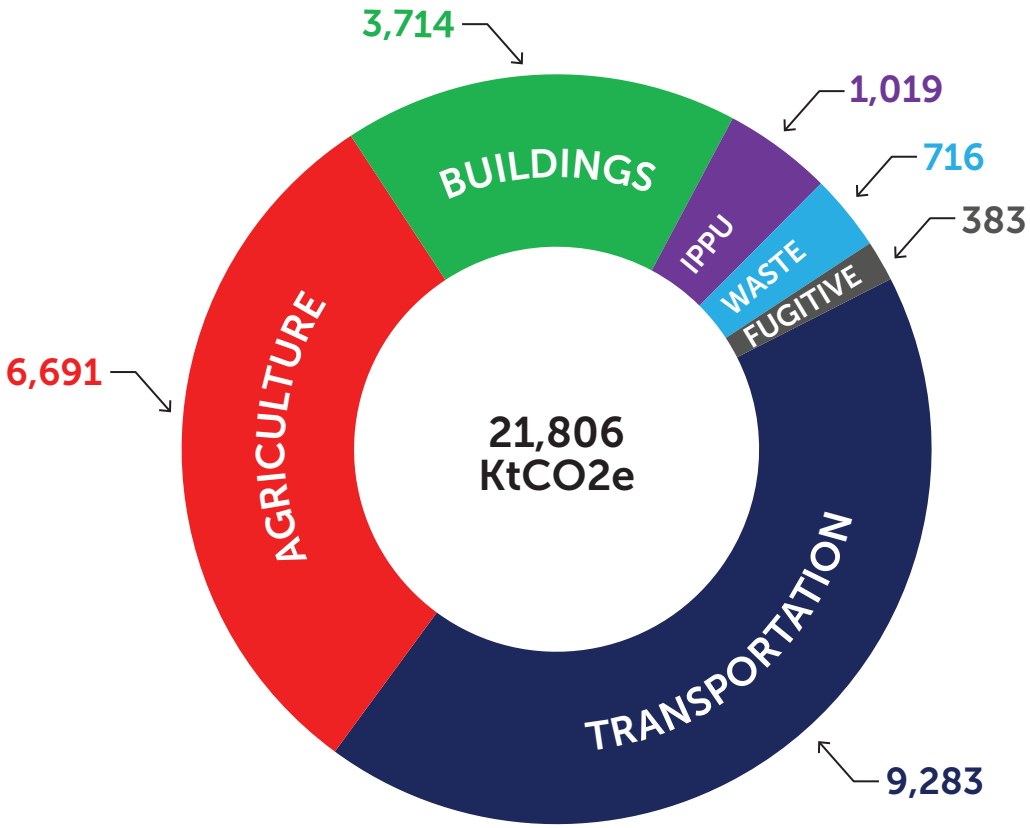
To achieve this low carbon transportation future, the Expert Advisory Council (EAC) believes it is critical that Manitoba develop a comprehensive strategic framework on how to adapt its existing transportation and infrastructure systems to meet the emerging realities of a low carbon economy while taking full advantage of the new opportunities for zero carbon transportation in Manitoba.

This report summarises the work undertaken by the EAC, with support from the Youth Advisory Council (YAC)[1], as they worked to fulfill their mandate from the Minister to "provide advice and recommendations for a provincial strategy on greening transportation and infrastructure recognizing the transition to a low carbon economy".

Section 2 recounts some of the key research questions that the EAC identified as pertinent to their mandate, and provides a summary of the research undertaken over the past three years. Section 3 offers an overview of the expert input and advice on several aspects of Manitoba's transportation sector. Section 4 summarises the results of stakeholder contributions through in-person meetings, webinars, a survey, and documents submitted for EAC consideration. Based on the research, expert advice, and stakeholder input, section 5 contains the key recommendations by the EAC for the Minister's consideration.

1 The YAC is a subcommittee of the Expert Advisory Council. As part of the YAC's mandate, they assisted the EAC with its transportation mandate including attendance and involvement in the stakeholder engagement sessions, submitting responses to the engagement questions, and advising from a youth perspective on the key issues. The YAC's input has been included throughout this report.

Manitoba's Emissions Profile, 2018



TRANSPORTATION	KtCO2e
Road Transportation	6015
Other Transportation	1907
Railways	881
Domestic Aviation	481

AGRICULTURE	
Agricultural Soils	3242
Enteric Fermentation	2385
Manure Management	737
Liming, Urea, & Other Fertilizers	309
Field Burning of Agricultural Residues	19

BUILDINGS	KtCO2e
Manufacturing Industries	1524
Residential	1223
Commercial & Institutional	632
Construction	125
Mining	120
Ag & Forestry	49
Public Electricity & Heat	41

IPPU	
Consumption of Halocarbons	493
Non-Energy Products	443
Mineral Products	61
Other Product Manufacture & Use	23

WASTE	KtCO2e
Solid Waste Disposal	636
Wastewater Treatment & Discharge	48
Industrial Wood Waste	23
Biological Treatment of Solid Waste	9

FUGITIVE	
Oil and Natural Gas	383

Data Source: 2020 National Inventory Report

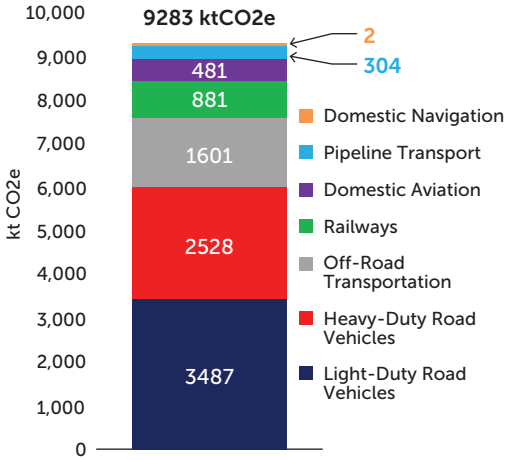
2. Research

The Expert Advisory Council's report and recommendations have been informed through research into various aspects of transportation system development related to the Manitoba context. This included background research on the provincial transportation sector, comparative analysis looking for activities and best practices in other jurisdictions, as well as evaluations of research and other input provided by external organizations.

The Transportation Sector in Manitoba

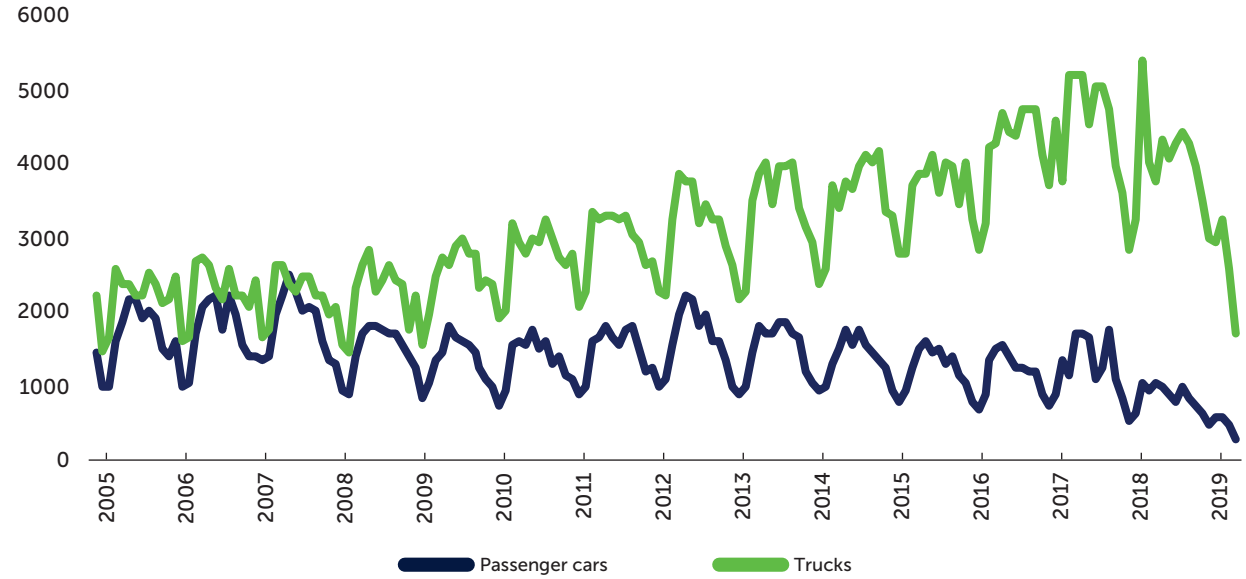
The EAC reviewed the historical, economic, and technical characteristics of the Manitoba transportation sector, with a focus on (1) how the market for sales of new motor vehicles (cars and light-duty trucks) is structured in Canada and Manitoba, and (2) how the Manitoba sector compares to other provinces. Key findings of this research showed that as a comparatively small segment of the global industry, Manitoba mostly adopts national regulations regarding vehicles, fuels, and related standards. As a small market, Manitoba has limited leverage to influence the global auto sector in terms of vehicle performance/efficiency standards or types of vehicles manufactured. Likewise, since there are no petroleum refineries and only one bioethanol refinery in Manitoba, the province has little influence on the fuel supply. However, Manitoba does have limited influence in certain regulatory areas, including: taxation (fuel tax, carbon levy), environmental, health and safety regulations (e.g., fuel storage, fuel quality standards), fuel types (e.g., biofuels mandates), and vehicle types (e.g., size, weight).

Composition of Transportation Emissions, Manitoba, 2018



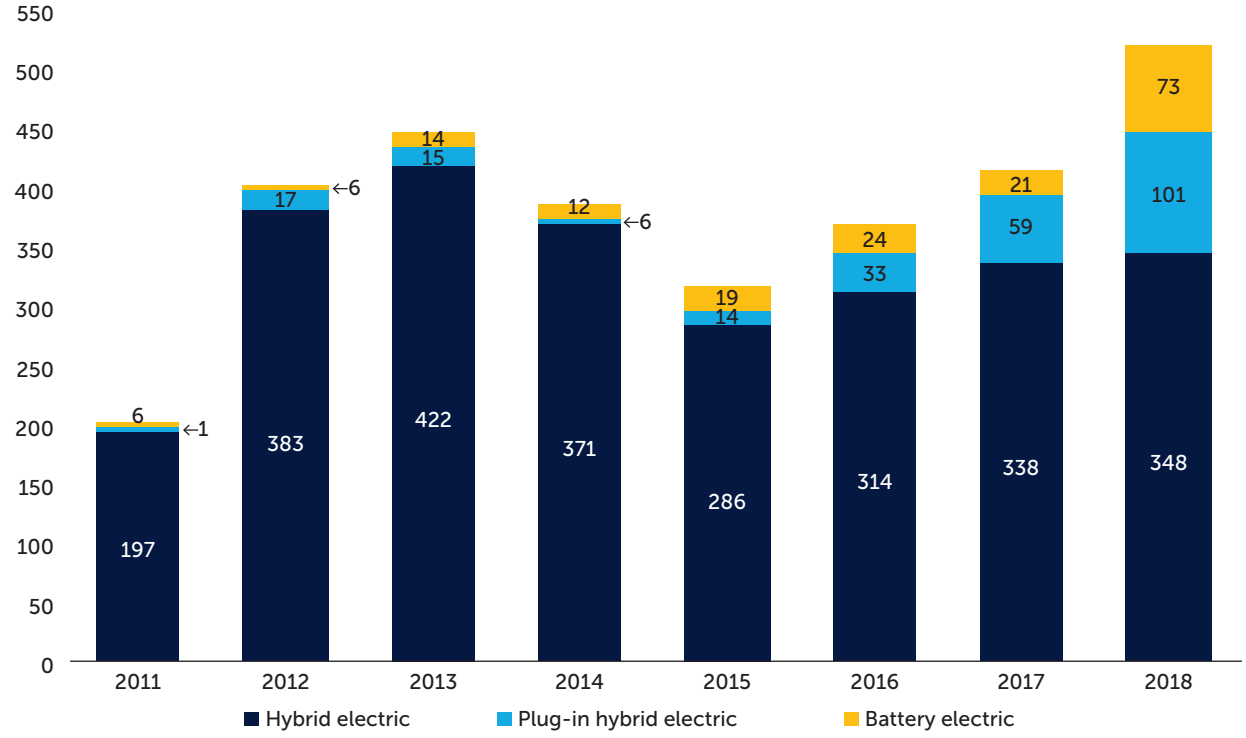
Data Source: 2020 National Inventory Report

Vehicle Sales in Manitoba, Monthly, December 2005 - December 2019



Data Source: Statistics Canada (Table 20-10-0001-01)

New Electric Vehicle Registrations, Manitoba, 2011-2018



Data Source: Statistics Canada Table 20-10-0021-01

Jurisdictional Comparisons

The EAC also conducted a jurisdictional scan of transportation strategies that included several subnational jurisdictions in North America, as well as the national strategies of Canada and nations in Europe and Asia. The scan focussed on select jurisdictions with similarities to Manitoba, and especially on jurisdictions that either recently released plans related to green transportation or are recognized leaders in this area. The scan included available information on the jurisdictions' visions, targets, considerations of alternative fuels, and policies and programs used to implement the strategy.

The jurisdictional scan revealed that greening of transportation is widely supported. Moreover, despite differences in population size, geography, and weather, there are nevertheless similarities across jurisdictions in terms of the types of actions identified and the types of policies and programs to achieve results.

Overall, there is a general intent to move toward low-carbon (renewable fuel blends) or zero-carbon fuels (electric or hydrogen). Many jurisdictions are employing multi-faceted programs involving both incentives ("carrots") and regulations ("sticks") to shift to lower/zero emitting transportation. The incentive programs vary by jurisdiction, and some support vehicle purchases with monetary incentives or rebates while others include other types of non-financial support (e.g., public charging stations, tax measures, etc.).

Information Provided by External Organisations

From time to time, the EAC was provided additional information from outside entities to inform their decisions. This information included "Building an EV Strategy for Manitoba", "Greening Transportation in Manitoba", and "Bike Winnipeg EAC MB Transportation Strategy". These documents provided the EAC with information prepared by interested stakeholders that sought specific changes in Manitoba.

The Council took every opportunity to receive and consider research covering multiple jurisdictions and Manitoba specific information. The EAC evaluated all information and data during their research effort on the merits of the supporting facts, verifiable evidence, and existing scientific literature.

3. Expert Engagement

Where research and review of the evidence provided an overall picture of the historical, economic, and technical context and common trends pertinent to the transportation sector and related infrastructure that Manitoban rely upon, the EAC also sought advice from experts that are currently active in different parts of the Manitoba transportation sector. The Council received input through several avenues, including the Sector Working Group on Transportation (which informed the June 2019 recommendations on the Carbon Savings Account) and the Low Carbon Economy Forum in November 2019.

Sector Working Group on Transportation

In December 2018, the Climate and Green Plan Office established Sector Working Groups (SWG) to assist with the development of Manitoba's first Carbon Savings Account (CSA) as set out in The Climate and Green Plan Act. The CSA sets out a proposed goal and actions for carbon emissions reductions over the next five years.

Each SWG, supported by officials from government departments, included a variety of stakeholders representing business, civil society, academia, and local communities. The SWGs provided their input to the Expert Advisory Council, which used this information to develop advice to the Minister for Sustainable Development on Manitoba's CSA, achievable sector emissions reductions, and the associated actions necessary to achieve the 1 megatonne carbon emission reduction target for the first CSA (2018-2022).

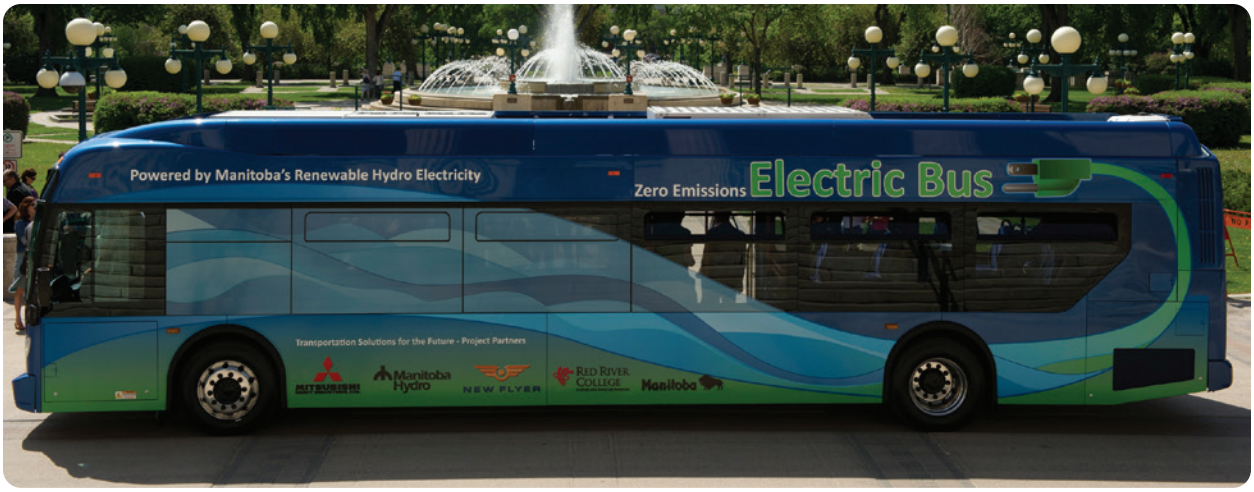
The initiatives that were considered included many of the items proposed in the Climate and Green Plan as well as additional initiatives that emerged from the sector experts who participated on the different working groups. A key consideration of the work was to assess how emissions reductions efforts may interact with the other elements of the Climate and Green Plan, including water, nature, jobs, and the green economy. The work of the SWGs was very valuable and had a real impact on the establishment of the first CSA and the future direction of the Made-in-Manitoba Climate & Green Plan.

The Transportation SWG included the following expert stakeholders:

- Advanced Biofuels Canada
- Bison Transport
- Canadian Fuels Association
- CentrePort Canada
- Efficiency Manitoba
- Electric Vehicle Technology and Education Centre - Red River College
- Federated Co-operatives Limited
- Functional Transit
- Global Automakers of Canada
- Green Action Centre
- Husky Energy
- Manitoba Electric Vehicle Association
- Manitoba Heavy Construction Association
- Manitoba Hydro
- Manitoba Motor Dealers Association
- Manitoba Sustainable Development
- Manitoba Trucking Association
- New Flyer Industries
- University of Manitoba
- Winnipeg Airport Authority
- Winnipeg Metropolitan Region
- Winnipeg Trails Association

The Transportation SWG put forward information on several potential actions, including:

- Heavy Duty Vehicle (HDV) Retrofits
- Electric Buses for Winnipeg Transit
- 10% Ethanol Mandate
- FEE-EV
- 5% Biodiesel Mandate
- Flex Fuel Refueling Stations
- Electric Vehicle (EV) & Charging Incentives
- Modal Shift



These proposed actions were reviewed and considered by the EAC, who considered them in making their recommendations to the Minister on the first CSA. The EAC recognises that the government has taken steps to implement several of these actions, such as the Premier's announcement in January 2020 that biofuels blend levels for ethanol and biodiesel will increase based on Council recommendations. In addition, other transportation-related "recommended reinforcing steps" included in the June 2019 recommendations report were:

- Manitoba should take steps requiring developers to incorporate electric vehicle (EV) charging stations into all new residential and commercial development projects above a minimal size (and as part of major renovations).
- Manitoba should explore the feasibility of adopting mandatory rules requiring a certain percentage of new motor vehicles sold in the province to be zero emission vehicles (ZEVs).
- In conjunction with the biofuel provisions included within the CSA, Manitoba should work toward the adoption of biofuel mandates for the various transportation subsectors at the highest percentages technically feasible for implementation in the next CSA period. This would help to establish new markets for agricultural products currently facing barriers to market access. Manitoba should then encourage other provinces and jurisdictions to adopt those higher mandates and purchase feedstock for biofuels from Manitoba thereby helping our economy grow.

In fulfilling the mandate to develop recommendations on a green transportation strategy for Manitoba, the EAC considered these past recommendations, and continues to support these actions as viable pathways toward greener, cleaner transportation in the province.

Low Carbon Economy Forum

Building upon the work of the SWGs, the EAC held a forum on November 29, 2019 on the topic of identifying the economic opportunities in a low carbon economy. The focus for the EAC was to understand the economic factors that influence a shift to a low carbon economy. The primary areas of focus under the umbrella of a low carbon economy were decarbonisation, agriculture, and transportation.

The forum guest speakers and participants were selected based on their corporate sustainability strategies, knowledge, and interests as stakeholders in the green economy. Guest speakers included representatives of organisations leading the low carbon transition, including the Manitoba Chamber of Commerce, North Forge, Simon Fraser University School of Resource and Environmental Management, Wescan Capital, Bison Transport, New Flyer Industries, Richardson International, University of Manitoba Asper School of Business, Maple Leaf Foods, and others.

The size and scope of the event facilitated meaningful dialogue and engagement. The EAC gained important insights with respect to transportation. For example, several features of the Manitoba economy align with potential opportunities for a low carbon transportation future, including:

- Manitoba offers transportation logistics expertise and can grow as a centre for transportation-related research and development
- As a non-landlocked province with an Arctic port, Manitoba has enormous untapped potential as a central transportation and logistics hub for North America
- Manitoba is a leader in ethanol and diesel blending rates and can continue to demonstrate further leadership in this area
- Electrification of transportation is a longer-term opportunity for Manitoba
- Manitoba offers space to build-out testing and facilities that rival any locale in North America as well as available funding focused on clean technology and commercialization
- Fuel-switching (such as replacing petroleum fuels with electricity for vehicles) can be done relatively easily in Manitoba

Following the Forum, the Expert Advisory Council considered the information the session provided. Some major action items resulting from the Forum were:

- The inclusion of greening transportation and infrastructure in the Council's January 2020 mandate letter
- The implementation of the Efficient Trucking Program, which supports vehicle retrofits in the transportation sector such as fuel-saving devices and technologies, reducing energy consumption, and other environmental benefits

Expert Input

The EAC also sought meetings with international experts in the field of transportation, land use planning, and transportation-related technologies and resources. The intent of these meetings is to confirm aspects of the research findings and expert input, and to test the direction of potential actions to reduce transportation emissions. At the writing of this report, the EAC has contacted several organisations. For example, the EAC met with the local office of Urban Systems, a team of professional engineers, community planners, policy analysts, landscape architects, environmental scientists, communication experts, technologists, legal surveyors, and administrative professionals that have worked on transportation-oriented planning for sustainability and a low carbon future.

The EAC will continue to meet with other experts in the transportation sector (such as auto manufacturers, fuel suppliers, energy experts, etc.) to obtain further advice as part of their on-going responsibilities to the fulfillment of the Climate and Green Plan and targets set for the second Carbon Savings Account (2023-2027).

4. Stakeholder Engagement Process

The EAC conducted stakeholder consultations in 2020 in order to test some of the background research and expert input as they might apply to local communities by engaging directly with stakeholders from local organisations. Despite the uncertainty associated with the global pandemic of COVID-19, this stakeholder engagement process began in spring 2020 when the Expert Advisory Council to the Climate and Green Plan prepared a consultation paper as a guide to gather feedback from stakeholders. The paper explained the reasons and contexts behind Manitoba's transportation emissions, and described the role of the EAC in developing a green transportation strategy. The guide provided an overview of trends in various jurisdictions that have modernised their transportation strategies and/or have taken steps to reduce emissions in their respective transportation sectors by looking at transportation systems, modes, and related infrastructure. This paper also identified the main system influences and potential sector-specific interventions that can be used to create a low carbon future for transportation in Manitoba. This included a discussion of the types of policy tools that are available, recognises that costs should not be a barrier to long-term planning, and encourages stakeholders to identify the types of measures they would like to see undertaken in the province. The paper was shared with invited stakeholders to provide them with some context for the development of a green transportation strategy for the Province of Manitoba as a whole-of-government approach to climate action in the transport sector in order to:

- Outline a practical and realistic path forward for Manitoba's use of existing transportation and infrastructure system.
- Identify ways to build better, greener transportation and infrastructure over the long-term.
- Determine which tools are available to achieve a greener transportation infrastructure.
- Deliver advice and recommendations based on stakeholder engagement and subject matter expert input.

Starting with the discussion paper, the EAC consulted with expert stakeholders on eight critical components of Manitoba's transportation sector. On July 9 and 10, 2020, the EAC engaged expert stakeholders during the pandemic with appropriate safeguards in place to ensure social distancing for in-person meetings. On-line discussions were also held to ensure stakeholders not meeting in person would have a chance to provide their input on the need for a green transportation and infrastructure strategy for Manitoba. A total of 109 participants were invited, with 44 participants (~40%) directly engaged by the EAC during in-person and web-based discussions. All participants and invited stakeholders were offered the opportunity to complete a survey and/or provide additional materials. The EAC received a total of nineteen stakeholder responses.

Participants were asked to complete a survey on several aspects of how transportation and infrastructure can reduce greenhouse gas emissions from the transportation sector. Eleven on-line surveys were completed by stakeholders, giving a survey completion rate of 10%. Some stakeholders also provided longer position papers as a way to further explain survey responses and include items of interest that may not have been captured in the survey design. The intent of this combined survey/submission process was to guide the discussion of the survey topics without unnecessarily limiting the topic or stakeholder interpretations of what a green transportation system might look like. A total of eleven stakeholder groups provided additional feedback in a separate submission. Three respondents completed both the survey and provided additional material. The total written response rate was 17% of all expert stakeholders invited to participate.

The EAC is considering all research, stakeholder input, and expert advice into consideration during the development of its recommendations to Manitoba. All participants were asked to consider the following principles:

i. Prioritises emissions reductions – The intent of a green transportation strategy is to reduce GHG emissions, with other supporting benefits to be considered as associated benefits and opportunities.
ii. Evidence-based – Opinions and anecdotes are welcome, but decisions are to be based on verifiable qualitative or quantitative evidence (e.g., data, modelling, projections, etc.).
iii. Technology neutral – Alternative technologies, including non-technical measures (e.g., behaviour change), will be evaluated on their potential contribution to achieve desired results.
iv. Manitoba-focused – Suggestions that identify direct benefits to Manitoba (e.g., local emissions reductions, improved transportation services, local opportunities, etc.) will have priority over benefits that occur elsewhere.
v. Low carbon economic growth opportunities – Emissions reductions suggestions that support economic development are desirable.

Section five addresses the preliminary findings from the on-line survey, as well as the submissions provided by invited stakeholders.[2] Section six offers twenty-one recommendations to the government of Manitoba on ways to increase, expand, or otherwise augment its existing transportation and infrastructure system in the development of a green transportation strategy for the province. The EAC believes that moving toward a low and/or zero carbon future in its transportation sector is a necessary and fundamental step to prepare for the transition to a low carbon economy.

2 All data collected during this process was aggregated. Stakeholders remain anonymous, and all given responses, statements, or claims are compiled and assessed. The intent of stakeholder engagement is to identify perspectives and desired outcomes, and neither the Government of Manitoba nor the Expert Advisory Council can confirm the accuracy of stakeholder contributions.

5. Analysis and Emerging Themes

i. Defining Green Transportation and Infrastructure

The initial discussion paper shared with stakeholders identified three distinct yet linked aspects of transportation and infrastructure systems:

1. The vehicle manufacturing and distribution system (e.g., car makers, dealerships, and autobody, engine service, and auto parts supply). This includes private and commercial on-road vehicles, as well as locomotive, aviation, and marine vessels, their manufacturing and distribution, and related infrastructure (e.g., train stations, airports, and marine ports).
2. The fuel supply system includes the full supply chain. Beginning with the feedstock from oil extraction and biomass production, to refining and wholesale distribution, and blending and retail sales. This also includes alternative vehicle energy options such as electricity, hydrogen, propane, and natural gas and their respective filling/charging stations.
3. Infrastructure like roadways, bridges, public transit, and traffic signs are obvious parts of the transportation system, as are the related laws and rules (e.g., speed limits, weight restrictions, and idling restrictions). Indirect infrastructure can include other types of transportation services, such as park and ride locations, transit routes, as well as pedestrian and non-motorised transit (e.g., cycling and walking paths, sidewalks, crossing signals, lighting, etc.).

Respondents tended to focus on modes of transportation, the importance of each to fulfill certain functions, and how different modes are integrated. Respondents pointed out that the design of urban areas tends to segregate different transport modes, which makes it inconvenient for people to combine different types of mobility options. For example, cycling and walking trails are traditionally separated from motorised traffic, which includes private vehicles and public transit. This segregation can "steer" travellers to one mode or another because it inhibits integration of different modes. Offering commuters and other travellers a convenient way to use different types of low or zero emission transportation modes for different legs of their journey could be expected to reduce the overall dependency on conventional light duty vehicles. However, this option does not fit the needs of other transportation users, such as rural residents, commercial operators, or industrial/private sector fleets.

The discussion of different transport modes is related to other considerations on the types of vehicles in use in the province. Fuel efficiency, low carbon fuels, fuel switching, and enabling infrastructure also were identified as important areas for further consideration as how to define the parameters of a green transportation strategy for Manitoba.

Broadly interpreted, stakeholders considered "green transportation" as a new way that people and goods will move around the province. Nevertheless, the changes that stakeholders identified as needed to achieve "green transportation" were not consistent. Some respondents seek changes to urban design and infrastructure planning while other seek technological improvements to vehicles and energy systems. Some considered the lack of "innovation" or "economic motivation" to be a source of the problem. Others considered it a behavioural matter with drivers needing to make better choices. Still others considered the terminology of "green" (as an aspiration) needed to be changed to reflect a more pragmatic approach to reducing transportation emissions (e.g., "greener" than what we have instead of an unachievable "green"; "eco-friendly" as less impactful than the current state of our integrated continental transportation system).

Considering the broad agreement on the need for change, but recognising that different stakeholders emphasise different ways to reduce transportation emissions, the EAC recommends that "green transportation includes the use of vehicles, energy, infrastructure, and their combinations in ways that progressively reduces greenhouse gas emissions over time, and increases the market share of zero emission transportation".

> **Green transportation** includes the use of vehicles, energy, infrastructure, and their combinations in ways that progressively reduces greenhouse gas emissions over time, and increases the market share of zero emission transportation.

ii. Opportunities and Challenges

Opportunities

Stakeholders identified several opportunities for the province as it considers green transportation for the future. Some participants pointed out Manitoba's natural advantages, such as a fairly concentrated population located in the Winnipeg metropolitan region and our access to plentiful, clean hydroelectricity, while others identified discrete opportunities, such as pilot projects, technology testing, and other types of innovation for economic development.

A common theme suggested that Manitoba's clean, low cost electricity is the province's strongest asset. This clean energy resource could be used for a variety of transportation-related activities, such as:

- attracting capital investment in clean technology,
- exploring/expanding low carbon technologies for use in private and public sectors,
- increasing electricity for transportation as a way to reduce the import of petroleum fuels
- increasing the revenue potential of Manitoba Hydro by selling electricity (or electricity products) as transportation energy (e.g., battery electric or hydrogen fuel cell vehicles)

The untapped potential for improved collaboration and coordination of land-use planning emerged as a secondary opportunity. Bringing municipalities together in a coordinated effort to reduce transportation emissions could help to improve transportation infrastructure investments and outcomes, as well as encourage behavioural changes by drivers and passengers.

> Manitoba's clean, low cost electricity is **the province's strongest asset** to reduce emissions from the transportation sector.

Challenges

The challenges identified by stakeholders were generally less consistent than the opportunities. While several respondents identified provincial demographics as a challenge in terms of the large area and sparse population, many also suggested the existing transportation system entails an infrastructure bias toward single-occupant light duty vehicles. This view was similarly represented in different ways, and was characterised as "car culture", "fuel dependency", "too costly to change", and "reliant on technologies not developed in Manitoba". Each of these reflect the importance of how user behaviour is influenced by the existing transportation and infrastructure options. Likewise, the difficulty of changing driver and passenger behaviours is often related to the cost (financial or otherwise) of switching to alternative or low carbon transportation options.

In some cases related to public infrastructure, the available funding is either too restrictive or insufficient to achieve emissions reductions – it is often perceived to be too expensive to improve the status quo. For example, electrifying public transit, increasing the network of cycling lanes and pedestrian pathways, and EV public charging stations are all considered outside of the typical budgetary considerations on public infrastructure, and tend to reflect long-term changes instead of immediate infrastructure needs and repairs.

In terms of private choices, the challenges seems to reflect an expectation that individual households are responsible for societal changes to reduce GHG emissions. The cost premium on low carbon technology is often a barrier for households to make behavioural changes or different purchasing choices.

Overall, all respondents reflected some level of dissatisfaction with the existing transportation options and infrastructure that is biased to the past decisions. A theme emerged in which the main challenge to a future in which "green transportation" become widely used was that the existing infrastructure is biased to the status quo, and does not reward personal or public efforts to reduce transportation emissions as a societal goal.

This suggests that the government can take a leadership position in identifying the main challenges to achieve a "green transportation" future by coordinating intergovernmental cooperation and articulating a common frame of reference for all Manitoba citizens, public sector and private industries, and not-for-profit organisations to pull together to reduce transportation emissions in practical, enduring, and successful ways. The survey and submissions provide greater detail on the potential role(s) for government (see section vi, below).

Manitoba's **existing infrastructure is biased to the status quo**, and does not recognise the risks and opportunities associated with personal or public efforts to reduce transportation emissions.

iii. Transportation and Energy Options

When asked to discuss in detail the types of transportation alternatives and different energy options they considered to be feasible for use in Manitoba, participants identified two broad categories. The most popular option was switching from fossil fuels to electric vehicles. Responses focussed mainly on light duty vehicles and public transit, but acknowledged the need for supporting infrastructure in terms of publicly available and workplace electric vehicle charging stations. The second most popular option was active transit, with specific reference to increasing the network of bike lanes, establishing interconnected trails, ensuring active and safe school routes, and walkable cities.

These two areas were most often suggested by respondents, which suggests an emerging theme of the need to reduce emissions from petroleum fuels by switching both the types of fuels we use and the types of transportation modes we can access.

Other suggestions, such as anti-idling campaigns, public awareness of the benefits of electric vehicles, increased biofuels use, hydrogen fuel cell development, increased municipal funding with greater taxation power, and intra-provincial bus service, each appeared much less often than the call for greater use of electric vehicles and more active transportation infrastructure.

Expert stakeholders identified **electric vehicles** and **active transportation** as the two best ways to reduce transportation-related greenhouse gas emissions.

iv. Behaviours

Respondents appeared to consider education and awareness as the main tool to encourage behaviour change, but also saw a role for governments, businesses, and municipal transit service. Where efforts to influence behaviour received most support was around increasing the awareness of electric vehicles and the fuel efficiency of internal combustion engine vehicles. The emphasis on EVs seems to be aimed at increasing the familiarity of this new vehicle technology, whereas the focus on fuel efficiency is meant to educate vehicle owners on the emissions benefits of small vehicles in comparison to vehicles with larger engines (e.g., pick-ups, SUVs, sports cars). Both areas of activity are aimed at educating potential car owners on the purchase of their next vehicle, rather than on reducing the emissions of their present situation.

Respondents suggested governments, work places, and municipalities should demonstrate leadership by inspiring social norms that support new/fuel efficient vehicles and to provide an enabling environment in which transportation users can reduce emissions. For governments, education and awareness initiatives can demonstrate forward thinking, enforce existing rules, increase public access, ensure proper price signals, or provide incentives or funding to exhort desirable behavioural changes. For businesses, the workplace can also be seen as a normalising environment for enabling low carbon choices, perhaps by encouraging bus-to-work policies, employee benefits for low carbon commuting, safe and secure cycle storage at the workplace, and flexible work hours to enable "off peak" commuting times, to name a few. For municipalities, the primary way to improve behaviour was through infrastructure funding or other incentives for public and active transit.

While the subject matter of any education and awareness initiative would depend on broader strategic objectives, the main theme supported by the majority of respondents was that education is a necessary component of any kind of behavioural shift, but that it would only be successful if the newly acquired knowledge could be routinely put into practice. This requires some consideration of enabling infrastructure to re-inforce the behavioural shift toward green transportation.

Education for behaviour change will only work when supported by **enabling infrastructure** that is practical, convenient, safe, affordable, efficient, healthy and enjoyable.

v. Economic Opportunities

Respondents were not consistent in their recommendation on economic opportunities. A few identified a province-wide EV charging network as the most likely economic development action related to "green transportation", but other items were identified only one or two times by other respondents. This inconsistency might be a function of how each respondent perceived the term "economic benefit", and the survey results suggest that the term "economic opportunities" was defined

differently by respondents, as follows:

- job creation (e.g., attracting investment, manufacturing)
- retail sales (e.g., bikes, e-bikes, e-scooters, etc.)
- cost savings (e.g. lower operating costs for public transit, provincial EV fleet, school buses)
- government revenue (e.g., domestic electricity sales)
- government funding to agencies (e.g., public interest groups, municipalities)

Further exploration of this question may be warranted, depending on the role of economic development in the final recommendations on developing a green transportation and infrastructure strategy for Manitoba. Based on surveys and submissions provided, the main economic opportunities identified by respondents were as follows (order of frequency):

1. Public transit
    a. Municipal
    b. Intra-provincial
    c. EV buses and coaches
    d. School buses
2. Increased EV use
    a. EV charging networks
    b. EV charge rate
    c. Hydrogen fuel cell vehicles
    d. EV and hydrogen vehicle manufacture
    e. Provincial EV fleet
    f. Winter weather testing facility in Thompson
3. Modal shift
    a. Shared roadways with active transit,
    b. More use of buses, rail
    c. More efficient roadways

For the most part, items related to public transit tend to reflect reduced operating costs. The same can be interpreted for items related to increased EV use, with some exception (i.e., EV and hydrogen vehicle manufacture, hydrogen energy production, winter weather testing). The prevalence of modal shift as a third-most frequent category of economic opportunities also seem focussed on reduced operating costs, albeit from increased operational efficiencies.

It is notable that few respondents identified economic development opportunities (e.g., attracting capital investment, job creation, market growth, innovation, clean technology), while most focussed instead on cost savings (e.g., affordability, fuel economy, efficiency). However, the EAC has taken into account larger economic strategic objectives of the province, as well as economic and environmental co-benefits in developing specific transportation measures. Further exploration of this may be warranted, and could benefit from additional insight from industry and other economic development experts.

vi. The Role for Government

While all stakeholders identified that government action was a critical component of a green transportation strategy, the suggestions for government action were generally diverse and inconsistent. Government leadership and coordination was viewed as the most important role that the provincial government should take and should set the vision for leading the change toward green transportation.

Cost savings are important to consider when seeking economic opportunities, especially those associated with long-term operation of green transportation and maintenance of transportation-related infrastructure.

The province should also adequately and consistently fund municipalities and other supporting organisations to secure their help in achieving the provincial strategy. The province should amend laws and regulations to better reflect green initiatives while ensuring that future infrastructure investment will include "green" criteria as part of all "value for money" calculations – cheaper today does not mean a better, low carbon tomorrow.

Some respondents identified specific actions that the provincial government could take to stimulate the uptake and use of green transportation solutions, including wide support for electric vehicles, including public charging networks, shifting the government fleet to electric vehicles, and supporting/undertaking pilot and demonstration projects on low and zero carbon transportation technologies. Information sharing was also a role that the provincial government can play in support the shift to a green transportation future, as is implementing some form of user/polluter pay programming to secure revenues that would be dedicated to supporting other green transportation initiatives (e.g., EV purchase incentives, modal shift, among others).

Not surprisingly, a strategic, long-term plan was the most recommended role for government, followed closely by government coordination across departments, policies, and programs to support green transportation. Administratively, the province can undertake statutory changes and regulatory amendments to align the existing rules with new practices and emerging technologies. In terms of government coordination, stakeholders indicated that the province can do better in terms of municipal-provincial transportation planning practices.

The Province needs to **lead the shift to green transportation**.

vii. Priorities

Stakeholders were asked to identify their three priorities for a green transportation and infrastructure strategy. This is perhaps the most telling indication of what stakeholder feel to be the most important items to address. According to survey responses, the top four priorities (in order) were identified as follows:

1. Increased EV use
2. Innovation/investment in clean technology
3. Zero carbon public transit (electric buses, active transit)
4. Provincial EV charging network

According to the other material submitted by stakeholders, the shift to electric transportation (of all types) was far and above all other priorities. Although not as prevalent as electric vehicles, the second-most identified priority was active transportation, followed closely by modal shift as the third-most identified priority. Long-term planning for community-based infrastructure needs was also identified in several submissions, but it was unclear if this was formal planning processes or a more informal expectation that communities should endeavour to include green transportation as part of their long-term planning exercises.

Electric vehicles are the highest priority.

viii. Visions for the Future

Survey respondents did not share a common vision of the future. Several responses were not expressed so much as a vision but rather as areas for consideration. A minority of survey respondents declined to answer. Of those that expressed a vision for the future, most suggested an optimistic view of a different future (e.g., new tech, 100% ZEVs, providing green options), one suggested a cautious view of the future (e.g., reducing adverse effects, economically realistic), and one offered a combined view (e.g., new tech but protecting people and business with realistic solutions).

Those respondents submitting additional materials expressed different visions for the future, but all recognised the inadequacy of the "status quo" in transportation to address the challenges and opportunities associated with climate change, technological change, societal change (especially post-COVID), and economic change.

Both the surveys and submissions suggest that respondents hold an appetite for change. The Expert Advisory Council and the provincial government have important roles to play in creating a common vision for all citizens. The government can demonstrate leadership by articulating what the change will look like. For example, is the green transportation strategy a part of a larger "green recovery" as a post-pandemic response? Is it a more general shift toward a low carbon energy future based on Manitoba electricity? Or is it part of an effort to provide enabling infrastructure that will support a technological-behavioural change toward cleantech innovation and adoption? This type of exercise would likely involve a significant effort in terms of communications and engagement to obtain explicit endorsement, however, implicit endorsement (citizen buy-in, incentives, or behaviour-based policy-making), might be an easier way to gain acceptance and obtain wide societal agreement on a proposed green transportation strategy.

The time is ripe for change, **but the government must articulate** what the change will look like in order for Manitobans to take action.

6. Recommendations

This section provides recommendations for a Green Transportation Strategy for Manitoba. It identifies the areas in which action is required to achieve short and long term GHG emissions reductions in Manitoba's transportation sector. It also recommends a timeline for action that should be consistent with the Manitoba Climate and Green Plan, the Carbon Savings Account framework, and the implementation approach that all provincial climate actions and emission reduction measures should follow.

The EAC provides this advice to the Manitoba government so that the government can take a leadership position on the problem of transportation emissions in Manitoba. Clear government leadership will help citizens, businesses, and community organisations work together to tackle the challenge of transitioning to a low carbon system for transportation and infrastructure across the province, including economic development opportunities related to natural resource advantages, materials management and supply, manufacturing, distribution, and use.

Keeping in mind these priorities of the Manitoba government, the EAC strongly believes that a full green transportation strategy and implementation plan be completed in advance of the second Carbon Savings Account (2023-2027). This would ensure the province can achieve meaningful emissions reductions during present and future carbon savings accounts.

The recommended approach for a province-wide Green Transportation Strategy addresses both the timing and direction in the following areas:

- Maximise ***low carbon and zero emission transportation*** modes, technologies, and practices;
- Improve and foster coordinated ***land-use and transportation planning*** to promote the efficient movement of people, goods and materials;
- Ensure that ***enabling technologies and infrastructures*** are available to support low carbon and emissions-reducing choices; and
- Seek ***innovation and economic development*** opportunities for clean technology in the transportation sector.

Timeline

1. Manitoba should develop a Green Transportation Strategy that will be approved by the Minister no later than December 31, 2022. This strategy will be made available to the public, and will include:
   a. A strategic direction that is consistent with, but not limited to, the recommended areas outlined below,
   b. A supplementary document containing an implementation plan that identifies immediate, short-term actions as well as long-term actions that reduce transportation emissions in sustainable and enduring ways.
   c. Recognition that activities consistent with EAC recommendations should occur in advance of the completion and approval of the strategy to achieve early success in reducing transportation-related GHG emissions (e.g., federal funding programs to expand electric vehicle charging stations).
   d. The Green Transportation Strategy should be reviewed and revisited no later than five years after its approval (i.e., in 2026) in order to identify additional opportunities to reduce emissions in

future carbon saving accounts. This review must include a full account of the GHG reductions attributed to each initiative, program, or any other action taken by the government to implement its Green Transportation Strategy.

Low carbon and zero emission transportation

2. Manitoba must develop an implementation plan for zero emissions vehicles and related infrastructure. This plan should consider the role of Manitoba's geography, population, and seasonal temperatures in relation to available ZEV technology.
3. Manitoba should dramatically reduce the reliance on imported petroleum products through incremental reduction in the following areas:
   a. Continued increase of the biofuels blending levels to 15% ethanol and 10% biodiesel (see EAC report, June 2019).
   b. Set a light duty zero emission vehicles mandate for new car sales that will reach a minimum of 10% by 2025, 50% by 2030, and 100% by 2035. This can be accelerated to achieve CSA targets where warranted by trends in the market.
   c. Support the replacement of heavy duty diesel vehicles with low carbon and zero emission alternatives in commercial trucking, agriculture, construction, natural resources, and other sectors.
4. Publicly-funded transit should develop plans and budgets to integrate zero emission alternative power trains into regular service in order to reduce GHG emissions associated with diesel powered buses.
5. The Manitoba government should recognise the importance of reducing GHG emissions as part of the procurement process for fleet vehicles, and should replace the existing vehicle fleet with zero emission vehicles as part of the normal fleet management and procurement process.

Land-use and transportation planning

6. Regional land-use and transportation planning should be coordinated between municipalities with common demographic and geographic areas to encourage the fluid movement of people and goods, improve transportation infrastructure investments, and maximise economic outcomes. Transportation master plans need to be regional plans that involve multiple municipalities along trade corridors.
7. The land use planning process must include and prioritize zero carbon, pedestrian and other active transportation modes, as well as low carbon transportation as a second-best alternative. Manitoba should ensure the significant expansion of active transportation pathways in cities and towns across the province so that residents can access multiple mobility options to reach their destination. This should include safe and convenient active transportation routes to public institutions (e.g., schools, universities and colleges, hospitals, libraries, municipal offices, public parks, etc.) and other popular destinations (e.g., sports, hospitality, entertainment districts, commercial and retail clusters, etc.).
8. Municipal public transit routes should extend beyond municipal boundaries to share service with residents in surrounding areas, and all municipalities within commuting distance of major urban centres must be part of a regional public transit plan that embraces transit-oriented development to reflect the needs associated with growing urban density. A specific element of such a plan should include building on the success of rapid transit corridors on a regional scale.
9. Collaborate with provincial government reporting entities (e.g., crown corporations, educational, health and social facilities, etc.), other levels of government, and the private sector to expand access to multi-modal and integrated transportation pathways to encourage low carbon movement of both people and material goods.

10. Set a policy direction on a zero carbon "last mile" of goods delivery to reduce idling, slow the decay of municipal roadways, and reduce traffic congestion. This policy direction should align with regional and community land use planning and transportation planning processes and outcomes.
11. Increase extent and frequency of repaving, maintenance and smoothing of road surfaces to the maximum extent feasible to increase the fuel efficiency of vehicles in operation and incorporate frictionless transportation planning features into regional land-use and transportation planning systems wherever safe, feasible, and considers the associated full lifecycle greenhouse gas emissions.

Enabling technologies and infrastructures

12. Manitoba should develop a plan to mobilise local investment to secure matching funding that will encourage the development of a policy direction for all Manitobans to use more low carbon and zero emission refueling/charging stations across the province, such as higher blends of renewable fuels offered at filling stations, increased number and location of electric vehicle charging stations, introduction and expansion of hydrogen fuel cell refilling stations.
13. Manitobans want to purchase zero emission modes of transportation (e.g., light duty, heavy duty, electric bikes and scooters, etc.), but face a high cost of upfront investment. The province should explore options to mitigate the cost premium on zero emission transportation purchases in a way that offsets the short term disincentive of a higher purchase price with a longer term incentive of operational cost savings.
14. Prepare for the future of automated and connected vehicles in all light duty and heavy duty commercial transportation by ensuring the appropriate planning processes, fiscal arrangements, and infrastructure is in place.
15. Increase the extent and service quality of broadband internet across the province to enable better integration of clean technologies in the transportation sector (e.g., smart EV charging and billing, autonomous vehicles, traffic monitoring, data collection, and reporting).

Innovation and economic development

16. Support research and development of "made for Manitoba" clean transportation technologies and services, including natural resources, materials supply, manufacturing, distribution, and use, as well as evaluation of global best practices for adoption in Manitoba.
17. Attract private sector investment into low carbon and renewable fuels industries (e.g., emission-reducing vehicles and related technologies manufacturing facilities) to offset petroleum fuel use.

18. Encourage pilot projects and product testing to confirm feasibility of using new vehicles and associated technologies in Manitoba.
19. Encourage pilot projects, product testing, and early and mid-stage commercialization and technology deployment through appropriate financial mechanisms and incentives, building on existing programs where appropriate, such as increasing the participation of clean tech companies in the Small Business Venture Capital Tax Credit program, or new and expanded programs where needed. Manitoba could explore the creation of an arm's length private equity fund for Manitoba's clean tech sector with an independent fund manager and some level of public contribution to get the fund started and continuing in its early stages.
20. Develop a favourable tax regime for cleantech innovation and adoption, either at the business level or with the final consumer, in order to facilitate a market for low carbon vehicles and related technologies, services, practices, and choices.
21. Develop and support innovation in transportation logistics with a centre of excellence on transportation innovation in North America.

These recommendations provide areas for action in which the government can demonstrate leadership. These are consistent with stakeholder comments, which aligned with expert advice in the call for the government to show leadership on this file in several ways, namely:

- Articulate a clear vision for green transportation in Manitoba,
- Embed this vision in the rules and practices set out in regulations,
- Align the future of green transportation with a long-term provincial energy strategy,
- Champion the potential of green transportation as an opportunity to leverage Manitoba's energy and technology resource for economic growth, and
- Boldly and enthusiastically support those who are essential to reducing greenhouse gas emissions in Manitoba by
  - petitioning the federal government to provide funding support for Manitoba initiatives,
  - ensuring municipalities have long-term regional transportation and infrastructure plan and are adequately funded, involved, and responsible to develop green transportation and infrastructure systems, and
  - engaging private citizens, industries, and community organisations to join in the shift toward a low carbon transportation future.

7. Conclusion

Since its creation, the EAC has taken an increasing interest in how to reduce emissions across the economy, and from the transportation sector more specifically. The EAC has dedicated a considerable amount of time and energy to research and identify recommendations that are critical for Manitoba to consider as it develops a strategy to reduce transportation-related carbon emissions. The recommendations put forward in this document are based on the background research, engagement with experts in several different fora, as well as input from local stakeholders that are intimately involved in different parts of the transportation sector.

Based on this effort, the EAC has found that the province is well positioned to take a new approach to reducing greenhouse gas emissions under the Climate and Green Plan. With a focus on achieving significant emissions reductions from transportation and related-infrastructure in Manitoba, the time for a long-term, province-wide green transportation strategy is now.

These recommendations are respectfully provided to the Minister of Conservation and Climate for consideration on how the province can move toward a cleaner, greener transportation sector across the province.