

Transportation



The Big Picture

The United Nations Environment Program (UNEP) 2018 Emissions Gap Report calls for a 45% reduction in total annual emissions from 2010 levels by 2030, and net zero emissions worldwide by 2050.

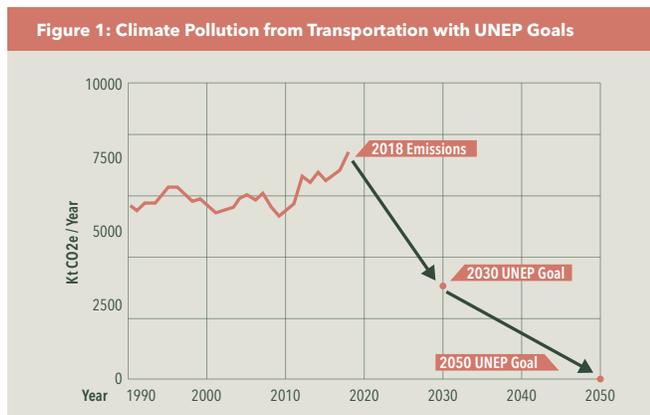


Figure 1: Figure 1 shows Manitoba's historic emissions from transportation, and how this must change to meet the UNEP 2030 and 2050 goals

Achieving the first UNEP goal in Manitoba's transportation sector will require a 59% reduction from current (2018) levels by 2030, from 9,280,000 tCO₂e to 3,835,000 tCO₂e. The required reduction has increased because our transportation emissions have increased by over 2,300,000 tCO₂e since the 2010 baseline year.⁴ Year-over-year reductions of 6.5% are now required for nine years in a row to achieve the UNEP 2030 goal. Further reductions will be needed to achieve the UNEP goal of net zero emissions by 2050. Failure to achieve these goals puts additional pressure on other sectors in Manitoba to make up the difference.

Climate pollution from Manitoba's transportation sector comes from different fuels used in a diverse range of sub-sectors, as shown in Figure 2.

Figure 2: Manitoba Climate Pollution from Transportation Sub-Sectors	
Sub-Sector	Emissions 2018 (tCO ₂ e)
<i>Road Transportation</i>	
- Light Duty Gasoline Trucks	2,330,000
- Heavy Duty Diesel Vehicles	2,010,000
- Light Duty Gasoline Vehicles	1,110,000
- Heavy Duty Gasoline Vehicles	520,000
<i>Other Transportation</i>	
- Agriculture & Forestry	938,000
- Railways	881,000
- Domestic Aviation	481,000
- Manufacturing, Mining, Construction	305,000
- Pipeline Transport	304,000
- All Other Sources	401,000
Transportation Total (2018)	9,280,000
UNEP Baseline Year (2010)	6,972,000
UNEP 2030 Goal (-45% of 2010)	3,835,000
Cut Required by 2030	5,445,000

*Historically very low number, explanation requested from the federal government.

Manitoba Climate Pollution from Transportation - Historical Overview

Transportation sources produced 9,280,000 tonnes CO₂e or 42% of Manitoba's total climate pollution in 2018. This is 31% more than the amount emitted in 1990 by transportation sources. The transportation sector is Manitoba's largest source of annual climate pollution and has been every single year since official records began.

Road transportation accounts for two-thirds of climate pollution in the transportation sector. Increased emissions from heavy-duty diesel trucks and light-duty gasoline trucks are the primary cause of our rising climate pollution in this sector.

³tCO₂e - Tonnes of carbon dioxide equivalent. This is a means of normalizing greenhouse gas emissions data. For example, on a 100-year timescale, nitrous oxide (NO_x) has about 300 times the global warming potential (GWP) of CO₂. So, 1 tonne of NO_x emission is equivalent to 300 tonnes CO₂e.

⁴All Figures: Derived from data contained at Environment Canada, Canada's Greenhouse Gas Inventory

Since 1990, pollution from light-duty trucks such as sport utility vehicles, crossovers, minivans, and pick-up trucks has doubled. Significant growth in Manitoba's successful long-haul trucking industry has contributed to a quadrupling of climate pollution from heavy-duty diesel trucks. Some regulatory reform and efficiency efforts have prevented this growth from being even higher. Pollution from smaller vehicles such as sedans and compacts has decreased by 28%. This is in part due to improved efficiency but is mostly because consumers are preferring larger vehicles to smaller ones by a 2:1 margin. Overall, climate pollution from road transportation has doubled in Manitoba from 1990-2018.

Performance in other transportation sub-sectors is mixed. Since 1990 emissions from domestic aviation and agriculture/forestry have held steady, railway pollution has gone up 46%, and pipelines now produce 64% less climate pollution thanks to conversions of pumping stations to electricity instead of natural gas.

Objective 2:

To be truly resilient, we must move all goods and people without gasoline or diesel.



Challenges

Achieving a 6.5% reduction in climate pollution nine years in a row from our transportation sector will be made more difficult if the following factors continue unchanged:

- Population and economic growth leading to more people and businesses buying more vehicles
- Continuing preference for larger, less efficient fossil fuel vehicles such as SUV's, pickup trucks, crossovers, and minivans versus smaller more efficient options
- Lack of choice among electric vehicle types other than passenger cars (e.g. pickup trucks)
- Continued preference for low-density urban design, causing longer, more frequent vehicle trips
- Funding cuts to public transit leading to declining service, higher fares, and lower ridership
- Incomplete active transportation networks combined with 5-6 months of winter weather

Electrifying vehicle transportation will require a lot of energy and power. According to the [Manitoba Hydro 2016 Electric Load Forecast](#), (pg 55) if all the vehicles in Manitoba were to be powered by electricity, it would require an additional 8,792 GWh of energy and 1,099 MW of peak power. This could be accomplished with the [Conawapa dam](#) project (~ 7,000 GWh and 1,500 MW) and about 500 MW of wind generation. (We aren't necessarily proposing this solution. It just provides the scale of the challenge.)

The Pathway

What needs to be considered and what changes might need to be implemented in order to achieve the objective of climate change resilience for transportation in Manitoba?

The first solution strategy for making transportation sustainable is to reduce the need for transportation. This involves more high-speed internet for virtual travel for medical needs, education, and business. Minimize travel by moving things closer together - densification in urban areas, and being able to provide for more of our needs locally instead of importing so much. Reduce the need for car ownership by enlarging carshare availability. Minimize vehicle transportation by doing more active transportation. Reduce the number of vehicles by making public transportation (urban and inter-urban) more available and attractive. Make all vehicles that are needed battery electric. Eliminate "free" parking. And finally we should adopt innovative approaches for transportation to remote northern communities and for powering farm and other off-road equipment.

We suggest the following elements are all necessary to achieve this objective:

Reduce Need for Transportation

The most effective way to reduce greenhouse gas emissions from transportation is to reduce the amount of travelling we do and the amount of goods that travel long distances.

City Planning

The need to travel by motor vehicle is reduced if people start off closer to their destination. This requires policymakers, developers, and consumers working together.

- **Cluster development** - Neighbourhoods need to be functional communities. People need to have access to essential amenities near where they live (e.g. grocery, pharmacy, convenience store, café, restaurant, medical, school, place of worship, recreation).
- **Densification** - There needs to be more people per unit area, especially near community centres. Zoning and permitting need to encourage multi-family dwellings and smaller units. This includes reviewing minimum parking requirements. People should also be closer to where they work. This means reviewing zoning to allow attractive residential development closer to commercial and light industrial areas.

- **Walkability / Bike-ability / Bus-ability** - Being close isn't enough - roadways need to be safe and attractive for cycling; neighbourhoods need sidewalks & cut-throughs to bus routes, and street design needs to address accessibility concerns.
- **Citizen support** - As these city planning adjustments are proposed and made, citizens need to be open-minded. We need to resist NIMBY-ism (Not In My Back Yard). We need to embrace the fact that our cities need to change.

Virtual travel

With computer and cellphone communication, we can reduce the need to travel considerably.

- **"Tele-commuting"** - Much of the work done in offices can be done from home. The work needs to be suitable and employers need to be flexible. This can also reduce the amount of office space required for a business and can therefore reduce cost.
- **Video conferencing** - With all of the new and improving platforms (e.g. Zoom, GoToMeeting, Google Hangouts, Slack) "virtual meetings" can be at least as productive, if not more, than in-person. Since the meeting is on your desktop, travel time to and from are eliminated. File and screen sharing encourages collaboration. Travel costs are dramatically reduced especially for teams that are international. Members can even participate on their smartphones from wherever they are.



Electrification

The ultimate fuel for vehicle transportation is electricity. Batteries are continuously improving in capacity and longevity at the same time as their costs come down. Mining and refining of battery materials has an environmental impact but lithium and other inputs can be recycled into new batteries. (If Manitoba developed a system to do so.) There is no recycling fossil fuels. The approach to refuelling will change. Instead of depending solely upon refuelling stations, recharging can be done wherever the vehicle is parked. Hydro needs to plan and build infrastructure to accommodate this coming reality.

- **Education and Promotion** - Teach car dealers and consumers the economics and environmental benefits. Electric Vehicles (EV) are cost neutral today - eliminating the purchase of gasoline saves \$100 to \$250 a month.
- **Collect Provincial Sales Tax (PST) on gasoline and diesel** - Depending upon the price of gasoline and diesel, the Manitoba Electric Vehicle Association (MEVA) estimates that this could reasonably generate between about \$200 million to over \$400 million in revenue annually.
- **Eliminate fossil fuel subsidies** - Eliminating the [Manitoba Petroleum Fiscal Regimen](#) would provide a similar amount of revenue to provincial budgets.
- **Set deadline for end of ICE sales** - Follow [Quebec's example](#) and set a deadline for the end of Internal Combustion Engine (ICE) vehicle sales.



- **Corporate Average Fuel Economy (CAFE) standards** - The cost to produce the drivetrain of passenger electric vehicles (EV) with the same range (500 km) as internal combustion engine (ICE) vehicles is coming down rapidly. *It is expected that by 2022, the production cost of both vehicle types will be equal.* Building codes should make recharging stations mandatory and straight-forward to install and get approval. Other provinces (e.g. Quebec) have used rebates to accelerate acceptance. However, the biggest impediment currently is that dealers don't want to sell them. This can be overcome with *Corporate Average Fuel Economy (CAFE)* standards that require a manufacturer to sell electric vehicles to offset their SUV sales.
- **School buses** - Allow no more diesel school bus purchases immediately. A Quebec company, *Lion Electric*, builds and sells electric school buses. Their initial cost is higher but total cost of ownership is lower and the *air quality around schools is much better.*
- **Goods transport** - In November 2017, Tesla unveiled the *Tesla Semi*. Analysis indicates that the costs and performance of these vehicles promises to make them very profitable to operate. The Tesla Semi is expected to be in limited production soon. In preparation, we need to ensure that our licensing, insurance, charging regulations, and infrastructure are planned and implemented so that we are prepared. The Manitoba Trucking Association has proposed that the Manitoba government work with them and their members to conduct vehicle trials on a *Lion Electric delivery truck* now.
- **Electric buses** - *New Flyer makes electric buses* and sells them around North America - but not in Winnipeg. As with other electric vehicles, their initial cost is higher but they are cheaper over their lifespan due to their reliability, longevity, and lower operating cost. However, Winnipeg Transit and Manitoba Hydro need to work together to plan and build a recharging strategy and capability.

Public Transit

Embracing public transit can result in a number of benefits in addition to greenhouse gas reduction. For each full bus, we could take approximately 40 cars off the road, lessening traffic, and reducing the strain on our roads.

- **Frequent Service Transit Network (FSTN)** - According to Jarret Walker's book *Human Transit*, frequent service means that a bus is coming every 15 minutes or better, all day - and ideally, every day. The new Winnipeg Transit Master Plan includes recommendations for frequent service on some routes. This needs to be implemented and expanded in the coming years. However, current Winnipeg city budgets are reducing transit service in Winnipeg instead of expanding it.
- **Routing** - Besides having service that is frequent, routes need to be simple. Destinations need to be "on the way" and not at the end of some deep side-trip or loop. This involves transit route planning that is integrated with city planning. It is impossible to provide satisfactory bus service in many newer housing developments just because of the street design. People in these developments can only get adequate bus service if they can walk or cycle to adjacent FSTN routes by sidewalk, cycle path, and cut-throughs.

Active Transportation

A transportation mode with no direct greenhouse gas (GHG) emissions.

- **Bike infrastructure** - Surveys indicate that the thing that prevents most people from cycling more regularly is the *feeling that it is unsafe*. As cycling infrastructure improves, more people cycle.
- **Route-finding and connections** - There needs to be a network of routes that riders feel are safe and attractive all the way from where they are to where they want to be. The network needs to be completely connected with routes that are easy to find and follow.
- **Education** - Cyclists who follow *CAN-Bike* recommended practices are safer on the road but most motorists and even most cyclists do not recognize good cycling behaviour when they see it. It needs to be taught and such training is not readily available.
- **Motorists** - Driver training needs to include awareness of CAN-Bike recommended practices and teach consistent driving behaviours.
- **Cyclists** - Cyclists don't know what they don't know. Riding a bike is not the same as driving a car. Just because a person has a driver's licence doesn't mean they know how to conduct themselves safely on a bicycle on a roadway in traffic. There needs to be more awareness and availability of CAN-Bike training.

No More Free Parking

Free parking isn't free. Because "free" parking encourages people to use their cars, the city needs to spend money on roadway construction, expansion, and maintenance. Big parking lots are also very unfriendly to pedestrians - they discourage people from walking or taking a bus.

- **Parking tax** - There should be a tax on big parking lots. This would offset the costs they cause due to the traffic they generate. It also makes downtown more competitive.

Carshare / Rideshare

Many people don't need to own vehicles. With carshare programs like [Peg City Car Co-op](#), people only pay for the time and distance they use the vehicle for. The limitation is the distance from where you are to the closest Peg City Car Co-op car.

- The number of cars and their distribution could be dramatically enhanced if public service fleet vehicles (municipal and provincial government, Manitoba Hydro, other crown corporations) were made available to the carshare network in off hours. This could also be a revenue source for the fleets.

Self-Driving Vehicles

The imminent arrival of self-driving vehicles will be a truly disruptive technology. There will be less reason to own a vehicle. We will look upon our vehicles less as a manifestation of our ego and more as a utility that is just something to get us (and stuff) moved from A to B. It will also have a profound impact on transportation jobs - we will need fewer drivers.

- **Passenger vehicles** - Carshare use will explode when autonomous vehicles enter the carshare fleet. It will no longer matter where you live. The shared car will come to you. You won't have to worry about parking. Cars will park themselves - or not at all. People who still own cars may commute to work and then their car will return home to park. Or you may use one carshare vehicle to get to your destination and another to get home.
- **Goods transport** - It will be possible to run trucks in convoys. Because of communication between vehicles, they will be able to travel much closer together. This "slipstreaming" reduces drag enormously. It will change the economics to the point where truck transport will be cheaper than rail and much more flexible and timely.

- **Uber-type transit** - Autonomous buses will be much less expensive to operate - although the absence of a driver may present personal safety issues. It may become feasible to use carshare vehicles as, at least part of, the feeder network to get people to the Frequent Service Transit Network (FSTN).

Air Travel / Remote Communities

Many remote communities in Manitoba do not have all-season road access. They depend upon the annual construction of the [24,000 km winter road network](#). These roads depend upon frozen muskeg, streams, and lakes. Climate change is shortening the average number of days these are open each year and making them less reliable. In the not-to-distant future, there will be a year when some or all of the network can't be built. What will happen to communities that rely on those roads for their heating fuel, construction material, and food supplies?

- **Airships** - [Dr. Barry Prentice](#) of the University of Manitoba has been working on this problem for over a decade. He proposes [airships](#). These are basically self-propelled gas bags. They don't require a runway and can be used all year long. Although airships will soon be commercially available, they will require public policy and infrastructure support - Air Canada and WestJet didn't build the airport.

Off-Road Vehicles

- **Farm equipment** - Today's farm tractors can run on biodiesel. This biodiesel can be produced on-farm or by a producer cooperative. David Rourke, founder and former President/CEO of [AgQuest Research](#), estimates that 5 to 10% of a canola crop would provide enough biodiesel to produce the crop itself. Manufacturers like John Deere are also experimenting with electric and self-driving tractors and other equipment. With self-driving electric technology, you may not need a separate, heavy tractor. It may be more practical to put the motor directly on self-driving implements themselves.
- **Construction & forestry** - We are not aware of any serious progress toward electrification or autonomous vehicle development in this area. However, all vehicles must move away from fossil fuels.

Metrics / Key Performance Indicators (KPI)

Key Performance Indicators (KPI) are those few essential metrics that will give us the best indication of progress towards our goals. Some of these may not yet exist and may need to be developed. We would like to track all of these metrics over time to reveal trends.

- Number of electric vehicles registered in Manitoba as a percentage of all registered vehicles by vehicle category (e.g. light truck, heavy truck, passenger vehicles)
- Number of Rideshare vehicles in the province (e.g. Peg City Car Coop)
- Number of transit routes with Frequent Service
- Number of kilometers of protected bike lanes

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