

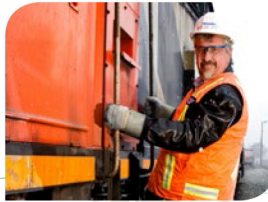
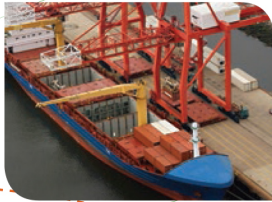


Transport
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Transports
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TRANSPORTATION IN CANADA 2016



Comprehensive Report

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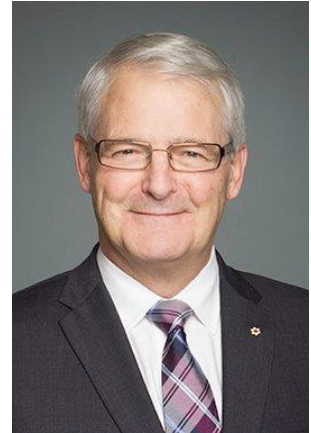
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Minister's Message

As Minister of Transport, it is with great pleasure that I submit *Transportation in Canada 2016*, the annual report on the state of transportation in Canada.

This report is based on the latest data and information in order to understand the challenges and opportunities facing Canada's transportation system and its stakeholders. An addendum of useful transportation statistics and figures is also included.

Transportation plays a critical role in the Canadian economy by enabling Canadian products, services and people to access key markets, thus creating prosperity and economic opportunities for the middle class. A modern, safe, secure, reliable and environmentally responsible transportation system is essential to our economic wealth.



In 2016, the Canadian transportation system continued its strong safety track record, with accident rates below their 10-year average for all modes. In terms of environment, transportation-related greenhouse gas emissions have been stable over the past decade as the effect of increased activities has been offset by stricter standards. The transportation system also continued to perform well in 2016 in a period of reduced demand for Canadian merchandise, resulting from subdued global and domestic economic growth.

To continue building on these accomplishments, the Government of Canada, through its Transportation 2030 Strategic Plan, aims to create a safe, secure, green, innovative and integrated transportation system that supports trade and economic growth, a cleaner environment and the well-being of all Canadians.

In accordance with this Strategic Plan, we announced a number of initiatives in 2016 including the Oceans Protection Plan, which aims to create a world-leading marine safety system that helps prevent marine incidents and strengthens environmental protection. We also continued our work with provinces and territories in support of the Pan-Canadian Framework on Clean Growth and Climate Change to develop a concrete plan to achieve Canada's international climate change commitments and drive innovation and growth.

While the system performed well in 2016, we must continue our efforts to strengthen transportation corridors to international markets and help Canadian businesses compete, grow and create more jobs for middle class Canadians. To that effect, we have announced a \$10.1 billion investment over 11 years through the Trade and Transportation Corridors Initiative, with the objective of improving the quality of trade infrastructure across Canada, strengthening the efficiency of the system and sharing evidence-based information about the Canadian transportation system with Canadians and relevant transportation stakeholders.

I hope this report will provide Members of Parliament, stakeholders and the general public with useful information on the state of Canada's transportation system and how it affects the life of every Canadian.

Sincerely,

The Honourable Marc Garneau, P.C., M.P.

Minister of Transport

Report Highlights

Summary:

- *The relatively modest global and domestic economy growth in 2016 translated in lower transportation demand for key Canadian commodities.*
- *While some fluidity issues were reported at the Port of Vancouver in the fall of 2016, the Canadian transportation system did not experience any significant bottlenecks.*
- *Contrasting with lower commodity volumes, passenger traffic was on the rise especially for international air passengers.*
- *Greenhouse gas emissions have been stable overall over the past decade. The Government of Canada put in place a number of initiatives to strengthen environmental protection, including the Pan-Canadian Framework.*
- *Canada continues to have a safe and secure transportation system with accident rates below their 5 to 10-year average. A number of initiatives aim to ensure a safe transportation system were established, including the new Oceans Protection Plan.*
- *In the coming years, Canada will face challenges and opportunities that will require transportation stakeholders to keep abreast of new developments and adapt to changing socio-demographic trends, key emerging technologies, and growing environmental concerns.*

The Canadian economy continued to experience moderate growth in 2016. Modest global economic growth translated into lower traffic volume in the Canadian transportation system, especially in the first half of the year. Demand slightly picked up in the second half of 2016, but remained below 2015 level for key bulk commodities, intermediate and finished goods. This resulted in rail traffic declines (in tonnage) for petroleum products, metals, grain and fertilizers materials.

On the marine side, international waterborne traffic (in value) also decreased, as did volume handled at certain ports. This is especially true for the port of Vancouver, which observed declines for wheat, coal, potash and intermodal traffic. In contrast, East Coast ports, notably the port of Halifax and Montréal, experienced a growth in volume handled in 2016 supported by container and crude oil respectively.

International air cargo exports (in value) decreased slightly in 2016, while trucking exports to the U.S. recorded a strong increase.

The Canadian transportation system did not experience any significant bottlenecks with respect to performance or capacity in 2016. The Port of Vancouver reported some fluidity issues at its South Shore in the fall, but the system was resilient enough to resolve the issue. No major labour disruptions or major weather related event significantly impacted fluidity at key ports or key railway corridors.

The lower volume of containers to handle over the year allowed fluidity to improve at key port terminals. Most container terminals remained below their effective capacity level throughout the year. Rail network velocity also continued to improve in 2016.

The Western grain supply chain remained fluid despite a late and abundant harvest. Some issues related to exporters having difficulties to source the right type of grain, especially the high-quality variety, caused more vessels to anchor outside the port of Vancouver.

Contrasting with lower merchandise volumes, the number of passengers increased in 2016 overall. Air passengers travelling on domestic and international flights recorded solid gains compared to 2015, while transborder sector growth remained the same. Benefiting from a low Canadian dollar, more foreign travellers came to Canada than in 2015. On the other hand, Canadian travellers to the United States (U.S.) declined across many modes. Intercity rail travel increased slightly from 2015.

Greenhouse gas (GHG) emissions have decreased for air and marine transportation over the past decade thanks to new initiatives, voluntary agreements and various international commitments by the Government of Canada. In contrast, rail and road transportation, the latter accounting for 83.5% of transport-related emissions, have increased their GHG emissions over the same period, mostly due to increased traffic.

Federal regulations have established progressively stricter GHG emission standards for passenger automobiles and light trucks of model years 2017 and beyond, building on the existing standards. The Government of Canada indicated it would continue its work to progressively establish stricter standards to further limit greenhouse gas emissions from new on-road heavy-duty vehicles and their engines in Canada starting with the 2021 model year.

Canada continues to have a safe and secure transportation system. The most recent figures show that accident rates are below their 5 to 10-year average for all modes. A number of initiatives aim to ensure a safe transportation system including the new Oceans Protection Plan which will increase capacity to prevent marine incidents, improve responses and strengthen environmental protection. For surface modes, the Government of Canada amended the

Railway Safety Administrative Monetary Penalties Regulations, introduced a new Rail Safety Improvement program and upgraded the Motor Vehicle Safety Act. Safety in the transportation of dangerous goods was also strengthened across Canada, notably through increased inspections, regulations updates, and outreach and awareness to first responders, municipalities and the general public, amongst other initiatives. Canada also continued to take steps to facilitate the flow of legitimate travellers and goods while maintaining Canada's high level of security through inspections, information sharing and stakeholder engagements.

In the coming years, Canada will face challenges and opportunities that will require transportation stakeholders to keep abreast of new developments in the continuously changing economy and adapt to changing socio-demographic trends, key emerging technologies, as well as growing environmental, safety and security concerns.

Experts expect emerging and developing markets (notably developing Asian countries) to lead global economic growth. With a growing middle class and strong infrastructure investments, these markets will stimulate demand for Canadian raw materials and merchandises and in turn, affect transportation patterns.

From 2016 to 2025, transportation for Canada's 5 major bulk commodities (coal, potash, crude oil, wood products and grain) is projected to grow moderately. This growth reflects demand for rail shipment of crude oil and wood products in the near term and potash and grain in the longer term.

The number of air passengers in Canada should continue rising over the next decade, with the strongest increase in international passengers (other than the U.S.) supported by growth from emerging markets. On the domestic market, moderate economic growth, an aged population and moderate demographic growth will hinder the rise in air passengers.

Introduction

The 2016 Transportation in Canada Annual Report presents the state of transportation in Canada with the most current available information.

Introduction

An efficient and modern transportation system has always been key to supporting a strong and competitive economy as well as to improve the quality of life of Canadians.

Transportation is essential for trade. It allows natural resources, agricultural products and manufactured goods to access domestic and international markets. It is also vital to supporting the service sector by helping Canada connect with its foreign business partners and represents a key pillar for the tourist industry.

The transportation sector also touches every aspect of our society and greatly affects our quality of life. It links communities and people by reducing the effect of distance and overcoming geographical barriers. It also affects decisions we make in terms of where we live, where we work, where we shop and what mode of transportation we use.

While transportation has such an interdependent role, it evolves over time as the environments change. This is especially true in an ever changing global economy where economic opportunities depend to a growing extent on the mobility of goods, people and the right information.

Transport Canada plays an integral role in monitoring and analyzing both the evolution and future trends in the Canadian transportation system by sharing data and information with the public through its main vehicle, the annual “Transportation in Canada” report.

About this report

As required by the *Canadian Transportation Act* of 2007 subsection 52, the Minister of Transport must table in both Houses of Parliament an overview of the state of transportation in Canada.

The report highlights the role of transportation in the economy. It presents a short overall assessment of the performance of the Canadian transportation system in 2016 looking at fluidity, utilization and capacity of the system. Subsequent chapters provide an overview of the four transportation modes (air, marine, rail, road) including major developments over the course of 2016. The report concludes with an outlook of foreseeable trends likely to affect the transportation system in the coming years.

Transport Canada bases the report and the corresponding Statistical Addendum on extensive factual transportation data from various data sources, which include a broad range of organizations. Great care and attention are given to data quality and reliability. However, the onus of data quality rests with the sources of data reported. While the most current information was used to produce the report, not all data reported was available for 2016. Providing a full picture of the state of transportation in Canada is a difficult task, restricted by access to data.

– TRANSPORTATION 2030 –

THE GOVERNMENT OF CANADA'S VISION ON TRANSPORTATION

The Government of Canada presented in 2016 its strategy for the future of transportation in Canada: Transportation 2030. This strategy integrates findings from the Canadian Transportation Act Review, as well as conclusions from extensive Minister-led public consultations during the spring and summer 2016.

TRANSPORTATION 2030 IS BASED ON FIVE THEMES:



THE TRAVELLER

Support greater choice, better service, lower costs, and new rights for travelers



SAFER TRANSPORTATION

Build a safer, more secure transportation system that Canadians trust



GREEN AND INNOVATIVE TRANSPORTATION

Reduce air pollution and embrace new technologies to improve Canadians' lives



WATERWAYS, COASTS AND THE NORTH

Build world-leading marine corridors that are competitive, safe and environmentally sustainable, and enhance northern transportation infrastructure



TRADE CORRIDORS TO GLOBAL MARKETS

Improve the performance and reliability of our transportation system to get products to markets to grow Canada's economy

As part of its Transportation 2030 Strategic Plan, the Government of Canada announced a number of initiatives to support a safe, secure, green, innovative and integrated transportation system that enables trade and economic growth, a cleaner environment and the well being of Canada's middle class such as:

- **The Trade and Transportation Corridors Initiative:** \$10.1 billion over 11 years in trade and transportation projects aim to improve the quality of trade infrastructure across Canada. Investments will be prioritized to address congestion and bottlenecks along vital corridors, and around transportation hubs and ports providing access to world markets. This initiative includes:
 - A National Trade Corridors Fund: to support investments targeted at reducing congestion and inefficiencies at marine ports as well as along the busiest rail and highway corridors;
 - Measures to modernize Canada's transportation system: to develop regulations and establish pilot projects for the safe adoption of connected and autonomous vehicles and unmanned air vehicles;
 - Trade and Transportation Information System: to fill significant information, data and analytical gaps in strategic elements of the transportation system.
- **The Oceans Protection Plan:** \$1.5 billion over the next eleven years to improve marine safety and responsible shipping, protect Canada's marine environment, and offer new possibilities for Indigenous and coastal communities.
- **The Pan-Canadian Framework on Clean Growth and Climate Change:** to achieve Canada's international climate change commitments, create good, well-paying jobs and leave a cleaner, more prosperous economy for generations to come.

The Role of Transportation in the Economy

A healthy Canadian economy is strongly connected to a well-functioning transportation sector. Transportation provides mobility for products, services and people to access key markets at home and abroad, creating prosperity and economic opportunities.

The Transportation Sector

Transportation and warehousing is important to the Canadian economy, representing 4.5% of total Gross Domestic Product (GDP) in 2016. This sector grew by 3.0% in real terms in the past year, more than double the growth rate for all industries. The compound annual growth rate for GDP in the transportation sector over the previous five years of 2.9% also exceeds that of the economy as a whole (1.4%).

In 2016, 897,000 employees (including self-employed people) worked in the transportation and warehousing sector, up 0.6% from 2015.

Employment in commercial transport industries accounts for about 5% of total employment, a share that has remained stable over the past two decades. There were approximately 3.8 unemployed persons for every vacant job in the sector, compared to a ratio of 6.5 for the overall economy.

Transportation and the Economy

GDP measures only include the economic activities directly linked to for-hire or commercial transportation. However, transportation is not confined solely to the commercial sector, as transport functions throughout the entire economy. When viewing the transportation sector in its entirety, the impact is much broader (see Figure 1 in Annex A for a summary of the importance of transportation by mode in Canada).

In 2016, aggregate household final consumption expenditures on transportation (including insurance) amounted to \$179.5 billion – second only to shelter, in terms of major spending categories. Household

spending for personal travel accounted for about 10% of GDP.

Transportation and Domestic Trade

Of the produced goods that remained within Canada, over 875 million tonnes were transported by the commercial sector in 2015. Nearly 72% of this amount was carried by for-hire trucking, 21% by rail and 7% by marine.

In terms of value, interprovincial merchandise trade totaled \$156 billion (current dollars) in 2015, down 10.9% from 2014.

Transportation and International Trade

Transportation is an important element of Canada's trade with other countries. In 2016, total international trade amounted to \$1,050 billion, a 1.0% decrease compared to 2015. The U.S. continued to be Canada's top trade partner, with \$673 billion in trade (\$394.5 billion exported, \$278.3 billion imported), down 2.2% from 2015. The U.S. accounted for 64% of total Canadian trade in 2016. This proportion has remained consistently between 63-66% each year over the past five years.

In addition to the U.S., Canada's top 5 trading partners in 2016 included China, Mexico, Japan and the United Kingdom. The latter four nations accounted for 17.0% of Canada's total international trade in 2016, eclipsing 16.8% in 2012 as the new high mark for this group. They have also remained constant as Canada's second through fifth trading partners over the past five years. Figure 2 in Annex A presents top Canadian merchandise export flows to North America, Europe and Developing Asia.

Government Revenues and Expenditures

All three levels of government deliver and finance transportation infrastructure, programs and services.¹ Tables G1 to G6 of the statistical addendum provide more details on governments' transportation expenditures and revenues.

Federal government

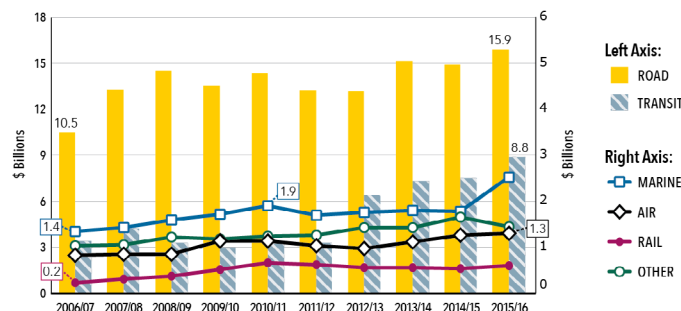
Total federal transport-related expenditures reached \$6.9 billion in 2015-2016, a 18.1% increase from the previous year, the highest level since 2010-2011. This can be attributed to increased expenditures for the Canadian Coast Guard, Marine Atlantic, Fisheries and Oceans Canada's Small Craft Harbours Program, and for the Windsor-Detroit Bridge Authority.

The three main federal departments in terms of transportation-related spending were Transport Canada, with \$1.7 billion (24.0% of total federal spending), followed by the Canadian Coast Guard (\$1.1 billion or 16.1%) and Infrastructure Canada (\$0.8 billion or 11.8%). Federal spending included operating and maintenance expenses, capital expenditures as well as transfer payments. Transfer payments include transportation-related contributions made under funding programs such as the Gas Tax Fund and the New Canada Building Fund. Tax expenditures, such as the cost of the GST exemption for municipal transit and the Public Transit Tax Credit, are also included.

At the federal level, transportation-related revenues more than offset transportation-related spending. Federal revenues from transportation items totalled \$13.8 billion in 2015-2016, a 1.6% increase from 2014-2015. This include \$5.6 billion in fuel taxes and \$6.7 billion in sales taxes on transportation-related household purchases. Overall federal user fees and other miscellaneous revenues, including major items such as the

Air Travellers' Security Charge (\$755 million in 2015-2016) and lease payments by airport authorities (\$324 million in 2015-2016) were up 11.4% compared to the prior fiscal year. Federal fuel tax revenues and transportation-related sales tax revenues rose by 0.7% and 0.4% respectively. Federal vehicle registration fees (from imported vehicles) fell by 50% relative to 2014-2015.

Combined federal and provincial/territorial spending by mode, 2006/07-2015/16



Source: Transportation in Canada, Statistical Addendum 2016, Table G2

Provincial-territorial governments

Provincial-territorial spending on transportation totaled \$24.5 billion in 2015-2016, up 8.9% from the previous year. After netting-out federal transfer payments related to transportation, provincial/territorial spending was \$23.8 billion, an increase of 9.2%. Nunavut reported the highest year-over-year increase (38.8%), along with New Brunswick (23.2%) and Manitoba (16.4%). Newfoundland and Labrador and the Northwest Territories were the only two jurisdictions reporting declines in transportation-related spending, down 1.7% and 6.9% respectively.

Provincial and territorial transportation-related revenues came from sales taxes on transportation-related household purchases, fuel taxes, license and registration fees, user fees and various other sources. In 2015-2016 revenues amounted to \$25.4 billion, a 4.9% increase from the previous year. Fuel taxes made up for 38.5% of overall provincial-territorial revenues, with sales taxes contributing 40.3%.

¹ Based on Transport Canada's survey of federal departments and agencies, as well as provincial and territorial governments for the period up to March 31st, 2016. Estimates for municipal governments are not available after 2009, as data was discontinued by Statistics Canada.

Nunavut reported large increases in fuel tax revenues (up 64.3% versus 2014-2015), followed by Alberta (up 45.1%), New Brunswick (up 17.2%) and the Northwest Territories (up 11.4%). Saskatchewan reported a 7.0% decline in fuel tax revenues year-to-year.

Federal-Provincial-Territorial Public Revenues and Expenditures by Mode

Combined federal-provincial-territorial expenditures (net of transfers) grew \$750 million for the marine mode in 2015-2016, due mostly to federal investments in the Coast Guard. In contrast, provincial spending was responsible for most of the \$1.4 billion increase in transit spending in 2015-2016 compared to 2014-2015, notably in Ontario and Québec.

Federal and provincial/territorial spending are not distributed evenly across modes. Taken together, the provinces/territories account for over 90% of expenditures for roads and transit, while the federal level contributes three-quarters or more of total expenditures on air, marine, rail and multimodal.

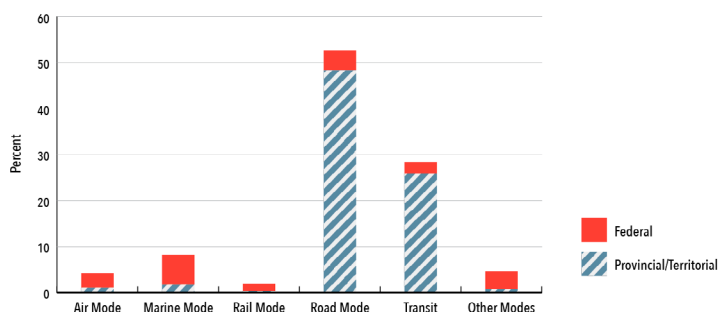
In fiscal year 2015-16 for example, all levels of government combined, spent over \$3.9 billion capital improvements to the National Highway System (a sub-component of total road expenditures), investments amounting to over \$35.4 billion since 2006-07:

- provincial and territorial governments have invested about \$30.2 billion (86%)
- the federal government has invested about \$4.4 billion (12%)
- other sources have invested \$0.7 billion (2%)

The road mode was the main source of revenues for both the federal and provincial-territorial levels of government, making up 94.4% of transportation-related revenues provincially-territorially and 78.7% federally.

The second-biggest transportation-related revenues in 2015-2016 was air for the federal government (accounting for 10.3%) and transit for the 13 provincial and territorial governments (with a 4.4% share).

Overall share of transportation spending by mode and level of government, 2015/16



Source: Transportation in Canada 2016, Statistical Addendum, Table G2
Note: Uses gross expenditures and does not net out transfers

Canada's Trade and Transportation Corridors

Canada's transportation and logistics system is comprised of key corridors, hubs and infrastructure that are crucial for ensuring the fast and safe movement of people and merchandise to domestic and international destinations.

As a large nation that depends on trade with the global market, Canada needs to ensure that people and merchandise can move quickly and safely through its transportation and logistics system in order to support economic growth and prosperity.

Building on Transport Canada's "gateways" model, the Government of Canada has launched the new Trade and Transportation Corridors Initiative that will invest \$10.1 billion over 11 years in trade and transportation projects aim to improve the quality of trade infrastructure across Canada. Investments will be prioritized to address congestion and bottlenecks along vital corridors, and around transportation hubs and ports providing access to world markets.

THE TRADE AND TRANSPORTATION CORRIDORS INITIATIVE

- ▶ A National Trade Corridors Fund,
- ▶ A Trade and Transportation Information System,
- ▶ Measures to modernize Canada's transportation system,
- ▶ The Oceans Protection Plan, and
- ▶ Funding to undertake climate risk assessments and address the requirements of existing federally funded transportation assets (VIA Rail, Marine Atlantic and Eastern Atlantic ferries).

Canada's transportation and logistics system can be divided into three strategic regions/corridors (see Map 1 in annex A), including:

1. the Western Corridor
2. the Continental Corridor
3. the Atlantic Corridor

While there are common characteristics among the three corridors with regards to facilitating trade and movement of goods and people, each corridor has its own unique features.

Western Corridor

The Western corridor is an important rail and marine transportation corridor in Canada. This corridor serves Canadian bulk commodities exports (crude oil, grain, coal, wood products, potash and copper), mainly destined to North American and Asian markets. The Western Corridor also links container imports from Asia to Central Canada, as well as to the U.S. Midwest markets.

In 2016, \$101 billion worth of goods exports (excluding pipelines exports to the U.S.) were shipped through this corridor. This amount is down 1.3% from 2015 due to low commodity prices and lower global economic growth. In 2016, 51% of the value of merchandise exported through the Western Corridor (excluding pipelines) was destined for the U.S., 38% for Asia and 2% for Mexico.

The Port of Vancouver is Canada's largest port in terms of traffic volume. It generated 135.5 million tonnes (Mt) of traffic in 2016,

down 1.8% from 2015. Key generators of traffic include bulk commodities (coal, crude oil, wood products, potash and grain) and containers. The Port of Prince Rupert, Canada's other main West Coast port, handled 18.9 Mt of traffic (mainly coal, grain and containers) in 2016, down 4% from 2015.

In 2016, Vancouver International Airport handled 257.1 thousand tonnes of cargo traffic, which amounted to 21% of Canada's air freight traffic.²

On the air passenger side, the Western Corridor is home to three of Canada's top five busiest airports. In 2016:

- Vancouver International Airport had 21.4 million passengers (+8.9% from 2015)
- Calgary International Airport had 14.8 million passengers (+1.6% from 2015)
- Edmonton International Airport had 7.0 million passengers (-6.6% from 2015)

Vancouver International Airport and Calgary International Airport serve as hub airports for both Air Canada and WestJet, Canada's two biggest airlines. In 2016, international passengers at Vancouver came from/went to:³

- Asia (29%)
- United States (49%)
- Europe (14%)
- Other international (9%)⁴

In 2016, international passengers at Calgary came from/went to:

- Asia (2%)
- United States (65%)
- Europe (18%)
- Other international (15%)⁵

In terms of passenger rail traffic, Via Rail operates the Canadian train, a long-haul passenger route that operates between Toronto and Vancouver, stopping at major cities such as Edmonton, Saskatoon and Winnipeg along the way. The Canadian had 93 thousand passengers in 2016, up 3.9% from 2015. Other routes operated by Via Rail in the Western Region include Jasper to Prince Rupert, and Winnipeg to Churchill.

Continental Corridor

The Continental corridor, the busiest corridor in terms of surface traffic, serves Central Canada, the most densely populated and industrialized region in the country. The Continental corridor is a key enabler of international trade with the U.S. through its connections into the American Mid-West and Northeast. Using the Great Lakes and St. Lawrence Seaway, the Continental corridor is key to moves goods to and from Europe and other international markets. Key exports included automotive products and parts, wood products, and metal/minerals.

In 2016, the total value of merchandise exported through Ontario and Québec totaled \$327 billion (excluding pipeline exports), an increase of 2.5% from 2015. In 2016, 80% of the value of merchandise exported through the Continental Corridor (excluding pipelines) was destined for the U.S., 11% for Europe, 5% for Asia, and 2% for Mexico

The Great Lakes and St. Lawrence Seaway System portion of the corridor is used for shipping bulk materials, transshipments of exports and container imports. Grain from the Prairies is typically shipped from the Port of Thunder Bay and carried to different Québec ports for international exports. In 2016, 11 million tonnes of grain moved through the St. Lawrence Seaway, up 3.7% from 2015. In 2016, other commodities of importance to the St. Lawrence Seaway traffic include:

² Source for all air passenger and freight statistics in this section: Transport Canada, adapted from Statistics Canada, "Air Carrier Traffic at Canadian airports", Cat. 51-203, various issues. Transport Canada, ECATS database for 2015 data.

³ Might not add up to 100% due to rounding.

⁴ Most popular "other international" destinations for Vancouver airport include: Australia, Cuba, Mexico and New Zealand.

⁵ Most popular "other international" destinations for Calgary airport include: Mexico, Cuba and Costa Rica.

- iron ore (6.2 million tonnes, 17.8% of total traffic, mostly due to production in Northern Québec)
- coal (2.2 million tonnes, 6.4% of total traffic)
- petroleum products (2.4 million tonnes, 6.8% of total traffic)
- salt (2.5 million tonnes, 7.2% of total traffic)
- other processed products (4.2 million tonnes, 12.1% of total traffic)

The Port of Montréal is of strategic importance as it is the entrance to the St. Lawrence Seaway, which connects the lower St. Lawrence River to the Great Lakes. The Port of Montréal serves as a major hub for container traffic, mainly serving Québec, Ontario and the U.S. Midwest. In 2016, 13 million metric tonnes of container traffic moved through the Port of Montréal, down 0.2% from 2015. Overall freight traffic at the Port of Montréal in 2016 was 35 million tonnes, up 10.4% from 2015.

Trucking activity plays a more important role in the Continental corridor, primarily moving food products, manufactured and other processed goods within the Québec City - Windsor corridor and to the American States surrounding the Great Lakes. Ontario and Québec have the busiest road border crossings in Canada. In the Continental corridor, 52% of total merchandise value were exported by road in the last five years, compared to 31% and 18% in the Western and Atlantic Corridors, which rely more on marine transportation.

In terms of air cargo transportation, Toronto (Pearson), Hamilton and Montréal (Trudeau and Mirabel) are active in cargo shipping and together accounted for 54% (667.7 thousand tonnes) of air freight traffic in Canada in 2016. This cargo travels mostly to the U.S., the United Kingdom and China. Since air cargo transportation is often reserved for high value merchandise, the most important cargo (in terms of value) exported by air out of the Continental Corridor include:

- pearls, precious metals and mineral (such as gold, diamond, coins.)
- airplanes, helicopters, and their parts
- turbo jets, turbo-propellers and other gas turbine
- pharmaceutical products such as medicaments

On the air passenger side, the Continental Corridor is home to Canada's busiest and third busiest airports. In 2016:

- Toronto Pearson International Airport had 42.3 million passengers (+6.7% from 2015)
- Montréal-Pierre Elliott Trudeau International Airport had 15.4 million passengers (+4.6% from 2015)

Air Canada uses both airports as hub airports while WestJet uses Toronto Pearson as a hub airport.

In 2016, international passengers at Toronto came from/went to:

- United States (44%)
- Europe (23%)
- Asia (9%)
- Other international (24%)⁶

In 2016, international passengers at Montréal came from/went to:

- United States (35%)
- Europe (35%)
- Asia (1%)
- Other international (29%)⁷

⁶ Most popular "other international" destinations for Toronto Pearson airport include: Cuba, Dominican Republic, Mexico and Jamaica.

⁷ Most popular "other international" destinations for Montreal airport include: Cuba, Dominican Republic and Mexico.

Most of Via Rail operations come from the Continental region, separated into two specific corridors.

- Corridor East operates trains between Québec City, Montréal, Ottawa, and Toronto. This is the busiest corridor, with 2.8 million passengers in 2016, up 5.8% from 2015.
- Corridor Southwestern Ontario operates trains between Toronto, London, Sarnia, Windsor and Niagara. It carried 953 thousand passengers in 2016, up 0.2% from 2015.

Via Rail also operates mandatory services in the Continental region, including trains between Montréal and Senneterre, Montréal and Jonquière, and between Sudbury and White River. Currently, mandatory service between Montréal and Gaspé is temporarily suspended until further notice due to infrastructure problems.

Atlantic Corridor

The Atlantic Corridor is strategically located to access global markets. The Port of Halifax, one of the few ports on the North American east coast that can handle fully laden post-Panamax container vessels, is also North America's closest point of ice-free and minimal tide access to Europe and Asia (via the Suez Canal) from the east coast.

Key exports through the Atlantic Corridor include petroleum products and sea food products. In 2016, \$24 billion worth of exported merchandise moved through the Atlantic corridor (excluding pipeline exports), down 5.5% from 2015. In 2016, 70% of the value of exported merchandise moving through the Atlantic Corridor (excluding pipelines) was destined for the U.S. and Mexico, 13% for Europe and 13% for Asia.

Containers account for an important part of the traffic, mostly transiting through the Port of Halifax. Containers handled at the Port of Halifax mainly serve the rest of Canada and the U.S. Midwest. Petroleum products also represent a large portion of traffic in this corridor, as offshore crude oil is often shuttled from the Hibernia and Terra Nova fields to the transshipment terminal at Whiffen Head, Placentia Bay. From there, the crude oil moves by conventional tankers, often heading to ports on the North American east coast and the Gulf of Mexico.

In the Atlantic Region, Via Rail operates the Ocean train, a long-haul passenger route that operates between Montréal and Halifax. The Ocean had 78 thousand passengers in 2016, down 2.7% from 2015.

Air Transportation Sector

Canada has 15 million km² of airspace to manage, one of the largest in the world. The Government of Canada through its Transportation 2030 Strategic Plan is committed to providing greater choice, better service, lower costs, and new rights for travellers.

Industry Infrastructure

Canada is the third largest aerospace sector in the world, and has 15,000,000 km² of airspace managed by the largest single Air Navigation Service provider in the world (NAV CANADA).

NAV CANADA is a privately run, not-for-profit corporation that owns and operates Canada's civil air navigation system. It operates air traffic control towers at 41 airports and flight service stations at 55 airports.

The Canadian Airport System includes:

- 26 airports (see Map 6 in annex A) from the National Airport System (NAS):

Calgary	Prince George
Charlottetown	Québec
Edmonton	Regina
Fredericton	Saint John
Gander	Saskatoon
Halifax	St. John's
Iqaluit	Thunder Bay
Kelowna	Toronto
London	Vancouver
Moncton	Victoria
Montréal/Trudeau	Whitehorse
Montréal/Mirabel	Winnipeg
Ottawa	Yellowknife

- 71 regional and local airports serving scheduled passenger traffic
- 31 small and satellite airports without scheduled passenger services
- 13 remote airports providing the only reliable year-round transportation link to isolated communities
- 11 Arctic airports (including the three territorial capital airports counted already in the NAS)

The *Canada Flight Supplement* and the *Canada Water Aerodrome Supplement* listed 1,594 certified and registered sites in 2016. They fall into three categories:

- 222 water bases for float and ski planes
- 370 heliports for helicopters
- 1,002 land airports for fixed-wing aircraft

Industry Structure

In 2016, 6.2 million aircraft movements took place at airports, 3.6 million of which were made by airlines. The other 2.7 million were itinerant and local movements made by general aviation companies.⁸

There were 36,448 Canadian registered aircraft, 69,012 licensed pilots, and 2,233 licences held by 1,440 air carriers (42.7% Canadian; 57.3% Foreign) in 2016.

Canada has 17,278 aircraft maintenance engineers, 1,001 approved maintenance organizations, with 535 certified and 1,067 non-certified aerodromes.

AIR TRAVELLERS

As part of its Transportation 2030 Strategic Plan, the Government of Canada announced it will:

- ▶ Work with industry to implement clear and fair consumer protection rules for air travellers;
- ▶ Work with other federal departments to make the transportation system more accessible for persons with disabilities.

⁸ General aviation includes the following sectors: other commercial, private, and government (civil and military).

Air Canada

In 2016, Air Canada, Air Canada Express and Air Canada rouge accounted for 51% of available seat-kilometres in the domestic air market.⁹

Air Canada, Air Canada Express, and Air Canada rouge operated on average 1,570 scheduled flights per day. The Air Canada network has three hubs (Toronto, Montréal and Vancouver) and provided scheduled passenger services to 64 Canadian destinations, 55 U.S. destinations and 87 other foreign destinations on six continents.

As of December 2016, Air Canada had a fleet of 168 aircraft, while Air Canada Express was using 152 aircraft, and Air Canada rouge operated 44 aircraft.

INTERNATIONAL OWNERSHIP OF CANADIAN AIR CARRIERS

The Government of Canada has announced in 2016 its intention to change the rules on international ownership for Canadian air carriers to encourage more competition in the air transport sector while ensuring that safeguards are in place to mitigate any associated risks.

WestJet

In 2016, WestJet and WestJet Encore accounted for 41% of available seat-kilometres in the domestic air market.

WestJet and WestJet Encore operated on average 641 scheduled flights per day. They provided scheduled passenger services to 38 Canadian destinations, 27 U.S. destinations and 34 destinations in the Caribbean and Mexico. In December 2016, WestJet had a fleet of 119 aircraft, while WestJet Encore recorded a fleet of 33 aircrafts.

Other carriers

In 2016, Porter Airlines, a regional carrier based at Toronto's Billy Bishop airport, used a fleet of 26 turboprop aircraft to provide direct, non-stop scheduled passenger services to 15 destinations in Canada and eight in the U.S.

Air Transat was the largest leisure carrier in Canada for 2016, with a fleet of up to 34 aircraft (depending on the season) serving 68 international destinations in 32 countries.

Sunwing Airlines is Canada's second largest leisure carrier. It operates a fleet of up to 32 aircraft (depending on the season) serving 37 international destinations in 15 countries.

Foreign operators offered 12.7 million scheduled seats from Canada on an average of 308 flights per day. This is no change from the 12.7 million seats also offered in 2015.

As of December 2016, Canada had air transport agreements or arrangements with 120 bilateral partners. In 2016, Canada concluded expanded agreements with key markets, including Mexico (ranked Canada's second largest air travel market based on 2015 data) and China (sixth largest market).

Safe and Secure Transportation

Transport Canada delivers approximately 120,000 Civil Aviation services per year. In 2016-17 the Department delivered 23,573 Licensing requests, 646 operating certificates, 4,840 Aircraft Registration requests, 44,429 Medical Assessments, 3,754 UAV Special Flight Operating Certificates and thousands of inspections.

⁹ Air Canada Express is comprised of Chorus (Jazz), Sky Regional, Exploits Valley Air Services and Air Georgian.

Marine Transportation Sector

The Government of Canada aims to build world-leading marine corridors that are competitive, safe and environmentally sustainable. A number of initiative were introduced in 2016 to improve marine safety and the environment, most notably the new Oceans Protection Plan.

Industry Infrastructure

According to the Chamber of Marine Commerce, Canadian shipowners have invested more than \$4 billion over the last five years to modernize their fleets, introducing a new generation of efficient, environmentally-friendly vessels and retrofitting current vessels on the Great Lakes-Seaway System.

The Canadian Port System

Ports and harbours offer vital connections to promote domestic and international economic activity. As of December 2016, Canada had 559 port facilities and had 866 fishing harbours and 129 recreational harbours.

Transport Canada is involved in two categories of ports:

- 18 independently managed Canada Port Authorities (CPAs), shown on Map 7 in annex A

Belledune	Saguenay
Halifax	Saint John
Hamilton	Sept-Îles
Montréal	St. John's
Nanaimo	Thunder Bay
Oshawa	Toronto
Port Alberni	Trois-Rivières
Prince Rupert	Vancouver
Québec	Windsor

- 48 port facilities currently owned and operated by Transport Canada¹⁰

Investments in new and existing port infrastructure has helped CPAs diversify their offerings as well as open up access to new global markets. Examples include:

- The Port of Montréal's new Viau container terminal, funded in part by the Government of Canada, began operations in 2016, and will increase capacity by 450,000 TEUs (twenty-foot equivalent unit). It will also serve as an essential part of the port's overall capacity optimization project.
- In October 2016, a contribution agreement was signed between the government of Canada and the St. John's Port Authority. The government of Canada will contribute up to \$6.4 million for the project. The project consists of the construction of a new steel pile supported Finger Pier at the junction of existing Pier 16 and Pier 17 with the capability of mooring, servicing and offloading two Offshore Supply or similarly sized ships.

The private sector also continues to invest in CPAs through privately-funded infrastructure projects, such as the \$50-million G3 Canada Ltd. grain terminal at the Port of Hamilton, announced in 2015 and expected to be completed in 2017.

In March 2016, the Fraser Surrey Docks completed the Port Authority Rail Yard to promote growth and expansion of the Asia Pacific Gateway. Funding for the project was shared by Fraser Surrey Docks (\$3.1 million) and the Government of Canada (\$2.5 million).

¹⁰ As of December 2016, a total of 501 of the 551 Transport Canada port facilities across Canada had been transferred, demolished or had their public harbour status terminated.

The Great Lakes St. Lawrence Seaway System

As shown on Map 7 in annex A, the Great Lakes St. Lawrence Seaway System provides a strategic waterway system into the North American heartland which includes:

- The waterway between Lake Erie and the Port of Montréal (the St. Lawrence Seaway), with eight locks in the Welland Canal and seven locks between Montréal and Lake Ontario. This portion of the system (including five of the seven locks between Montréal and Lake Ontario) is managed by the Canadian St. Lawrence Seaway Management Corporation.
- The two remaining locks in the Montréal-Lake Ontario segment are in U.S. waters and managed by the Saint Lawrence Seaway Development Corporation.

The Great Lakes St. Lawrence Seaway System serves 15 major international ports and 50 regional ports that connect to more than 40 provincial or interstate highways and 30 railway lines. In 2016, more than 7 billion dollars in direct Canadian trade flowed through the Great Lakes-St. Lawrence Seaway system.

Industry Structure

International

According to the United Nations, 90% of the world's trade travels by sea. This represented 10 billion tonnes in 2015, the highest level in history.

The financial crisis of 2008 marked the end of one of the longest positive shipping cycles. While world seaborne trade has recovered since its 3.2% decline in 2009, the average annual rate of growth is slowing from the historic long-term (1950-2008) rate of 4.3%. World seaborne trade increased 2.6% in 2015 and 2.3% in 2016.¹¹

The slowdown in global trade, the weakness in commodity prices, the number of new vessels and the introduction of mega-ships have created an important supply-demand imbalance that pushed freight rates to their lowest level in recent decades.

In 2016, this situation caused the bankruptcy of Hanjin Shipping and the merger of key players notably China Ocean Shipping Company (COSCO) and China Shipping Group. This environment has also triggered a series of new mega alliances between container carriers. Vessel sharing agreements are not new, but the new mega alliances now control almost 90% of container capacity on major trade lanes.

On June 26, 2016 the expanded Panama Canal began commercial services, doubling its capacity. The Canal, which can now accommodate Post-Panamax vessels with up to 13,000/14,000 TEUs, will likely divert some flows of international traffic from the North American West Coast to the East Coast. The increasing use of larger vessels in the global fleet requires ports to have sufficient capacity to service them. This in turn, requires matching surface connection capacity to ensure the efficient flow of goods along the supply chains.

Canada

In Canada, dredging occurs in many locations across the country. Most dredging activities focus on port and shipping channel maintenance while there are other areas of activities taking place in support of construction projects. In 2016, there were 54 Canadian registered dredging vessels located across the country. The main dredging operators in Canada include:

- Fraser River Pile and Dredge (Graymar Equipment 2008 Inc.)
- Ocean Group
- JJM Construction Ltd
- Dean Construction
- McNally Construction
- Dragage Acadien Ltée

¹¹ Martin Stopford, Clarkson Research, Workshop on Maritime Clusters and Global Challenges, December 2016.

The marine sector transports bulk and containerized cargo domestically and overseas. This sector also supports Northern resupply and resource development, passengers coastal and inland ferry services, and cruise ships. Many ferries are critical transportation links.

Canadian registered vessels are active in domestic commercial activities (carrying on average 98% of domestic tonnage) as well as in trade between Canada and the U.S. In contrast, Canadian shippers rely predominantly on foreign-based carriers for other international destinations.

A number of Canadian-based marine companies active in international trade use foreign registered vessels. The main ones are Fednav Ltd., CSL International (Canada Steamship Lines), Teekay Shipping (Canada), Canfornav and Kent Line.

Domestic shipping serves four main geographical sectors.

1. The Pacific Coast

Most West Coast marine activity is trade-related, with Port of Vancouver and Port of Prince Rupert being the two main gateways for international trade. Nevertheless, domestic marine activities play an important role in British Columbia's economy. The Pacific Coast geographic area is very diverse and includes many inlets and islands. Coastal communities located across this complex island shoreline rely on domestic tug and barge operations. Domestic marine carriers serve:

- the Fraser River and Burrard Inlet
- the coastal routes within the Gulf Islands
- the Strait of Juan de Fuca
- the inside Passage from Vancouver up to the Alaska Border
- the Haida Gwaii's archipelago

Main carriers serving this sector are:

- Seaspan Marine
- Island Tug and Barge
- Pacific Towing Services
- SMIT Canada
- West Coast Tug and Barge

These carriers are also active in transborder trade to the states of Alaska, Oregon and Washington. Freight carried in this sector includes general cargo for community resupply, wood products, gravel and stones, construction materials and coal.

2. The Great Lakes and the St. Lawrence River

Domestic marine activity in the Great Lakes–St. Lawrence River covers a large area from its western point at Thunder Bay/Duluth (U.S.) through the Great Lakes and the Seaway System, ending at the opening of the Gulf of St. Lawrence.

Main domestic carriers in this sector are also active in trade with the U.S. They include:

- Algoma Central Corporation
- Canada Steamship Lines
- Groupe Desgagnés Inc.
- Lower Lakes Towing Ltd.
- McAsphalt Marine Transportation Ltd.
- McKeil Marine Ltd.
- Purvis Marine Ltd.

Freight carried in this area includes grain, coal, iron ore, petroleum products, salt, gravel and stones.

Canada and the U.S. have a history of close regulatory co-operation in this region, as shipping on the Great-Lakes St. Lawrence Seaway system is an important driver for both, the Canadian and the U.S. economies, directly supporting almost 100,000 jobs and over \$33 billion (U.S. dollars) in business revenue.

3. *The Atlantic Coast*

While most of the East Coast's domestic marine activity takes place within the Great Lakes–St. Lawrence River, many activities also take place in Canada's four Atlantic provinces. Newfoundland and Labrador receive supplies in general commodities via different daily and weekly feeder services. Marine activities related to the mining industry are also important in the province such as the Voisey's Bay Nickle Mine in Northern Labrador.

Main domestic carriers in this sector include:

- Irving/Kent Line
- Coastal Shipping Ltd.
- Oceanex (1997) Inc.
- Canada Steamship Lines
- Groupe Desgagnés Inc.

Most activities in this region relate to the petroleum industry in:

- Saint John (New Brunswick)
- Come by Chance (Newfoundland and Labrador)
- Newfoundland and Labrador's current offshore oil project sites—Hibernia, Terra Nova, and White Rose

Nova Scotia has two gas production sites—Sable Island and Deep Panuke. Most activities in this sector relate to using specialized offshore vessels for research, construction (deepwater) and support development and production activities.

Main offshore operators in this region include:

- Atlantic Towing
- Maersk
- Secunda

Offshore operations in this region and transborder trades with the U.S. also contribute to marine activity. However, international marine carriers conduct most of this activity.

4. *The Northern Region*

Canada's territories cover close to 40% of Canada's area, but are home to just over 113,600 people (around 0.3% Canada's population). This population is dispersed among numerous small communities often separated from each other by hundreds of kilometers of land and water. Since they are so remote, seasonally operated marine transportation plays a critical role in the resupply of basic necessities sourced from southern Canada. Resource projects similarly rely on marine transportation to move equipment and supplies from the south and to get their products to southern markets.

There are four distinct marine systems involved in resupplying northern Canadian communities:

- the Athabasca marine resupply system (A. Frame Contracting Ltd.)
- the Mackenzie River and western Arctic system (Northern Transportation Co. Ltd. and Cooper Ltd., Island Tug and Barge)
- the Inside Passage and Yukon system (Seaspan Marine)
- the Keewatin/Hudson Bay and Eastern Arctic system (Woodward, Nunavut Eastern Arctic Shipping Inc., Nunavut Sealink and Supply Inc., Desgagnés Transartik/PetroNav and Fednav)

Ferries

Ferries in Canada provide an important transportation link for coastal and island communities, as well as communities separated by rivers or lake crossings where crossing demands do not warrant building a bridge. Ferries also play a vital role in resupplying some communities across the country. There are ferry operators in most provinces, examples include:

- Marine Atlantic Inc.
- Northumberland Ferries Ltd.
- Société des traversiers du Québec
- BC Ferries

The Canadian Commercial Fleet

In 2016, Canada's commercial registered fleet (1,000 gross tonnage and over) had 185 vessels with a total of 2.5 million gross tonnes.¹² The dry bulk carriers formed the fleet's backbone, with 50% of the gross tonnage and 30% of vessels, followed by tankers and general cargo vessels.

There was also a large active fleet of 526 tugs (15 gross tonnage and over) and 2,026 barges (15 gross tonnage and over) operating in Canada, mainly on the Pacific coast.

According to the United Nations Conference on Trade and Development, as of January 1, 2016, Canadians owned 362 ocean going ships that trade internationally under foreign flags.

Safe and Secure Transportation

On November 7, 2016, the Government of Canada announced the \$1.5 billion Oceans Protection Plan (see box).

In addition to new measures introduced as part of the Oceans Protection Plan in 2016, safety and security of seafarers was improved by introducing:

- *Vessel Fire Safety Regulations* published in *Canada Gazette*, Part I
- *Regulations Amending the Small Fishing Vessel Inspection Regulations* published in *Canada Gazette*, Part I & Part II,
- *Regulations Amending the Vessel Operation Restriction Regulations (Columbia River)* published in *Canada Gazette*, Part I & Part II, and
- *Regulations Amending Certain Regulations Made Under the Canada Labour Code* published in *Canada Gazette* Part I

As a core member of the Marine Security Operations Centres (MSOCs), Transport Canada continues to partner with other federal government departments and agencies to leverage our combined capability, capacity and authority to enhance Canada's marine security.

THE OCEANS PROTECTION PLAN

The Oceans Protection Plan is designed to achieve a world-leading marine safety and coastal protection system that includes:

- ▶ Restoring and preserving the marine ecosystems,
- ▶ Strengthening partnerships with Indigenous communities, and
- ▶ Investing in evidence-based emergency preparedness and response.

Investments under the Oceans Protection Plan will:

- ▶ Increase capacity to prevent marine incidents and improve responses,
- ▶ Strengthen environmental protection,
- ▶ Create opportunities for Indigenous communities to participate and play an active role in responsible shipping and the marine safety regime, and
- ▶ Fund additional research that draws on the expertise and experience of the science community, both in Canada and abroad.

¹² Self-propelled vessels of 1,000 gross tonnage and more. This includes dry bulk vessels, tankers, general cargo vessels and ferries (including government-owned ferries). It excludes tugs used in offshore supply. This is the way the Canadian Vessel Register defined the Canadian commercial registered fleet.

Green Transportation

In 2015, the Government of Canada announced funding to install shore power:

- \$6 million to the Port of Vancouver, to service container vessels at two container terminals
- \$5 million to the Montréal Port Authority

These projects are currently under construction. The shore power technology reduces fuel consumption, fuel costs, GHG and air pollutant emissions from vessels by providing ship operators an alternative to running diesel auxiliary engines.

In 2013, Canada adopted a number of measures to reduce air pollutant and GHG emissions from ships, developed at the International Maritime Organization (IMO).

Since January 1, 2015, under the North American Emission Control Area in coastal waters, vessels operating in Canada must use fuel with a maximum sulphur content of 0.1% or use technology that results in equivalent sulphur emissions, to reduce air pollutants. In the Great Lakes St. Lawrence Seaway System, progress continued under the Fleet Averaging Regulatory Regime to reduce sulphur emissions from domestic vessels. We expect these measures will reduce sulphur oxide emissions from ships by up to 96% from 2013 levels.

The Energy Efficiency Design Index requires vessels on international trade that were constructed after January 1, 2015, to meet energy efficiency targets to reduce GHG emissions.

To protect Canadian waters from invasive species, Transport Canada:

- requires ships to manage their ballast water
- conducts joint inspections with U.S. authorities to verify that all vessels from overseas entering the Seaway meet ballast water regulations

Joint inspections found that 97% were compliant, while the remainder needed to take corrective action before entering the Seaway.

In 2010, Canada ratified an international Convention to further increase protection. In 2016, this Convention met the applicable requirements for entry into force, and will do so on September 8, 2017. Transport Canada is working to amend the *Ballast Water Control and Management Regulations* to give effect to the Convention in Canada.

Rail Transportation Sector

The Government of Canada continues its work to build a safer and more secure rail system through a number of measures including amendments to the Railway Safety Administrative Monetary Penalties Regulations and a new Rail Safety Improvement program.

Industry Infrastructure

The Canadian Rail System currently has 45,199 route-kilometers (km) of track, as illustrated on Map 7 in annex A:

- CN owns 49.1% (22,186 km)
- Canadian Pacific (CP) owns 25.6% (11,574 km)
- Other railways own 25.3% (11,439 km)

The Rail System also includes:

- 19 intermodal terminals operated by either CN or CP to run truck/rail and container intermodal services
- 27 rail border crossings with the U.S

In the last 10 years (2007-2016), 2,600 km of track were officially abandoned and 845 km transferred, mainly to new short line rail operators. CN has acquired some track in takeovers of Class II carriers.

On a system-wide basis, railways invest about 20% of their revenue into infrastructure, averaging approximately \$1.8 billion annually over the past 5 years.

Industry Structure

The rail transportation sector specializes in moving heavy, bulk commodities and containerized traffic over long distances.

Its passenger function includes providing commuter, intercity and tourist rail services.

Over 60 railways operate in Canada. About half of them operated under the federal jurisdiction in 2016, including three Canadian Class I and several U.S. railways:¹³

- CN
- CP
- VIA Rail a Crown corporation established in 1977, which operates Canada's national passenger rail service on behalf of the Government of Canada. VIA Rail operates intercity passenger rail services, mainly over CN and CP track
- AMTRAK, the U.S. National Railroad Passenger Corporation, which provides two cross-border passenger rail services to Montréal and Vancouver and a joint cross-border service to Toronto with VIA Rail
- Some large U.S.-based carriers with freight rail operations in Canada. Examples include the BNSF Railway Company, CSX Transportation Inc., and the Union Pacific Railroad Company

¹³ In December 2016, 26 federal railway companies held a valid certificate of fitness (with 5 cancelled and 1 suspended licenses), down from 34 in 2007.

Note: The BNSF rail line is a strategic link in the trade route between Canada, the United States and Mexico. Its service to Canada's Pacific Gateway gives Vancouver with unique strategic advantage of being the only port on the west coast served by three Class I railroads.

Other federally regulated railways include short line railways. These are line-haul carriers that provide point-to-point haulage services across distances of between 20 and 450 kilometres, though some have shorter or longer networks. Short lines typically connect shippers to Class I railways, other short lines and/or ports to move products across longer distances. For example, Québec North Shore and Labrador Railway (QNS&L), a wholly-owned subsidiary of Iron Ore Co. of Canada, offers freight services between Labrador City, Emeril Junction and the port of Sept-Îles. Some short lines also provide passenger rail services, including Rocky Mountaineer Railway.¹⁴

In terms of equipment, Class I railway carriers had over 2,700 locomotives in 2015, with 51,600 freight cars (mainly hopper cars, boxcars, flatcars and gondolas).

Under the *Safe and Accountable Rail Act*, Transport Canada adopted a strengthened rail liability and compensation regime which came into force on June 18, 2016. The strengthened regime establishes risk-based minimum insurance levels for federally regulated freight railways ranging from \$25 million to \$1 billion; and a shipper-financed compensation fund that would be accessed in the case of an accident involving crude oil or other designated goods, when the costs exceed a railway's insurance level.

As well, in August 2016, the *Fair Rail for Grain Farmers Act* was extended by one year to allow the Government to plan for the upcoming crop year under predictable conditions and enable the Government to assess the CTA Review report. In November 2016, the Minister announced the intention to introduce legislation in Spring 2017 for a more transparent, balanced, and efficient rail system that reliably moves Canadian

goods to global markets. The legislation will strengthen the freight rail policy framework by striking a proper balance between supporting rail customers and delivering continued investments in the system.

Safe and Secure Transportation

Amendments to the *Regulations Amending the Railway Safety Administrative Monetary Penalties Regulations* (Grade Crossing Regulations) came into force in April 2016. These amendments give the Minister of Transport a full set of safety compliance and enforcement tools.

In December 2016, the Prevention and Control of Fires on Line Works Regulations were introduced, and will come into force in June 2017. These regulations will improve the Rules for the Control and Prevention of Fires on Railway Rights-of-Way.

In October, 2016, the Minister of Transport announced the \$55 million Rail Safety Improvement program. This new program increases funding, expands lists of eligible recipients and broadens the scope of three Transport Canada rail safety programs:

- the Grade Crossing Improvement Program
- the Grade Crossing Closure Program
- Operation Lifesaver

In addition, Transport Canada continued applying regulations that had previously come into force, such as the:

- *Administrative Monetary Penalties Regulations*
- *Railway Operating Certificate Regulations*
- *Grade Crossings Regulations*
- *Railway Safety Management System Regulations, 2015*
- *Amendments to the Transportation Information Regulations*

¹⁴ Other smaller companies include Alberta Prairie Railway Excursions, South Simcoe Railway, and Steam Train HCW.

In response to recent terrorist attacks in various countries (e.g. Brussels airport and metro system in March 2016), Transport Canada continues to conduct inspections at major passenger rail and urban transit stations across Canada. In 2016, Transport Canada also held several multimodal classified briefings and a Canadian Surface Security Roundtable with key industry stakeholders to increase information sharing, discuss best practices and enhance stakeholder engagement to improve the security of Canada's transportation system.

Green Transportation

In 2013, Transport Canada and the Railway Association of Canada renewed a memorandum of understanding to encourage voluntary emission reductions from the Canadian rail sector during 2011-2015. In 2015, the memorandum was extended until the end of 2016. The latest annual report published under this memorandum shows the intensity of GHG emissions from rail freight operations in 2014 improved by 3.6% compared to 2013. In addition, Transport Canada and the U.S. Environmental Protection Agency are working with key stakeholders to advance efforts under the Canada-U.S. Regulatory Cooperation Council Locomotive Emissions Initiative.

Road Transportation Sector

As most passengers and goods in Canada travel by road, the Government of Canada has taken actions to strengthen the safety of the network by amending the Motor Vehicle Safety Act, and to ensure the reduction of GHG emissions through the stricter standards.

Industry Infrastructure

There are more than 1.13 million two-lane equivalent lane-kilometres of public road in Canada.¹⁵ Approximately 40% of the road network is paved, while 60% is unpaved.¹⁶ Four provinces—Ontario, Québec, Saskatchewan, and Alberta — account for over 75% of the total road length.

In 2015, the National Highway System (NHS) included over 38,075 lane-kilometres.¹⁷

- 72.7% was classified as Core routes
- 11.8% as Feeder routes
- 15.5% as Northern and Remote routes

As shown on Map 6 in annex A, the NHS consists mainly of interprovincial and international road linkages. In 2015, the NHS accounted for nearly 40% of vehicle-kilometres travelled.

Four important highway projects were completed in 2016:

- In October, the Highway 104 Phase 2 twinning project in Nova Scotia opened to traffic. The Government of Canada gave \$55 million towards the \$159 million phased project. The multi-phased project is a new 14.5-kilometre four-lane highway that stretches from west of Addington Forks Road to the east point of Taylor's Road, Antigonish County. It will improve

safety, ease congestion and cut travel time for drivers.

- In 2016, the final stretch of Autoroute 73 connecting Lévis to Saint-Georges in Québec was completed. The Government of Canada gave \$126.5 million towards the \$531 million project. This project will enhance the security and fluidity of moving people and goods, and will make it easier to export products to the United States.
- In July, the Philip Avenue overpass in Vancouver, British Columbia opened to traffic. The Government of Canada contributed \$10.8 million towards the \$27 million project. The new overpass reduces traffic congestion in the area and improves safety by eliminating the Pemberton Avenue at-grade rail crossing.
- The Government of Canada gave \$16.7 million towards highway improvements between Monte Creek and Pritchard on the Trans-Canada Highway near Kamloops, completed in 2016. The highway improvements were made in a manner that was sensitive to aboriginal artifacts found on-site.

¹⁵ This figure is lower than previously reported. There has been a methodological change to the calculation of two-lane equivalent kilometres for unpaved roads.

¹⁶ A lane-kilometre measures the number of traffic-lanes on each section of road.

¹⁷ The NHS was first established in 1988 as a result of federal-provincial-territorial cooperative study, and was comprised of 24,459 kilometers across Canada.

Industry Structure

Most passengers and goods in Canada travel by road. This is particularly true for the transport of manufactured goods.

As of December 2016, there were 66,751 businesses whose primary activity was trucking transportation. Trucking includes many small for-hire carriers and owner-operators, and some medium and large for-hire companies that operate fleets of trucks and offer logistic services.

Trucking companies were concentrated in four provinces: Ontario (41.1%), Alberta (16.3%), Québec (15.1%), and British Columbia (14.6%).

The trucking industry is involved in three main types of trucking activities.

1. For-hire trucking services, which fall into two main categories:
 - less-than truckload, i.e. the transportation of relatively small-sized freight from different shippers in a truck
 - truckload, i.e. transportation of a shipment from a single shipper in a truck
2. Courier operators, which specialize in transporting parcels. As of December 2016, there were 11,764 companies with courier or messenger services as their main line of business.
3. Private carriers, where businesses maintain a fleet of trucks and trailers to carry their own goods (e.g., Walmart, Costco). These carriers' activities are not tracked, as they are part of companies whose main line of activity is not trucking.

Trucking companies can also be classified as intraprovincial or extraprovincial (i.e. ones that routinely cross provincial or international boundaries).

Owner operators are independent business people (e.g. drivers) who own or lease their trucks/road tractors and haul goods for either a private (e.g., manufacturer, retailer, wholesaler) or a for-hire carrier.

In 2015, more than 23.9 million road motor vehicles were registered in Canada, up 1.6% from 2014. Most (92.2%) were vehicles weighing less than 4,500 kilograms (mainly passenger automobiles, pickups, Sport Utility Vehicles (SUV) and minivans), while 4.4% were medium and heavy trucks weighing 4,500 kilograms or more, and 3.3% were other vehicles such as buses, motorcycles and mopeds.

The Memorandum of Understanding (MoU) on Vehicle Weights and Dimensions is the main tool for harmonizing truck weights and dimensions across Canada. It was first signed by federal, provincial and territorial transportation ministers in 1988, and has been amended nine times since. The most recent amendments were approved in September 2016 by the Council of Ministers Responsible for Transportation and Highway Safety to allow longer maximum wheelbase tractors for:

- category 1 trucks (a tractor pulling a single semitrailer) from 6.2 to 7.2 metres
- category 3 trucks (a tractor pulling two semitrailers) from 6.2 to 6.8 metres

Also in 2016, an agreement was signed between Ontario, Québec, New Brunswick and Nova Scotia to harmonize requirements for long combination vehicles. This agreement will allow carriers to transport goods more easily and efficiently across the four provinces while reducing fuel consumption and emissions.

In December 2016, Canadian Tire unveiled 53 and 60-foot prototype trailers for use on Canadian highways. Max-Athas (an Ontario-based company) developed two other prototype models. All were easy to operate with one hand, a key design requirement. The designs easily alternate between 53- and 60-foot configurations and are both expected to reduce manufacturing and overall transportation costs. CP Rail has successfully tested one of the prototype units on its network. The use of transport 60-foot trailers is awaiting the approval of individual provinces and territories.

Safe and Secure Transportation

In 2016, Bill S-2, an amendment to the *Motor Vehicle Safety Act* was tabled to:

- enhance defect and recall powers
- provide an administrative monetary penalty system
- provide some flexibilities for introducing new technologies

In 2016, Canada upgraded the Motor Vehicle Safety Regulations with several new and updated regulations. For example:

- a new requirement will mitigate the ejection of vehicle occupants. It requires that side curtain air bags to remain inflated during a rollover collision
- updated regulations for side impact protection, which will improve vehicle occupant safety

Green Transportation

In 2016, the Pan-Canadian Framework on Clean Growth and Climate Change included a commitment for federal, provincial, and territorial governments to work with industry and other stakeholders to develop a Canada-wide strategy for zero-emission vehicles by 2018.

In 2016, the Government of Canada indicated it would continue its work to implement emissions standards for post- 2018 model year heavy-duty vehicles and engines, building on the first-ever regulations covering model years 2014 to 2018. On March 4, 2017 the Government of Canada published proposed amendments to the existing Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations. These proposed amendments would:

- establish progressively stricter standards to further limit greenhouse gas emissions from new on-road heavy-duty vehicles and their engines in Canada beginning with the 2021 model year
- introduce new standards for new trailers hauled by on-road transport tractors in Canada beginning in the 2018 model year

Transportation of Dangerous Goods

As part of a series of transformative changes, the Transportation of Dangerous Goods (TDG) Program continues to work to improve all areas of its Program with the overarching objective of ensuring that the appropriate TDG related regimes are in place to protect public safety.

Safety in the transportation of dangerous goods was strengthened across Canada through the following measures and initiatives undertaken by Transport Canada:

- Increase in inspection regime, resources and capabilities required to respond to the significant increase of flammable liquids transported by rail to ensure that high risk sites handling dangerous goods continue to be identified, inspected and, as required, that corrective measures are taken to further protect public safety.
- Completion of phase 2 of its chlorine release study (Jack Rabbit II) to address rapid large-scale releases of pressurized, liquefied Toxic Inhalation Hazard (TIH) gases from a railcar.
- Launching of a collaborative research project on crude oil, in partnership with the U.S. Department of Energy, Department of Transportation, and Sandia National Laboratory. The project will assess sampling and analysis methods to ensure an accurate characterization of crude oils in transport. It will also investigate fire properties of different crude oils.
- Publication of regulations in the Canada Gazette, Part I. These regulations will update parts of the Transportation of Dangerous Goods Regulations in order to:
 - Align with the 20th edition of the United Nations (UN) Model Regulations for the Transportation of Dangerous Goods (UN recommendations).
 - Address the classification of dangerous goods and new dangerous goods safety marks.
- Introduce ambulatory references for:
 - » UN recommendations;
 - » International Maritime Dangerous Goods Code; and
 - » International Civil Aviation Organization (Technical Instructions).
- Update safety standards for the design, manufacture, selection, and use of Means of Containment (MOC).
- Publication of regulations in Canada Gazette, Part II to update and clarify the reporting requirements. This will enable the efficient collection of data and improve risk analysis related to dangerous goods incidents. These new regulations also harmonize with how the U.S. collects its own incident data. This will allow the two countries to compare data and promote further collaboration on research initiatives.
- Completion of the Emergency Response Task Force (ERTF) mandate in March 2016, in response to the Lac-Mégantic tragedy. Its final report was published in December 2016, which proposed 40 recommendations to strengthen response capacity to rail incidents involving flammable liquids in Canada.

- Establishment, in December 2016, of a Steering Committee on First Responders Training, per an ERTF recommendation to facilitate the development of a flammable liquid curriculum for First Responders.
- Adoption of a TDG Safety Awareness Strategy, which comprises the distribution of outreach and awareness information materials to first responders, municipalities and the general public – such as the Transportation of Dangerous Goods Safety Awareness Kits.
- Development of an Emergency Response Guide to support emergency responders attending dangerous goods incidents.

Performance of the Canadian Transportation System in 2016

Modest economic conditions in North America and around the world, translated into lower demand for the Canadian transportation system, especially in the first half of 2016 favoring the efficient movement of goods. While some capacity issues were registered at the Port of Vancouver South Shore, the Canadian transportation system did not experience major bottlenecks or capacity problems.

Economic Drivers

Canadian real gross domestic product increased 1.4% in 2016, a slight improvement from 2015 (0.9%). The first half of the year was marked by the Fort McMurray wildfires, which forced temporary shutdown of many energy projects in northern Alberta. The economy rebounded slightly in the second half but continued to face a number of challenges including modest business investments, particularly in the oil and gas sector, as the industry responded to low commodity prices.

Exports were also low in 2016 despite the depreciation of the Canadian dollar over the past two years. The value of merchandise exports declined by 1.4% with drops in most top transported commodities such as potash and oil products. We can attribute this modest performance on commodities struggling to regain value over the year and to the modest economic performance of Canada's main trading partners.

The U.S., Canada's main trading partner, recorded moderate economic growth in 2016. Despite showing more momentum in the second half of the year, real GDP increased by 1.6% over the whole year, the slowest growth rate since the 2011 recession. This performance hampered demand for Canadian commodities, notably iron ore, coal and potash.

Real gross domestic product increased by 1.8% this year in the European Union (compared with 2.2% in 2015). Europe is a large market for Canadian exports of precious metals, grain (wheat) and containerized goods.

Asian markets continued to post strong growth, but have been losing momentum over the past years with China rebalancing from an export driven economy to one centered on domestic consumption. China's GDP increased by 6.7% in 2016, down from 6.9% a year earlier and from 9.6% in 2011. This represents the lowest growth since 1990. Despite this slowdown, Canada's export value with China increased by 4.0% in 2016, supporting transportation demand for key commodities (i.e. copper, colza, wood products, iron ore, coal). Japan, the largest market for Canadian coal and an important destination for copper, lumber, cereals and wood product, posted a 1.0% growth in 2016 (from 1.3% in 2015).

Productivity in the Transportation Sector

Productivity has grown faster in the transportation and warehousing sector than in the overall business sector since the 1980s. According to Statistics Canada, total factor productivity (TFP) in the transportation and warehousing sector has increased by an average of 0.4% yearly from 1986 to 2015, compared to 0.1% for the overall business sector.¹⁸ Over the same time period, labour productivity increased by an annual average of 1.6% for the transportation and warehousing sector and by 1.3% for the overall business sector.¹⁹

¹⁸ TFP is the ratio of output to a combined measure of all inputs.

¹⁹ Labour productivity is the ratio of output to labour input.

In addition to calculations from Statistics Canada, Transport Canada calculates productivity measurements for the air and rail transportation sectors.²⁰

TFP for the freight rail sector increased by 2.9% yearly on average between 1986 and 2014, with labour productivity increasing by an annual average of 4.9%. Output increased by an annual average of 1.8% and the amount of inputs used decreased by 1.1%. Between 2011 and 2014, the freight rail sector's TFP improved by 1.5% yearly on average and labour productivity improved by 2.8%.

Factors responsible for the long term improvement of productivity in the freight rail sector include:

- the deregulation of freight rail transportation in the 1980s and 1990s,
- increased fuel efficiency
- more powerful and efficient locomotives
- infrastructure improvements,
- better educated and specialized workers
- organizational and other technological improvements

Between 1986 and 2014, TFP improved by 1.4% yearly on average for the passenger rail sector, with labour productivity improving by 0.7%. Output decreased by an annual average of 1.6% and the amount of inputs used decreased by 2.9%. Between 2011 and 2014, passenger rail sector's TFP declined by 0.1% yearly on average and labour productivity improved by 0.5%.

In the air transportation sector, TFP increased by 1.7% yearly on average between 1986 and 2014, with labour productivity increasing by 3.4%. Output increased by an annual average of 3.1% and the amount of inputs used increased by 1.4%. Between 2011 and 2014, air transportation sector's TFP improved by 1.0% every year on average and labour productivity improved by 2.7%.

We may attribute these strong long term productivity gains to many factors, including:

- deregulations of the air transportation sector in the 1980s and 1990s
- the restructuration of Air Canada in the early 2000s
- the liberalization of international air markets
- the easing of international travel burdens
- increased capacity utilization by using big data and advanced software,
- increased fuel efficiency
- organizational improvements

Freight Transportation Flows

Traffic flows and utilization were slightly down for most of the 2016 reflecting the modest demand for commodities.

Traffic by Region

Freight flows were down overall across all modes in the Western, Continental and Atlantic corridors for most of the year. This reduced pressure on the congested portions of the network contributed to a generally strong performance of the transportation network. Modest growth in most freight traffic was observed in the fourth quarter of 2016, suggesting a recovery may be under way.

Despite the strong overall system performance, there were a number of efficiency/infrastructure issues/bottlenecks along key bulk export supply chains and import containers.

TRADE AND TRANSPORTATION INFORMATION SYSTEM

Budget 2017 announced a **\$50 million investment over 11 years** to establish a Trade and Transportation Information System to fill significant information, data and analytical gaps in strategic elements of the transportation system. More investments and enhanced collaboration with transportation stakeholders will better inform key strategic public and private decisions on transportation.

20 Trucking and Marine were not calculated due to a lack of data. Statistics Canada uses the growth accounting methodology while Transport Canada calculates productivity using growth in indices (see Centre for the Study of Living Standards report for more information <http://www.csls.ca/reports/csls2016-04.pdf>).

For example, the Port of Vancouver South Shore experienced performance issues over the fall of 2016 due to human resources challenges (i.e. lack of experienced operators on the ground), construction at Delta Port Container Terminal and the high volume of grain harvested. Complex rail operations (e.g. interchanging, co-production) in Vancouver, combined with large volumes of freight traffic of multiple commodities makes accessing terminals on Vancouver's North and South shore a challenge.

Marine Transportation Flows

The value of Canadian international waterborne trade was \$199 billion in 2016, down 3.0% from 2015. In terms of value, the most important waterborne commodities were crude petroleum, gasoline and fuel, as well as grain and agricultural products.

In 2016, Port of Vancouver was Canada's busiest port, handling 135.5Mt of freight. Of this total:

- 69% were bulk commodities (coal, grain, basic minerals, fertilizers, wood products and petroleum products)
- 15% were containerized goods
- 12% was breakbulk

Montréal, the second busiest port, handled 35.4 million tonnes in 2016. This is an increase of 10.4% compared to 2015, due partly to the increase of crude oil movements.

Cargo handled at some Canadian ports decreased in 2016, especially for coal, wheat, iron ore and potash. Of note, almost 90% of coal exported through Western Canadian ports is shipped through Vancouver with the remaining 10% shipped through Prince Rupert. Coal volumes through Prince Rupert have fallen by over 65% from their peak in 2012, while coal volumes fell by 6% at Vancouver in 2016, year over year.

Grain tonnage handled at Canadian ports remains unchanged compared to 2015. The ports of Vancouver and Montréal saw slight increases whereas ports of Prince Rupert and Thunder Bay saw a modest decrease. Overall

grain tonnage remains above the 5 years average.

The growth in container volumes handled at Canadian ports varied across the country in 2016. After having recorded a strong year in 2015 due to diverted traffic from U.S. ports facing labour disruptions, container volumes handled at the Port of Vancouver decreased 4% in 2016 to 2.9 million TEUs. In contrast, the Port of Prince Rupert saw a growth of 2% over the same period. On the East Coast, container traffic at the port of Montréal decreased to 1.3 million TEUs in 2016, down from 1.4 million TEUs in 2015. A decrease was also recorded at the Port of Saint John, while volumes surged by 15% at the Port of Halifax.

Rail Transportation Flows

Total rail freight carried in 2016 was an estimated 297.4 million tonnes, down 2.5% from 2015.²¹ Most rail freight traffic was bulk commodities.

The railways transported nearly 539,000 carloads of grain produced across Canada during the 2015-2016 crop year, a 6.0% decrease compared to the record high of 2014-2015. So far in 2016-2017 (August to February), there have been over 337,000 carload movements of grain, a 2.3% increase compared to the same period in 2015-2016.

The number of crude oil rail carload movements decreased by about 51% in 2016 compared to 2015, falling to about 72,000 carloads (preliminary estimate) from a peak of 193,000 in 2014. Crude oil carloads accounted for about 2% of total carloads in 2016.

In 2016, the value of rail international trade traffic amounted to \$128.3 billion, up 0.7% from 2015. This included rail exports of \$81.9 billion and imports of \$46.4 billion. The main commodities by export value were automotive products, chemical products, forest and metals. On the import side, automotive products and chemical products were most significant.

²¹ Including both federally regulated and provincially regulated railways that interchange with a federally regulated railway.

Road Transportation Flows

In 2016, about 10.9 million two-way trucking movements were recorded at Canada/U.S. border points, up 3.2% from 2015. This was the highest number of trucks crossing the border since 2008. Over 68% of these movements were related to Canadian registered trucks.

The value of trucking traffic between Canada and the U.S. totaled \$418 billion in 2016 (\$218 billion for exports and \$200 billion for imports), up 16.3% from 2015. The same commodities dominated both exports and imports: automotive products, machinery and electrical equipment, other manufactured products, and agricultural products.

Air Transportation Flows

In 2016, Canadian and foreign air carriers loaded and unloaded an estimated 1.2 million tonnes of freight at Canadian airports. This is up 5.5% from 2015. The value of Canada's international air cargo trade in 2016 amounted to \$125.2 billion, an increase of 2.6% over 2015.

High-value commodity air cargos were mainly machinery and electronic equipment, aircraft material, precious minerals/stone, and pharmaceutical products.

Performance and Utilization of the Transportation System

Several indicators are used to measure the performance of the system including measures of: multimodal flow rates, rail velocity, border wait times, supply chain end-to-end transit time and inter-city travel time. For 2016, these indicators show that the modest demand for commodities translated into a reduced flow of key commodities on the network. Performance improved with respect to rail velocity and truck border wait times at some crossings compared to 2015. The system's good fluidity performance allowed Canada's West Coast ports to remain competitive.

Multimodal Flow Rate²²

Given the modest demand for commodities, rail-marine commodity flow rates declined or remained stable for most commodities in all three corridors in 2016. This suggests that freight levels are well within levels the transportation system is used to handling. The Port of Halifax was the only exception, with double-digit container growth.

As a result of this downward trend in demand, the rate of utilization of most container terminals was below the 85% threshold for effective capacity set by Port Authorities. Prince Rupert was a slight exception with a utilization rate over 85% in 2015 and 2016. It is important to note that operating at this level had no negative impact on operational efficiency.

On the grain side, the Western grain volumes transported along most of the rail and marine network from September through December 2016, was 3% lower than in the previous year (as shown in Map 4 in annex) despite supply being 7% higher.²³ This implies that the late harvest for the current crop resulted in lower than usual monthly volumes at the beginning of the grain shipping season.

Given its heavy dependence on bulk commodities, total tonnage on the Great Lakes St. Lawrence Seaway System was down by 10% compared to 2015. Shifting trade patterns has caused an imbalance between up-bound and down-bound Seaway movements that affect marine carriers' profitability and could translate into higher costs to shippers in the future.

Rail Velocity

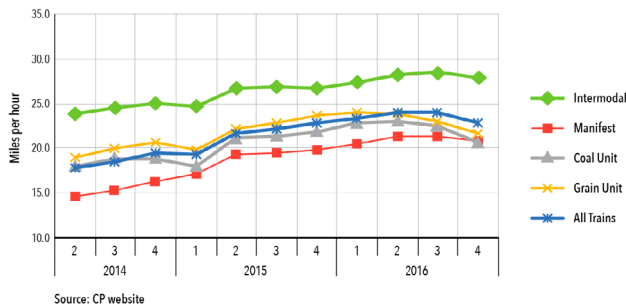
Network rail velocity continued to improve in 2016, with an increase of 6% year-over-year. As shown in the figure below, intermodal (con-

²² The Commodity Flow Rate Indicator is a monthly measurement that evaluates how much freight the transport system is handling compared to the previous 5 years. This indicator provides a signal of whether there is a potential for capacity constraints on a particular corridor. It is multimodal in scope, as it includes a combination of rail and marine traffic flows by corridor.

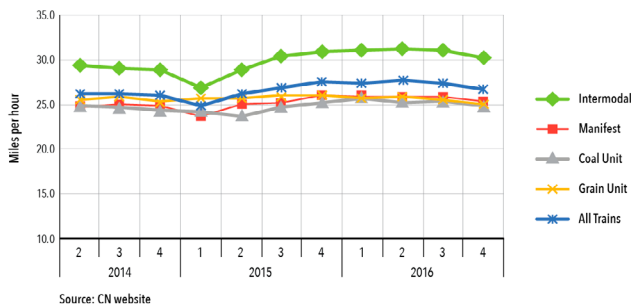
²³ That is, grain supply (production plus carry-forward volumes) in British Columbia, Alberta, Saskatchewan and Manitoba from August to July.

tainer) trains usually travel faster than other commodities, reflecting the time-sensitive nature and competitiveness of the container business. Velocity is a key indicator of rail network performance, and every marginal gain in speed significantly improves rail system capacity and productivity.

CP Average Train Velocity
Q2:2014–Q4:2016



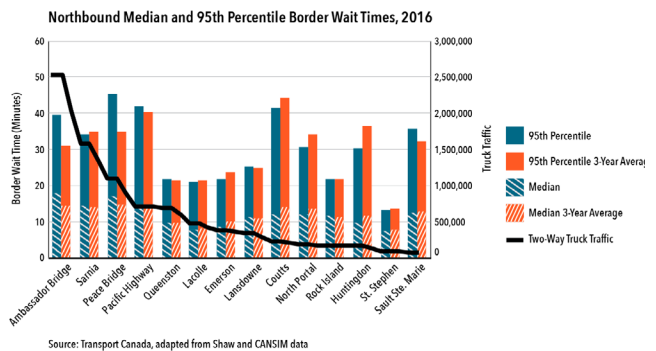
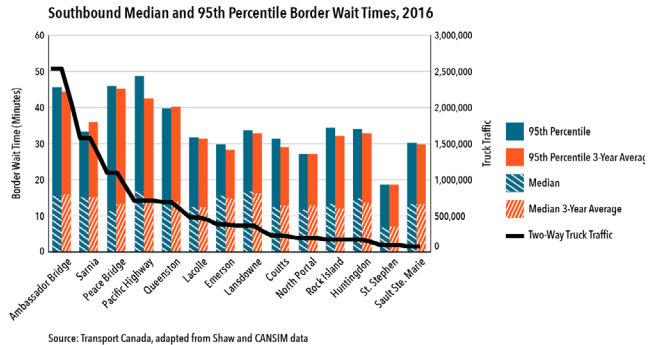
CN Average Train Velocity
Q2:2014–Q4:2016



Border wait times

Border wait times were maintained or improved in 2016 for both directions at most border crossings. On average, southbound truck wait times were less than 20 minutes at all major border crossing across the country. Congestion was not a significant problem at most borders as only 5% of trucks had wait times greater than 30 minutes in 2016 (95th percentile). However, delays during busy periods (represented by 95th) exceeded 40 minutes at high-traffic borders in Southern Ontario and British Columbia. Delays of more than 40 minutes can be costly and disruptive for short-haul trips carrying time-sensitive goods, such as in the automotive sector. Northbound truck border wait times were generally lower across the board, though for the most part delays were highest at the same high-traffic borders for U.S.-bound traffic mentioned above. One likely reason for lower wait times when entering Canada is that

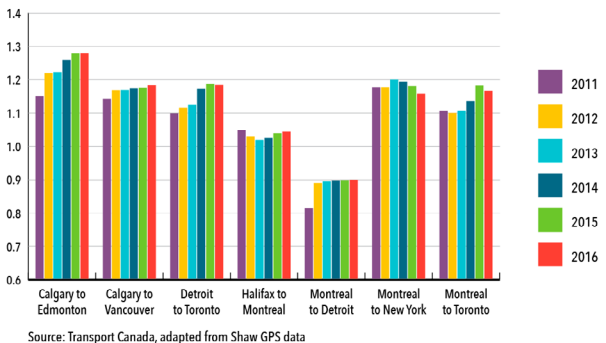
shippers have the option of clearing customs inland rather than at the border.



Intercity Travel Time Index

The Intercity Travel Time Index was stable or improved relative to 2015 for most road corridors.²⁴

Truck Travel Time Index for Selected Corridors



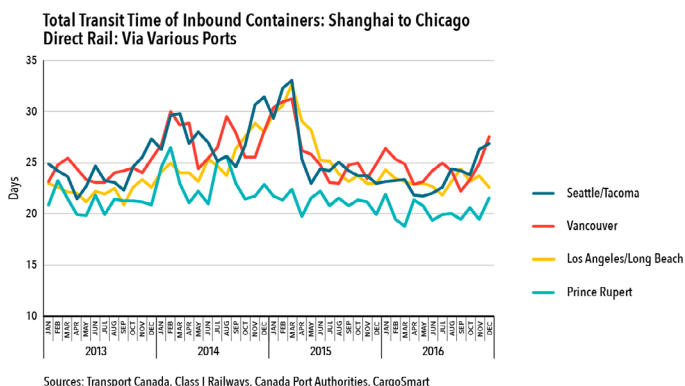
However, over the last 5 years, truck travel reliability has deteriorated and actual truck travel times have been increasing for most trade corridors. This could be the result of increasing urban and highway congestion. For example, in 2016 average truck transit times between Calgary and Edmonton were more than 20% longer than expected.

²⁴ The Intercity Travel Time Index is a comparison, on a corridor level, of actual to expected travel time. A value above 1 indicated that trucking firms' average travel times were higher than expected.

Intermodal Container Supply Chain End-to-End Transit Time²⁵

Despite some challenges in container dwell times at the Port of Vancouver (due in part to rail yard reconfiguration at Deltaport and operational challenges accessing South Shore terminals), the relative competitiveness of Canada's West Coast ports, in terms of end-to-end transit times, remained strong. The average end-to-end transit time (marine-port-rail) was 23.6 days from Shanghai to Chicago at the Port of Seattle/Tacoma, compared to 24.5 days via the Port of Vancouver, which is more than a day less than the 3-year average.

Vessels arriving on time (within 8 hours) at the Port of Vancouver in 2016, reached 58%, an improvement from the 3-year average of 50%. The arrival of vessels within the scheduled berth window is particularly important for a large port such as Vancouver, since late arrivals can lead to congestion in the terminal yards.



²⁵ Transport Canada's measure of end-to-end transit times encompasses ocean transit from key ports in Asia and Europe, dwell at the port, and in-land (rail and truck) transit to major inland hubs such as Toronto and Chicago. Segmenting the indicator by marine, port and inland portions sheds light on the relative importance of each transportation mode, and provides insight into the impact of the performance of a particular mode. For example, the indicators reveal that the marine portion makes up roughly 60-65% of the total transit time for containers going from Shanghai to Central North America via West Coast ports. This is important to note, since Canada relies exclusively on foreign carriers to move containers and therefore has little influence on the industry.

The Port of Prince Rupert stood out again with a strong performance, outperforming the Ports of Los Angeles and Long Beach in the end-to-end transit time for the Shanghai to Chicago trade lane: 20.2 days on average in 2016 via Prince Rupert compared to 23.2 days through Los Angeles/Long Beach. Prince Rupert's performance in 2016 was an improvement over its 3-year average of 21.8 days.

At the Port of Montréal, import port dwell times were more than half a day shorter than last year and on par with the three-year average. Shorter dwell times pushed the average end-to-end transit times of containers moving through Montréal from Antwerp to Chicago to just below the 3-year average (17.1 days versus 17.3). As is the case on the West Coast, ocean transit accounts for most of the transit time (almost 70%).

In addition to efficient rail service, the Port of Montréal also enjoys reliable and quick truckload services to major inland markets. Truck travel times to Toronto and Chicago have consistently averaged around 10 and 31 hours respectively over the last 5 years.

Travellers Traffic Flows

Increases in passenger traffic were recorded for the air, rail and marine (ferry) modes. In contrast, vehicles crossing the Canada/U.S. were down from 2015.

Air sector

In 2016, Canadian airports reported an estimated 140 million enplaned and deplaned passengers, a 5% increase over 2015.

- 83.9 million on domestic services
- 26.7 million on services between Canada and the U.S.
- 29.4 million on other international services

Between 2007 and 2016, total air passenger traffic (enplaned and deplaned passengers) grew by 32%.

In 2016, around 90% of the total air passenger traffic was handled at Canada's 26 National Airport System (NAS) airports, with record-breaking traffic experienced at the top three airports:

- Toronto Pearson International served 42.3 million passengers (6.7% annual growth), accounting for 30% of passenger traffic.
- Vancouver International served 21.4 million passengers (8.9% annual growth), accounting for 15% of passenger traffic.
- Montréal-Trudeau International served 15.4 million passengers (4.6% annual growth), accounting for 11% of traffic.

U.S. customs pre-cleared over 12 million U.S.-bound passengers per year at Canada's eight largest airports under the current bilateral Air Agreement on Air Transport. Once the new bilateral land, rail, marine and air preclearance agreement signed in 2015 comes into force, it will become possible to expand preclearance to all modes.

Marine sector

In 2016, international cruise ships carried close to 1.4 million passengers to major Canadian ports, up 3.5% from 2015, mainly in Vancouver (826,820 passengers), Halifax (238,200) and Saint John (143,900). BC Ferries, Canada's largest ferry operator, recorded carrying 6.7 million vehicles and 17.2 million passengers on various routes, representing an increase of 4.1% and 3.0% respectively from 2015.

Rail sector

VIA Rail's annual passenger traffic grew 4.1% to around 4 million in 2016. This was the first significant increase after remaining stable during the 2012-2015 period. The number of passenger amounted to 3.7 million in the busy Quebec City-Windsor Corridor, rising 4.3% from 2015.

In 2016, 181,900 passengers used rail carriers to cross Canada/U.S. border points, nearly identical to 2015 (down by 0.1%). The number of passenger has been trending down over the past five years and was down 3.8% from 2012.

Road sector

In 2016, around 52 million two-way passenger vehicle movements were recorded at Canada/U.S. border crossings, down 4.3% from 2015. The decline is entirely due to an 8% reduction in Canadian vehicles crossing. American vehicle crossings increased by nearly 5%. This can be attributed to the falling Canadian dollar over that same period. Over 67% of vehicle movements crossing the border in 2016 were Canadian registered vehicles (down from the 2013 peak of 87%).

In 2015, public transit systems carried 2.07 billion passengers, no change from 2014.

Safe and Secure Transportation Performance

Canada continued to have a safe and secure transportation system with accidents rates below their 5 to 10-year average for all modes in 2016.

Air sector

In 2016, 184 aviation accidents (under the *Canadian Aviation Regulations*) involving Canadian-registered aircraft were recorded, down 13% from the 2011-2015 average. These accidents caused 29 fatalities, a decrease when compared to 35 fatalities in 2015. This was lower than the previous five-year average of 42.

In 2016, Canada continued to take steps to facilitate the flow of legitimate air travellers and goods while maintaining Canada's high level of aviation security. In 2016, the Canadian Air Transport Security Authority (CATSA) screened 60 million passengers and their belongings from 89 Canadian airports, including the 26 NAS airports.

Marine sector

Canada has a strong record of safe and secure marine shipping. Given the thousands of ships that operate in Canadian waters, there are relatively few accidents. In 2016, there were 251 reportable accidents involving at least one Canadian registered vessels, down from the ten-year average. There were also 49 foreign registered vessel accidents reported in Canadian waters in 2016, down from the ten-year average. There have been 164 commercial marine fatalities reported in Canada over the 2007-16 period, including 7 in 2016.²⁶

Rail sector

In 2016, there were 1,032 recorded railway accidents, down 14% from 2015. These accidents caused 65 fatalities, 14% less than the average over the previous 5 years.

Road sector

Over the last 10 years (2005-2014), road casualty collisions decreased by 24%, although more vehicles were on the road. The fatality rate decreased from 1.5 to 0.8 over that period.^{27,28}

In 2016, manufacturers issued 662 safety recalls affecting a total of 5,494,685 vehicles, tires and child car seats in Canada. Of these recalls, 31 (or 4.7%) were influenced by Transport Canada's interactions with manufacturers, affecting 20.3% (1,113,605) of the total recall population.

Green Transportation Performance

Overall, transport-related greenhouse gas emissions have been stable over the past decade with decreases recorded for air and marine modes and increases for rail and road transportation.²⁹

Air sector

In 2014, domestic aviation emitted 7.5 megatonnes (Mt) of carbon dioxide equivalent (CO₂e). This accounts for 4.4% of transportation-related GHG emissions. Over the 2005-2014 period, domestic aviation GHG emissions decreased by 3.4% despite increased passenger traffic.³⁰

The sector has been improving fuel efficiency through measures under voluntary agreements with the Government of Canada since 2005, and updated in 2015. Compared with 2014, Canadian air carriers improved fuel efficiency by 0.8% in 2015. This represents a 1.5% average annual improvement from a 2008 baseline, or a cumulative improvement of 10.1% from 2008 to 2015.

Marine sector

In 2014, the domestic marine sector emitted 4.8 Mt of CO₂e. This is 2.8% of transportation-related GHG emissions. Over the 2005-2014 period, domestic marine GHG emissions decreased by 2.6%, as shippers have shifted to other modes such as trucks and rail.

In 2016, the National Aerial Surveillance Program flew 1,886 hours to watch Canada's three coasts. Crews found 179 oil spills totalling 1,764 litres of oil in the water. Regular aerial surveillance flights have contributed significantly to the decrease in oil discharges at sea, as ships are increasingly aware

26 Statistical information provided by the Transportation Safety Board (March 15, 2017).

27 Collisions with fatalities and injuries.

28 Dead person in a reportable traffic collision per 10,000 motor vehicle registrations.

29 Emissions for other modes (e.g. residential, commercial and recreational off-road vehicles) of transportations are lower than a decade ago and represent 8.8% of transport-related emissions in 2014.

30 This differs from domestic aviation emissions reported in the latest annual report on Canada's Action Plan to Reduce Greenhouse Gas Emissions from Aviation. This is due to scope and methodological differences between that report and the official emissions reported in Canada's national inventory.

that their illegal polluting activities can be detected.

Rail sector

In 2014, the rail sector emitted 7.6 Mt of CO₂e. This is 4.5% of transportation-related GHG emissions. Freight operations accounted for 98% of rail GHG emissions. Despite efficiency improvements, a large jump in freight activity increased rail GHG emissions in 2014 by 14.1% compared to 2005.

Road sector

In 2014, the road transportation sector emitted 142.6 Mt of CO₂e, or 83.2% of transportation-related GHG emissions and 19.5% of total Canadian GHG emissions.

From 2005 to 2014, road transportation GHG emissions grew by 3.1%. Despite fuel efficiency improvements across all vehicle classes, this increase stems from:

- growth in passenger and freight activity
- a shift towards more GHG intensive transportation including heavy duty trucks and larger passenger vehicles (i.e., SUVs and light trucks)

GHG emissions from on-road freight vehicles increased by 14.0% between 2005 and 2014, from 48 to 55 Mt. Over the same period, road freight activity, measured in tonne-kilometres, also increased by around 25%.

GHG emissions from on-road passenger vehicles decreased by 2.7% between 2005 and 2014, from 90 to 88 Mt. Over the same period, road passenger activity, measured in passenger-kilometres, increased by about 6%.

Federal regulations have set progressively stricter GHG emission standards for passenger automobile and light trucks of model years 2017 and beyond, building on the existing standards covering model years 2011 to 2016.

Financial Performance

The overall financial performance of the air and marine transportation sectors remained strong with increasing revenues and profits, and decreasing expenditures.

Air sector

Canadian air carriers in 2015 had operating revenues of \$22.6 billion, up from \$22.3 billion in 2014. This represents a 1.3% increase year over year. Operating expenses declined to \$20.1 billion, decreasing by 2.6% between 2014 and 2015. This is largely due to falling fuel prices. Rising operating revenues and declining expenses translated into an operating income of \$2.5 billion, up 49.7% from the 2014 reported income of \$1.6 billion.

Important financial notes from 2016 include:

- Air Canada reported a net profit of \$876 million on revenues of \$14.7 billion. Its EBITDAR was \$2.8 billion and its operating profit was \$1.3 billion.³¹
- WestJet reported a net profit of \$295.5 million on revenues of \$4.1 billion. Its EBITDAR was \$965.7 million and its operating profit was \$440.1 million.
- Chorus Aviation, parent of Jazz Aviation, reported a net profit of \$111.8 million on revenues of \$1.3 billion. Its EBITDAR was \$253.6 million and its operating profit was \$151.5 million.
- For the fiscal year ending October 31, 2016, Transat A.T. a tour operator that owns Air Transat, reported a net loss of \$86.5 million on revenues of \$2.9 billion.³²
- Total rent the National Airport System airport authorities paid to the federal government was \$314.5 million in 2015, a 1% increase from 2014.

³¹ Earnings before interest, taxes, depreciation, amortization, and restructuring or rent costs.

³² These figures reflect the entire group. The company does not report the Air Transat component separately.

In 2015–16, revenues from Transport Canada's airports and aerodromes were \$11.7 million while operating expenditures were \$28.2 million.

Marine sector

Due to the discontinuance of Statistics Canada's Financial Survey of Canadian Water Carriers (last released on April 2010), no information is available on marine carriers' financial performance.

Operating costs for ports under Transport Canada's management totalled \$11.7 million in 2015-16, which represents a 5% increase from 2014-15. In 2015–16, Transport Canada collected about \$8.1 million in revenue from these ports, down 7% compared to 2014–15.

Rail sector

In 2016, Canadian Class I rail freight carriers had operating revenues of \$18.2 billion. This represents a decrease of 5.7% from 2015 revenues of \$19.3 billion. Operating expenses decreased 8% in 2016 to \$10.4 billion. This provided a favourable decrease in operating ratio to 57.1%.

System-wide, CN earned \$12 billion in operating revenues in 2016. This represents a decrease of 4.8% over 2015 revenues of \$12.6 billion. Operating expenses decreased 8.2 %, from \$7.3 billion in 2016 to \$6.7 billion in 2015. Labour and fringe benefits represented the largest expense, decreasing 12.5%, from \$2.4 billion 2015 to \$2.1 billion in 2016. Net income rose 2.9% from \$3.5 billion in 2015 to \$3.6 billion in 2016.

System-wide, CP earned \$6.2 billion in revenues in 2016, representing a 7.5% decrease over the \$6.7 billion earned in 2015. Operating expenses decreased 7.5%, from \$4 billion in 2015 to \$3.7 billion in 2016. Compensation and benefits, the largest operating expense, decreased 14.3%. Net income rose 14.3% from \$1.4 billion in 2015 to \$1.6 billion in 2016.

In 2015, VIA Rail Canada reported revenues of \$297.8 million and a loss of \$280 million. The federal government provided \$280 million in operating funding and \$97.9 in capital funding.

The same year, the federal Remote Passenger Rail Program gave \$11.2 million in subsidies to two Aboriginal-owned passenger rail services, the Keewatin Railway Company and Tshiuetin Rail Transportation.³³

Road sector

No information is available on the financial performance of the road mode.

³³ Funding for Algoma Central Railway has been terminated as per the Budget 2013 decision.

Outlook, Trends and Future Issues

Economic growth and activity are the main drivers for transportation demand, but over the medium to long term, the Canadian transportation system is bound to experience significant changes amid global uncertainties, linked to environmental issues, safety and security concerns, significant socio-demographic changes, and rapidly evolving technology. Canada's transportation system will need to be successfully positioned to address fundamental opportunities and challenges lying ahead.

Transportation demand, both for passenger and freight traffic, is fundamentally connected to increasing economic activity and incomes. However, within this economic context, transportation demand will also likely be influenced by other important factors over the long term that alter how people choose to travel and the needs of businesses in connecting to suppliers and customers. While these factors will apply to the particular geography, demography, and resource endowments in Canada, they are often global in scope. More specifically, Canada will face challenges and opportunities that will require transportation stakeholders to keep abreast of new developments in a continuously changing economy, evolving socio-demographic trends, key emerging technologies, as well as growing environmental, safety and security concerns.

Successfully positioning Canada's transportation system to better respond to these challenges and opportunities will ensure it remains one of the most modern and efficient systems in the world while continuing to be safe, secure, reliable and environmentally responsible.

Key Trends in Transportation

A number of important issues will likely change and shape passenger and freight transportation in the 21st century. Some of these were identified in the most recent transport outlook of the International Transportation Forum (ITF).³⁴

Technological Change and Innovation

The transportation sector is being transformed by emerging and disruptive technologies with broad economic, social, and environmental impacts. The speed and scope of these changes is outpacing established regulations and policies, and will require policymakers to review these conventions to ensure growth of these technologies is not hampered while continuing to ensure high standards for safety and security.

Over the next decades, significant advancements are expected in the area of automated and connected vehicles (CV/AV), as well as unmanned air vehicles (UAV). However, these new technologies also raise many questions, which challenge established regulatory regimes and force planners to rethink the way they conceive transportation infrastructure and urban development.

New players are also entering the transportation marketplace. Their innovative business models and mobility solutions are transforming how people and goods move, and are poised to have a significant impact on the transportation sector. For example, companies like Amazon and Google are exploring delivery by unmanned aircraft and delving into automated vehicle technology.

Connectivity is also expected to expand to other modes and pilot applications, such as vehicle to rail communication for grade crossing safety, and other connections that can increase efficiencies in multi-modal hubs, such as ports. In terms of infrastructure, developments in satellite-based remote

³⁴ ITF Transport Outlook 2017, Published on January 30, 2017.

sensing and smart infrastructure sensing will provide alerts on abnormal behavior and levels of degradation, to support preventive maintenance and increase the safety of the network. Automated inspection technologies for the rail industry will also have a significant positive effect on the existing network's growth in capacity.

Also, the ITF outlook notes that new technologies in manufacturing could have profound impacts on existing supply chains, which many subject matter experts argue have reached their limit. 3D printing, in particular, could result in localized manufacturing and "re-shoring" of manufacturing activities in North America.

Green transportation

As noted in the ITF report, efforts to meet national emission reduction targets established at the Paris Conference of the Parties (COP21) will require application of a wide range of policy levers to avoid unnecessary transportation demand, shift transportation to sustainable options, and make transportation systems more efficient.

Electrification of the transportation system is expected to grow over the next decade as battery performance improves and the cost of battery technology falls. However, the extent of this growth remains uncertain and hinges on many factors, including consumer preferences, relative fuel prices and available charging infrastructure, among others. Vehicle manufacturers will continue developing a portfolio of powertrains including battery electric vehicles, plug-in-hybrids, and hydrogen fuel cell vehicles, and are expected to continue to make improvements in engines, transmissions, aerodynamics, light-weighting, and accessories to improve the fuel efficiency of internal combustion engines.

In addition, a gradual shift to a low-carbon global economy points and changes in the energy mix in many countries will reduce or alter the demand for hydrocarbons, notably oil and coal. This would result in changes of existing trade patterns and associated transportation activities.

Social, demographic and economic determinants

According to the ITF, transportation policy-makers will need to stay up-to-date on changes in consumer behavior that can influence demand for transportation. This could entail accelerated demand of digital goods (e.g. book, music), increased localized consumption, particularly for food and the emergence of the sharing economy, which could entail substantial changes in commuter behavior and spending.

The development of transportation infrastructure faces increasing challenges due to the need to earn social license, particularly in major transportation hubs featuring dense population and competing land use. For instance, some marine ports face mounting pressure with respect to air, water and noise pollution, as well as pressure to convert waterfront properties to residential or leisure use. Furthermore, views and considerations on development vary across the country. As traffic is likely to trend upwards going forward, capacity expansion projects could prove difficult to achieve without public support.

Moreover, an aging population leads to more workers retiring, skill shortages will likely be an issue moving forward. The need to recruit, train and retain workers in the transportation sector, especially in the marine and trucking industries will increase as competition for skilled employees grows.

Safe and secure transportation

Security will remain a central concern with the growing number of domestic and international travelers and the growing interconnectedness of the international transportation system. While new technologies and efforts from all transportation actors (i.e. governments, the industry and international partners) have made travelling more secure than ever, terrorism poses ongoing threats as the transportation system remains a possible target for attacks.

Increasing dependence on connected technology and web-based communication (e.g. connected and automated vehicles) has also opened the door for cybersecurity

threats. To counter this growing risk and protect our transportation network, enhanced cyber security software and technologies will evolve as security considerations get more complex.

Therefore, transportation security technologies and methodologies, including education and new regulations, must continuously evolve and adapt in response to threats. Such efforts and vigilance will be necessary for the system to remain secure.

The Key Trends in the Canadian Context

Technological change and innovation

Canada needs to position itself for a future characterized by emerging and disruptive technologies and new approaches. Connectivity and automation will have far-reaching impacts on the transportation sector, and the economy as a whole.

In 2016, for the first time in Canada, Ontario allowed the testing of automated vehicle technology as part of a pilot project to develop driving automation. While these applications are only a first step, the move shows that technologies are developing rapidly.

MODERNIZING CANADA'S TRANSPORTATION SYSTEM

Budget 2017 proposes to provide Transport Canada with \$76.7 million over 5 years, for modernizing Canada's transportation system. Proposed activities include:

- ▶ developing regulations for the safe adoption of CV/AVs and UAVs
- ▶ working with industry, provinces, territories and municipalities to identify and address critical technical, regulatory or policy barriers, and to establish pilot projects
- ▶ increasing Transport Canada's ability to establish and provide the codes, standards and certifications that industry will need to safely use these new technologies in Canada

The automotive industry in Canada is also ensuring that they are keeping pace with the rapid development of automotive technology. In 2016 General Motors of Canada Company announced that it is investing in the areas of Autonomous Vehicle Software & Controls Development, Active Safety and Vehicle Dynamics Technology, Infotainment and Connected Vehicle Technology. Moreover, Ford Motor Company of Canada joined with the Government of Canada and Government of Ontario to announce a \$1.2-billion investment that will strengthen Canada's research and development capacity at existing facilities, and establish new research and engineering centres focusing on connectivity, infotainment, in-vehicle modems, gateway modules, driver-assist features and self-driving cars.

Green transportation

Transportation accounts for almost a quarter of Canada's greenhouse gas emissions. Although increased efficiencies, particularly in the on-road passenger sector, will likely reduce overall transportation emissions, transportation will continue to rely primarily on fossil fuels over the next decade. This, along with rising demand, means the transportation sector must be a key contributor to reaching national emission reduction targets established at COP21. In 2016, the Government of Canada, in collaboration with the Provinces and Territories, brought forward the Pan-Canadian Framework on Clean Growth and Climate Change to reduce domestic greenhouse gas emissions (see box above).

Canada will address the environmental impacts associated with continued growth in international maritime shipping and aviation by its ongoing involvement at the International Civil Aviation Organization (ICAO) and International Maritime Organization (IMO). Efforts to advance recent accomplishments and other milestones will continue, such as the agreement reached at ICAO in October 2016, for a global aviation market-based measure to address CO₂ emissions from international aviation. Canada will also continue to engage at the IMO, as an international convention on ballast water management will enter into force in 2017, which will trigger a global regime to reduce

the risk of aquatic species invasions, and challenge the global fleet to purchase, install and operate emerging technology to meet its requirements.

Canadian leadership will help shape the development of standards and other approaches to reduce the environmental impacts from international transportation.

PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE

The framework includes a Pan-Canadian approach to carbon pricing, which will:

- ▶ incentivize the use of low-cost ways to reduce emissions
- ▶ drive the uptake of low-carbon solutions and modernized, energy-efficient supply chains

Key elements shaping these environmental performance of the transportation sector will include:

- ▶ more stringent GHG emission regulations for new on-road vehicles
- ▶ regulatory and other measures to improve fuel efficiency
- ▶ transportation infrastructure investments, including for public transit, alternative fuel and charging infrastructure
- ▶ the further evolution of low-carbon and smart transportation technologies, such as zero-emission vehicles

Social, demographic and economic determinants

Over the past two decades, the Canadian population has increased by more than 20% to 35 million in 2016. Looking ahead, the population is expected to increase by more than 6 million by 2036. As major urban centres absorb the bulk of that growth, the United Nations, through its World Urbanization Prospect, projects that urbanization in Canada will reach 88% in 2050 up from 83% today, increasing demand for urban travel and the risks of congestion. Higher urban congestion could also raise demand for public transit. According to the TomTom 2016 Traffic Index, Vancouver ranks as the most congested city in Canada, followed by Toronto and Montréal with extra overall travel time between 26% and 34%.

The growing population of Canadian seniors will also affect the nature of passenger transportation in the future by increasing the need for more flexible and accessible transportation. In 2036, Statistics Canada expects the population aged 65 and over to reach 24% of the population, up from 17% in 2016.

Safe and secure transportation

Canada has recorded a decade of decreasing accident rates across all modes. Yet, the growth in freight and passenger traffic expected over the next decade could increase the risk of accidents and incidents in the system.

Risks related to the transport of dangerous goods will likely remain, notably for crude oil transported by rail, despite the approval of new pipelines, including the expansion of the Trans Mountain pipeline to Canada's West Coast, and the approval of the Keystone XL to the United States Gulf Coast.

In addition, risks related to other dangerous goods such as lithium batteries, widely used in commercial and consumer goods will likely increase. Lithium batteries have a documented risk of spontaneous combustion, making them a dangerous good, particularly when transported in bulk on aircraft.

Looking ahead, it will be important for Canada to keep up with evolving risks and proactively adopt new technologies tools and other measures to minimize the risks, while ensuring the transportation system remains efficient.

The Economic Outlook

Eight years after the global financial crisis, global economic growth is expected to pick up over the next two years, increasing freight and passenger transportation demand. According to the International Monetary Fund (IMF) January 2017 forecast, growth will be led by recovery among developing markets while near-term growth prospects among developed countries will be mixed. World output growth is expected to rise to 3.4% in 2017 and 3.6% 2018 from the (estimated) 3.1% realized in 2016.

Export-led growth in many key Canadian markets will be supported by a strengthening outlook for the U.S. In the near term, the economy of Canada's most important trading partner should grow in the mid-2.5% range and is expected to converge to just below 2% annually out to 2025.

In the near term, growth will be strongest among East Asian nations with China's economy expanding at about 6% per year and India coming in at around the mid-7% range. As China continues its pivot towards domestic-led growth, India has taken the lead among high-growth countries over the last few years. Looking further down the road to 2025, the growth prospects for developing countries are expected to moderate as global demographic growth continues to slow. India is expected to remain a growth leader, with expansion in the 6% range while China should grow at a 5.5%. Growth for the entire Asia-Pacific region will average in the 5% range annually over the next ten years, supporting demand for both Canadian freight and passenger transportation services.

Despite U.S. recovery and ongoing expansion in developing markets, some of Canada's largest trading partners are expected to record slower growth. Of note, Japan's economic growth should remain very modest over the next decade around 0.5% to 1%

while growth in the Euro area is expected to average 1.5%. As with most industrially advanced nations, slower demographic expansion is anticipated to restrain long-term growth.

Consistent with this outlook, commodity prices are expected to pick up over the next few years. While forest product prices have recovered most of their recent losses there is still room for upward growth in agricultural products and in metals and minerals relative to their mid-2014 price levels. On the energy side, after reaching a 2016 low of \$US43, the West Texas Intermediate price of oil should reach approximately \$US64 in 2021.³⁵

Domestically, with energy prices recovering, growth should return to the oil patch as firms refocus on expansion. The Canadian dollar slid along with oil and gas prices in recent years, making Canadian goods more competitive abroad and absorbing part of the economic shock of falling commodity prices. This is expected to reverse over the next few years, as commodity prices recover. While the rebound in commodity prices will lift Canadian investment and exports in the near term, the domestic front will experience long-term headwinds with the slowdown in population growth, gradually eroding economic growth rates. Despite these longer-term domestic challenges, U.S. growth and a recovering world economy will help Canada to strengthen growth over the next few years.

Key Commodities Outlook

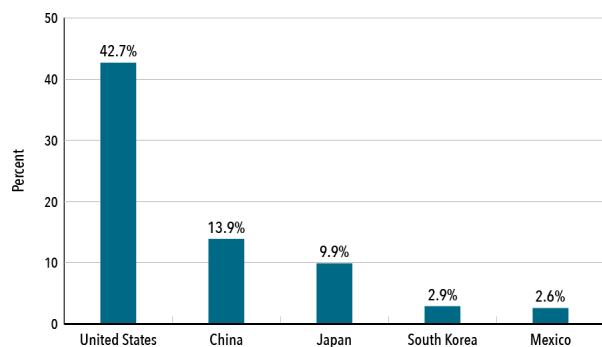
Canada's vast territory is blessed with abundant primary products (e.g. crops, wood products, minerals, or energy goods). Growing demand from increased economic activity in large developing countries, as well as from economic growth of traditional commercial partners, creates opportunities for expanding trade and economic prosperity for Canadians.

35 December 2016 Survey of Private Sector Economic Forecasters released by Finance Canada.

Canada's major markets

The U.S., the destination for more than 40% of key transported bulk commodities value in 2016, will remain by far Canada's largest trading partner. The U.S. is the primary destination of Canadian wood products and potash, energy, and a large market for grain.

Proportion of top 4 commodities exports (in values) by country, 2016^a



^aTop 4 commodities in 2016: coal, grain, potash, wood products
Source: Transport Canada Trade Database

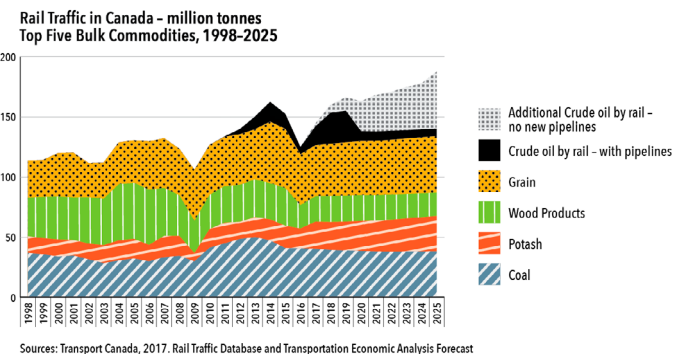
China's growing middle class and infrastructure investments will stimulate demand for raw materials and imported goods, and continue to drive growth of Canadian exports. The country is currently the destination of close to 14% of key exported bulk commodities and the principal market for Canadian grains. Other major Canadian partners for bulk commodities such as Japan (coal), Mexico (grain) and South Korea (coal), are expected to grow at a more moderate pace. This growing demand is already creating capacity pressures on the Canadian transportation system's accessibility and fluidity, particularly in Western Canada.

To fully benefit from the anticipated growth in demand for commodities, Canada will need to:

- ensure the needed transportation infrastructure is in place to access these remote and northern areas
- address bottlenecks to ensure fluid movement of commodities to tidewater and main border crossings

Key transported commodities in Canada: Rail demand outlook

Bulk commodities are of high importance to the Canadian economy. In 2016, Canadian industries directly related to producing coal, crude oil, grain, potash and wood products (top 5 bulk commodities) represented 25% (\$124 billion) of the goods-producing industries' GDP.



In the next ten years, bringing Canada's primary goods to industries around the globe will likely continue to be challenging due to these commodities' volumes and due to the large distances and geographic obstacles that separate production sites from major consumption centers. Although trucking will likely continue to be used to some extent, experts expect rail to keep its economic advantage for bulk commodities transportation over long distances.

From 2016 to 2025, transportation for the top five bulk commodities is projected to grow steadily, driven by demand for rail shipment of crude oil and wood products in the near term; and potash and grain in the longer term. Note: If new oil pipelines construction fails to occur or is significantly delayed, crude oil shipments by rail could be higher than the current base case projection in 2025.

Air Passenger Outlook

Over the last 10 years, the number of origin-destination passengers in Canada have grown by an average 3.6% annually reaching 79 million passengers in 2015.

Over that period, the fastest growth occurred in the other international sector, which showed annual gains of 4.8%. Transborder and domestic sectors expanded at a more modest 3.0% and 2.7% rates, respectively. During this period, the other international sector increased its share of total travelers to 38.4% in 2015 from 34.2% in 2005.

The historical pattern above is expected to persist over time, driven mainly by domestic growth in Canada and its respective destination regions as well as the increasing travel requirements of growing immigrant communities. In addition, the air carrier industry response to factors such as competition, the role of low-cost carriers, and the ability of full-cost carriers to adjust to changing market conditions, all play a part in future passenger growth prospects.

The total number of origin-destination passengers in Canada is expected to rise from 79 million in 2015 to 106 million travelers in 2025 corresponding to an average annual increase of 3.1%.

Over this period, the strongest growth (3.9%) should occur in the other international sector, which relies on growth from emerging markets. As such, a proportion of the growth in this sector is due to foreign travelers from rapidly growing markets entering income groups that make air travel an affordable option (e.g. China, India and Brazil). In addition, as the world becomes increasingly interconnected, international leisure and business travel will become increasingly popular for Canadians.

Domestic passenger growth is expected to slow to 2.1% over the 2016-2025 projection horizon, from 2.7% over 2006 to 2015. As global economic growth moderates and fares

begin to come under pressure, air travel growth is anticipated to be less rapid than in recent years. In addition, a gradual aging of the population over the coming decade will slowly erode the growth of Canada's population base in relation to the preceding decade.

Despite the lacklustre domestic results, a strong market for sun-seeking travel will continue to expand, since older Canadians make up a key segment of winter travel to the southern U.S and the Caribbean. A recovering Canada-U.S. exchange rate, due to recovering energy prices, will enhance Canadian spending power which should support more southbound movement in the long term. In the interceding years, a lower Canadian dollar will support U.S.-originating trips to Canada as U.S. tourism dollars will "go further" north of the border.

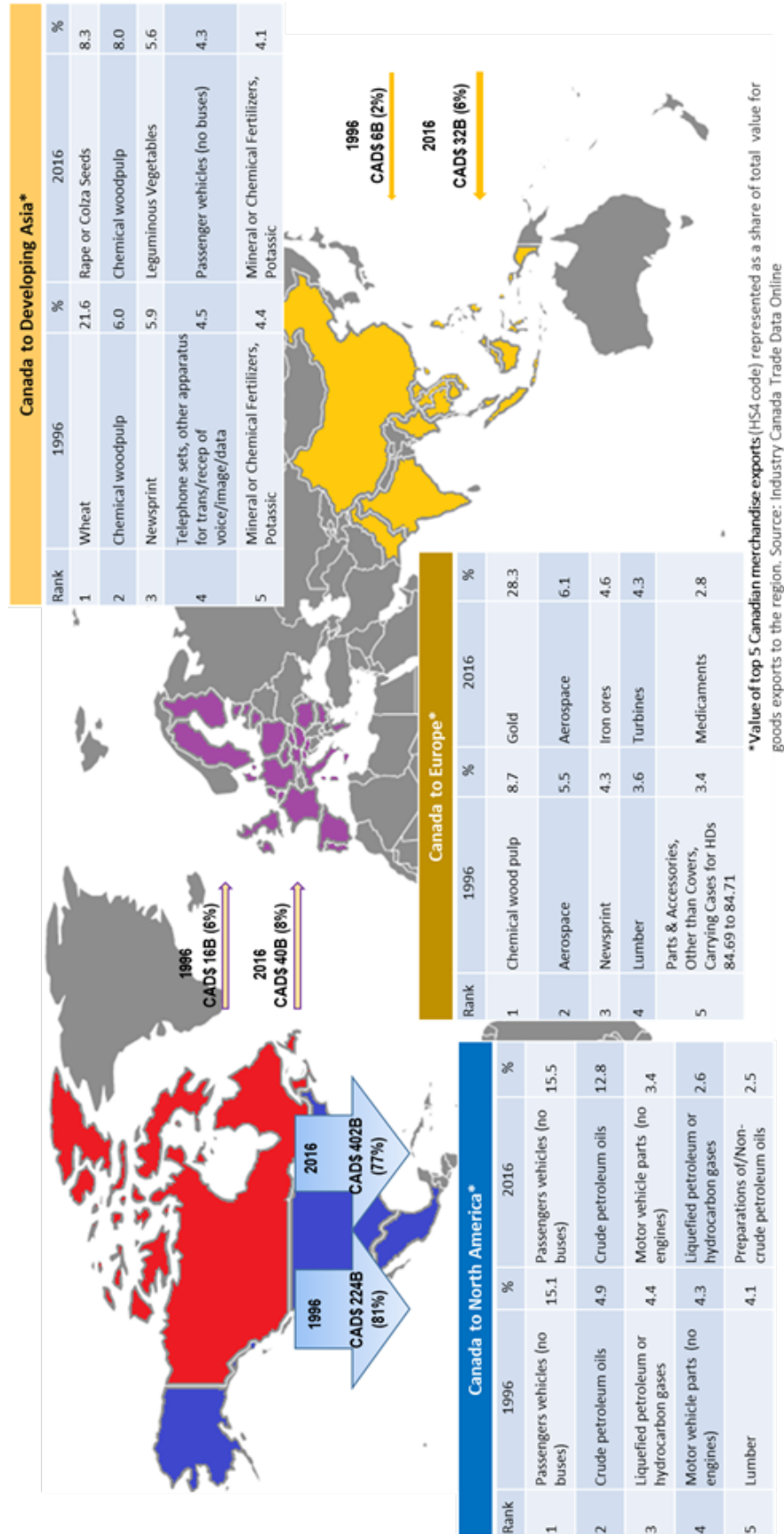
Transborder passenger growth averaged around 3% over 2006 to 2015 and this is expected to be largely unchanged over the 2016-2025 projection horizon. With U.S. growth picking up and disposable incomes rising, it is anticipated that growth should remain stable. Moreover, with the close business ties shared between Canadians and Americans, business travel will remain strong between the two countries.

Annex A: Maps and Figures

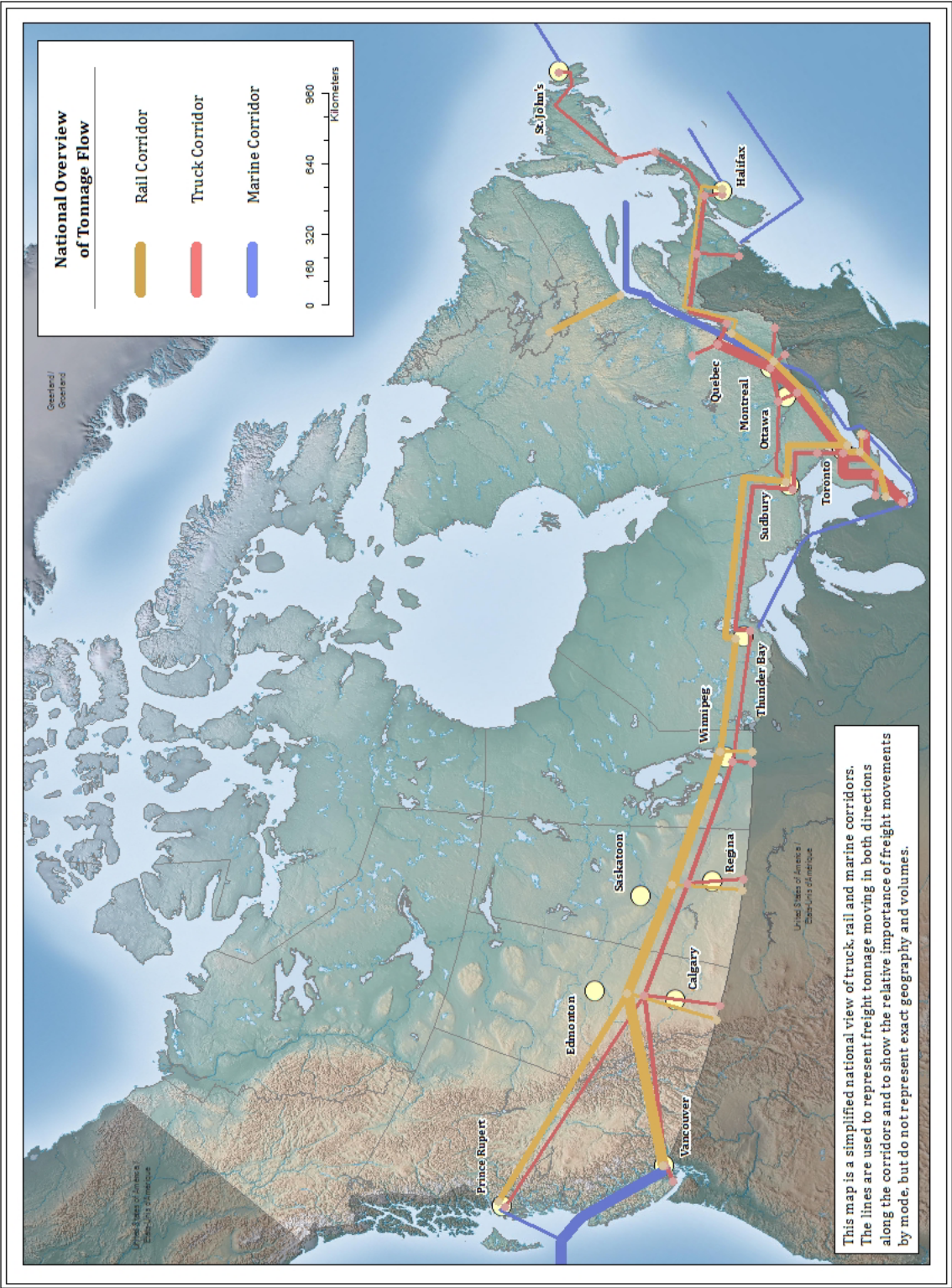
Figure 1: Transportation Network



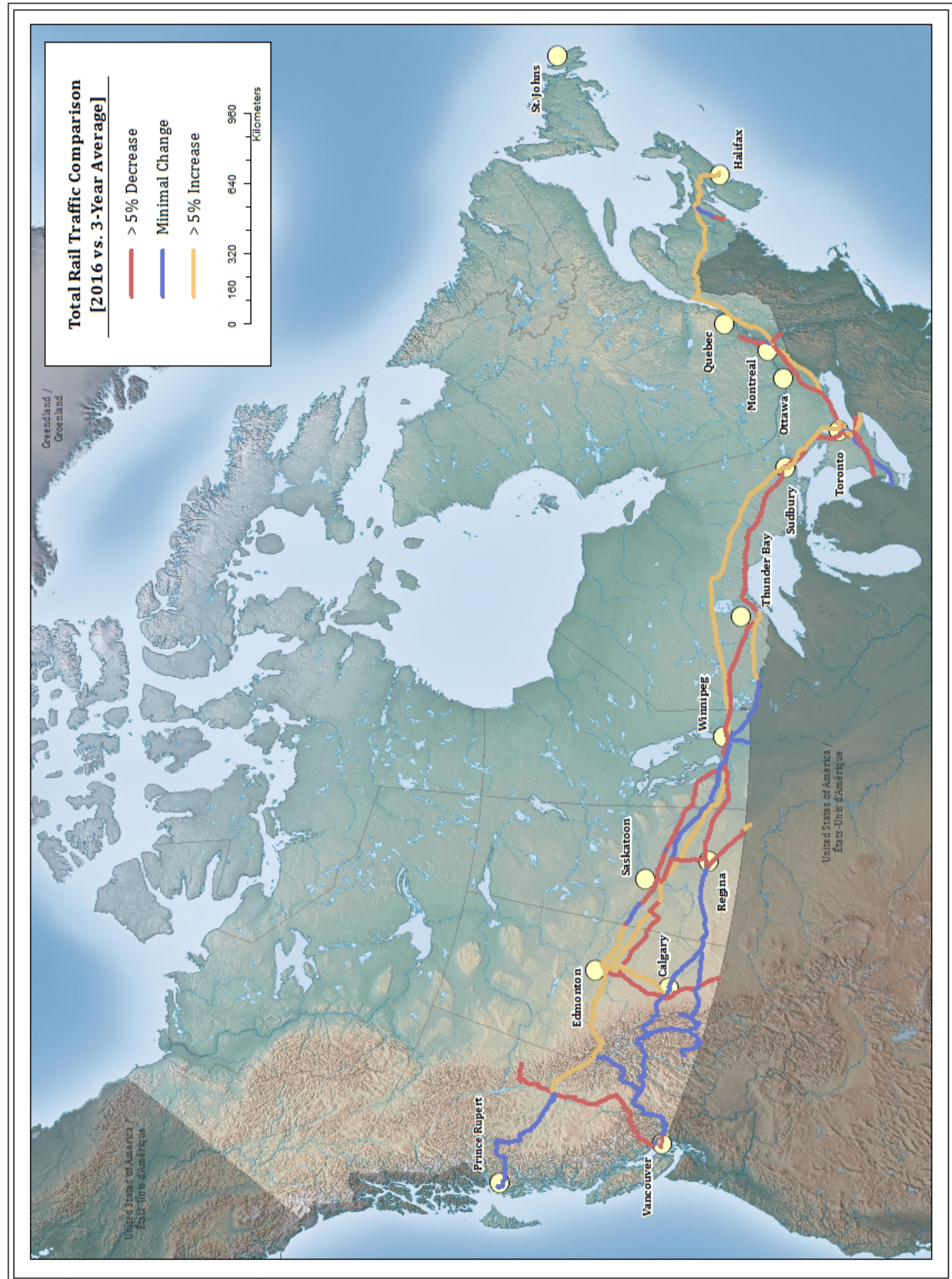
Figure 2: Canadian Merchandise Export Flows by Region



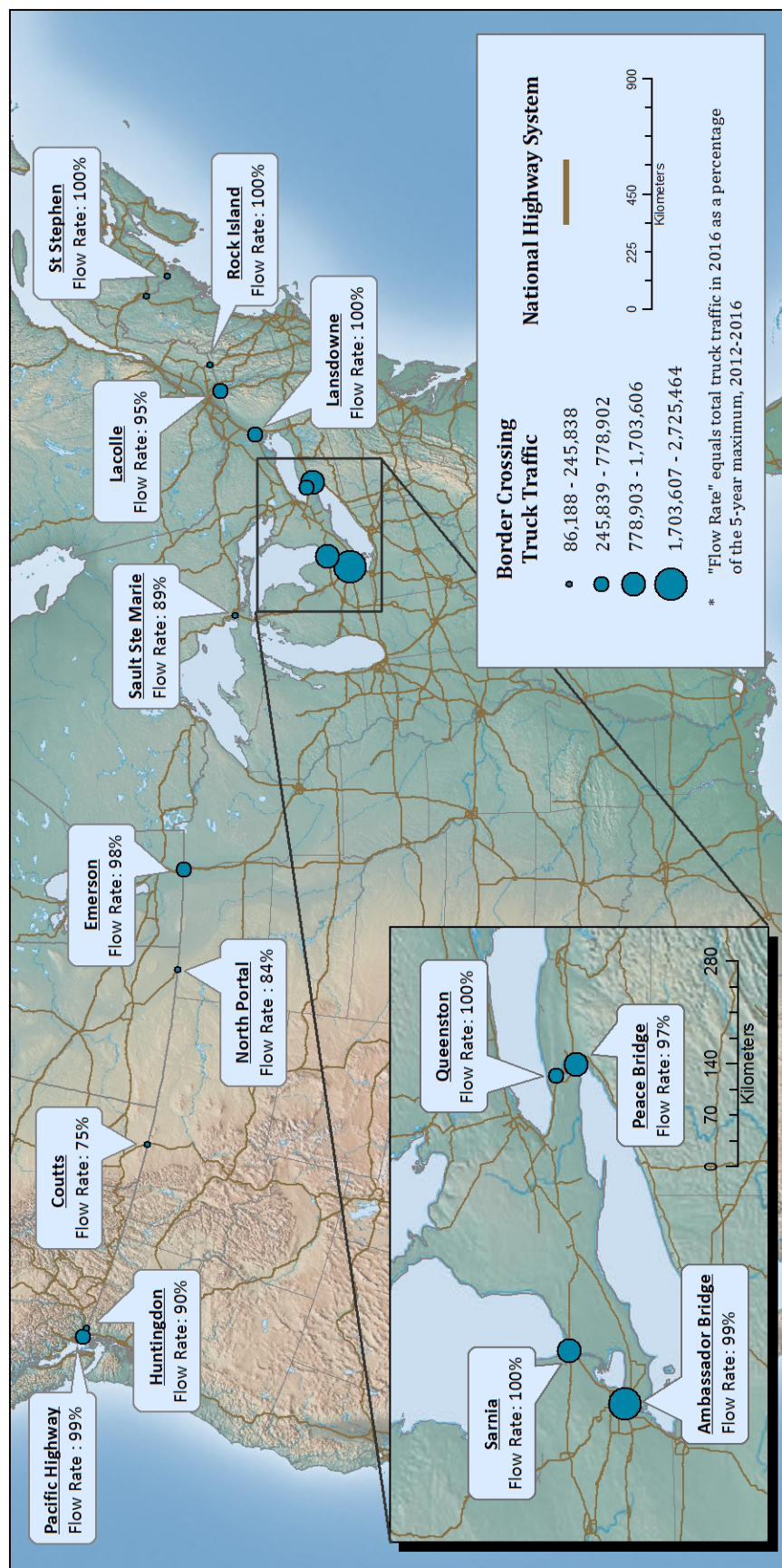
Map 1: Freight Transportation Corridors



Map 2: Rail System Flow Comparison – Total Traffic 2016 Compared to 3-Year Average



Map 3: Truck Border Crossings Performance Metrics – Traffic Flows



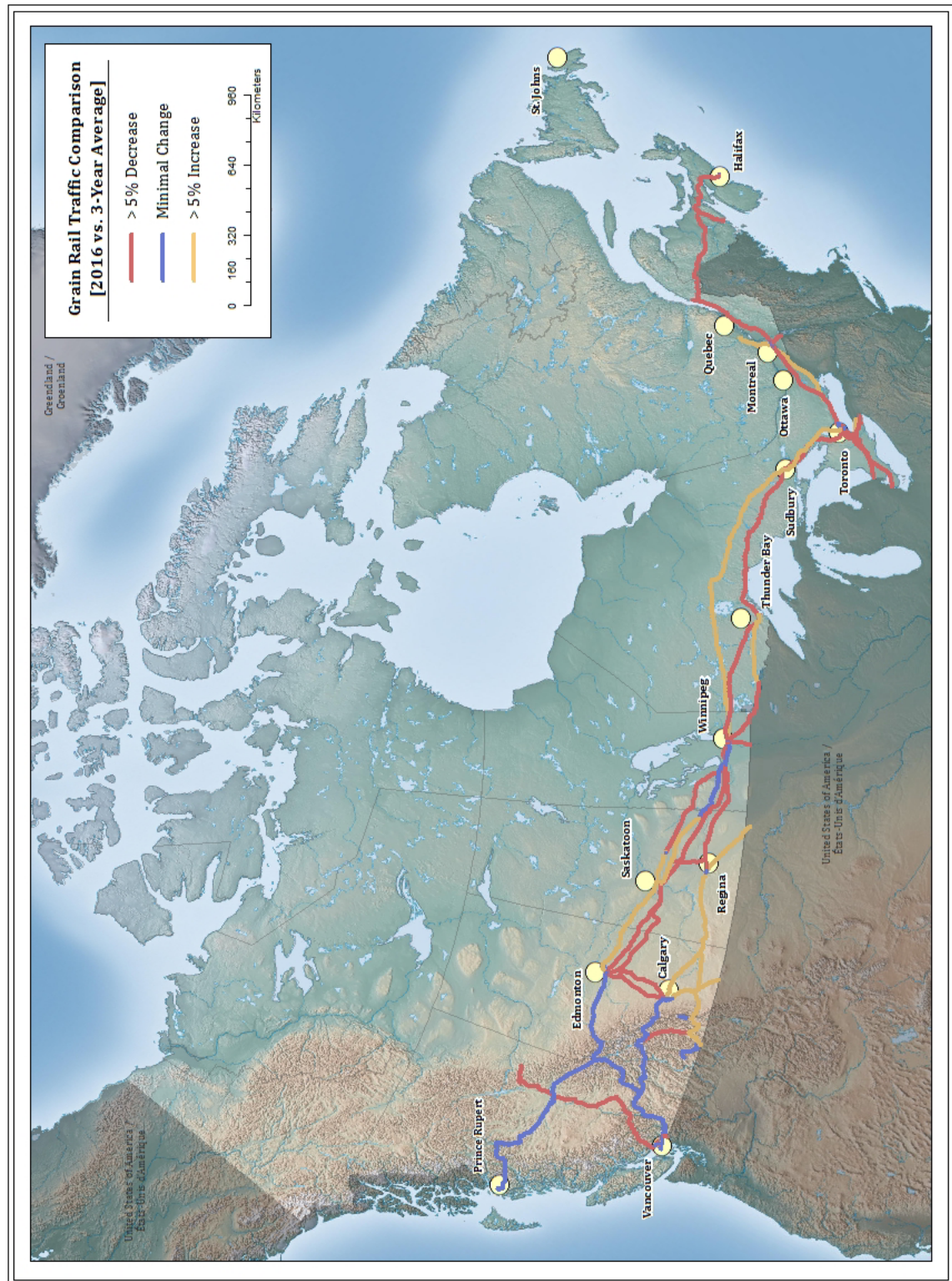
Two-Way Truck Traffic Flow Rate – Key Regional Border Crossings

Year	Pacific Highway				Emmerson				Ambassador Bridge				Peace Bridge				Lacolle			
	Quarter				Quarter				Quarter				Quarter				Quarter			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2012	89%	92%	93%	93%	93%	91%	96%	93%	100%	100%	88%	98%	100%	99%	90%	98%	100%	100%	93%	98%
2013	91%	94%	96%	97%	98%	94%	96%	97%	97%	97%	88%	100%	97%	99%	94%	99%	89%	93%	96%	99%
2014	92%	97%	100%	100%	97%	100%	97%	100%	89%	89%	83%	96%	98%	100%	100%	96%	85%	88%	94%	99%
2015	100%	100%	100%	99%	100%	91%	98%	99%	84%	84%	85%	96%	98%	96%	93%	100%	87%	95%	100%	100%
2016	94%	94%	97%	97%	99%	92%	100%	98%	96%	96%	100%	95%	99%	95%	92%	95%	88%	91%	94%	99%

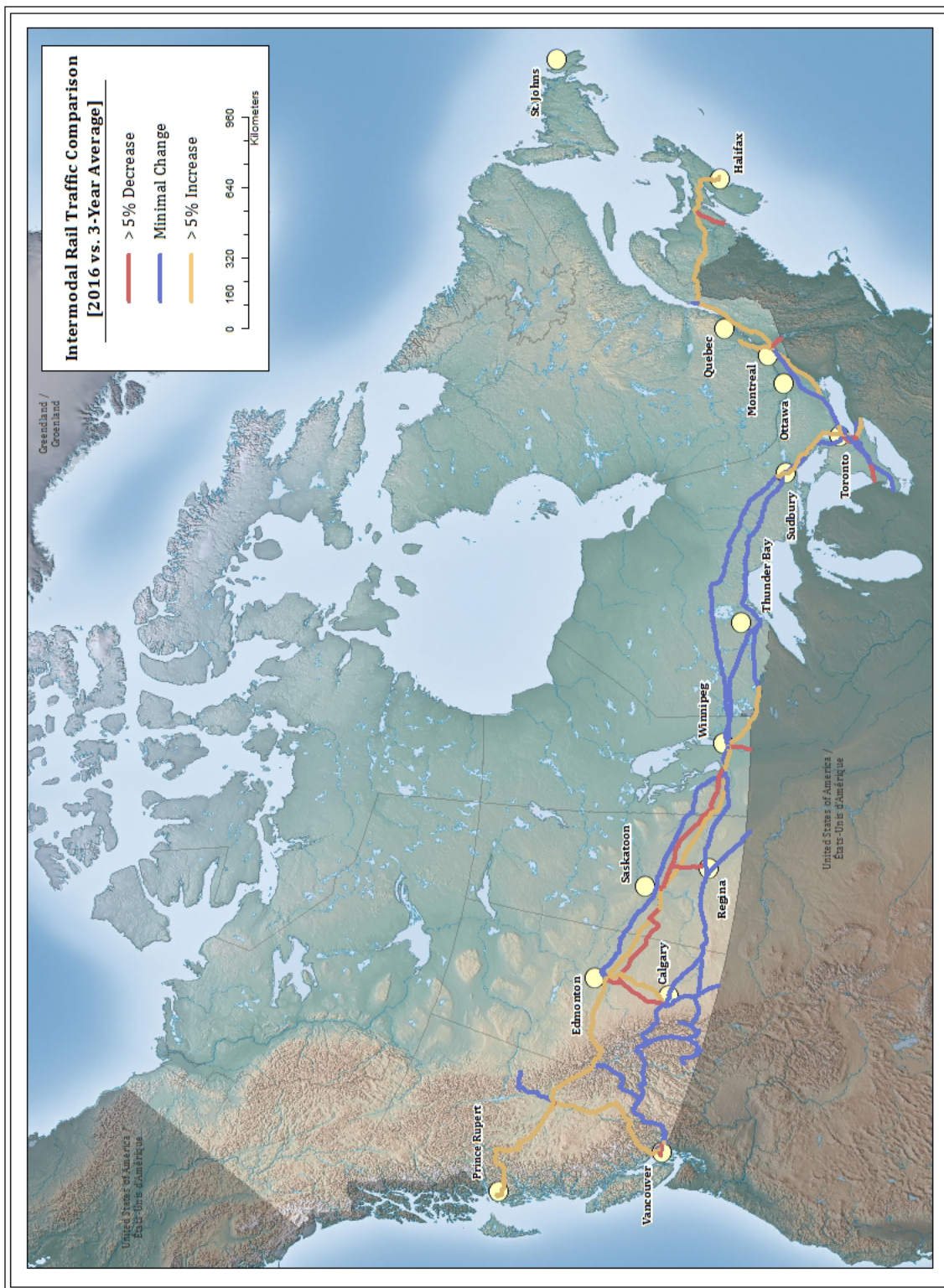
Red – indication of truck traffic flow rate values that represent the quarterly maximum for those five years

*Note: rounding errors may cause flagging inconsistencies, i.e.) 99.7 flagged as 100.0

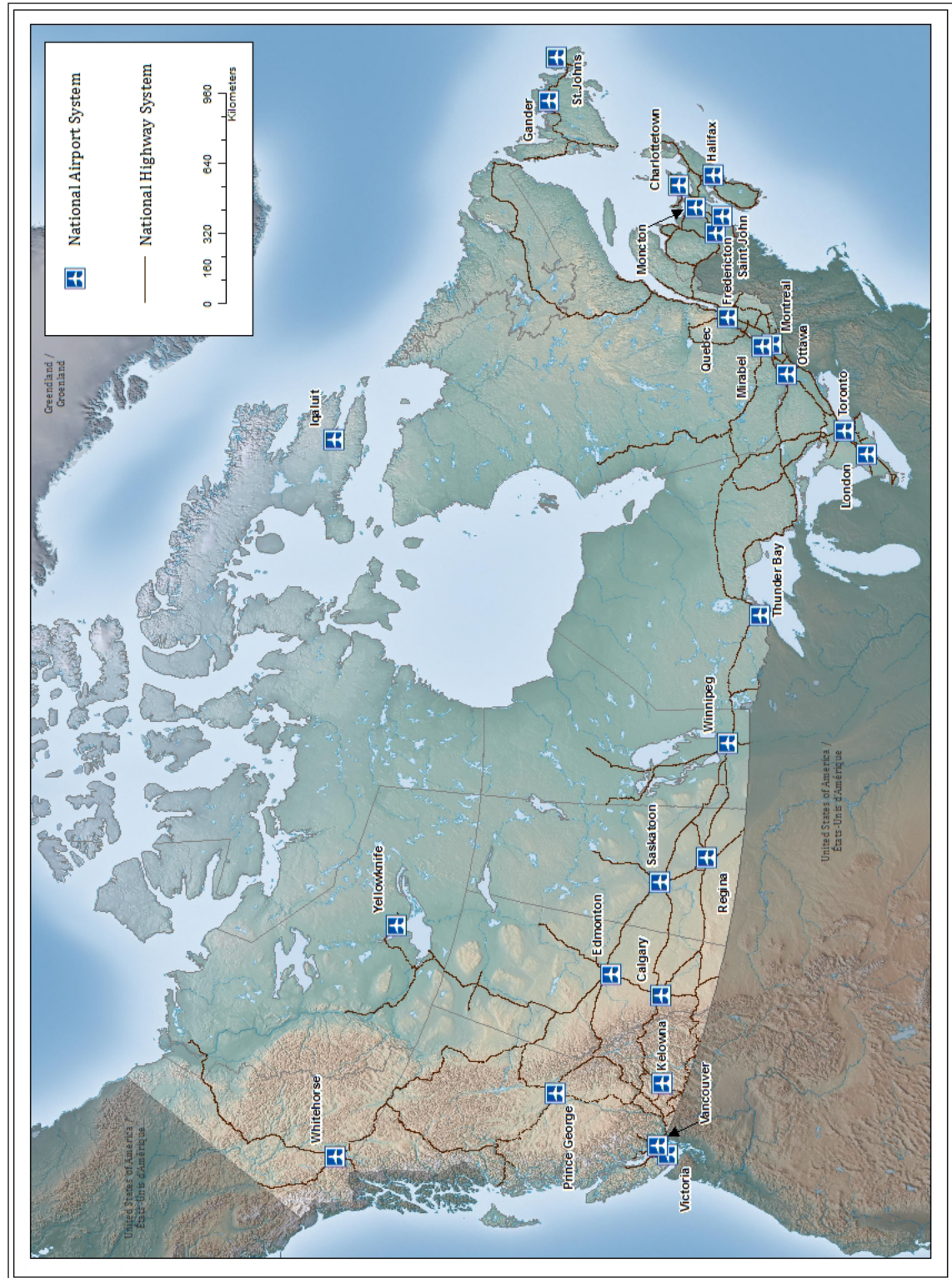
Map 4: Rail System Flow Comparison – Grain Traffic 2016 Compared to 3-Year Average



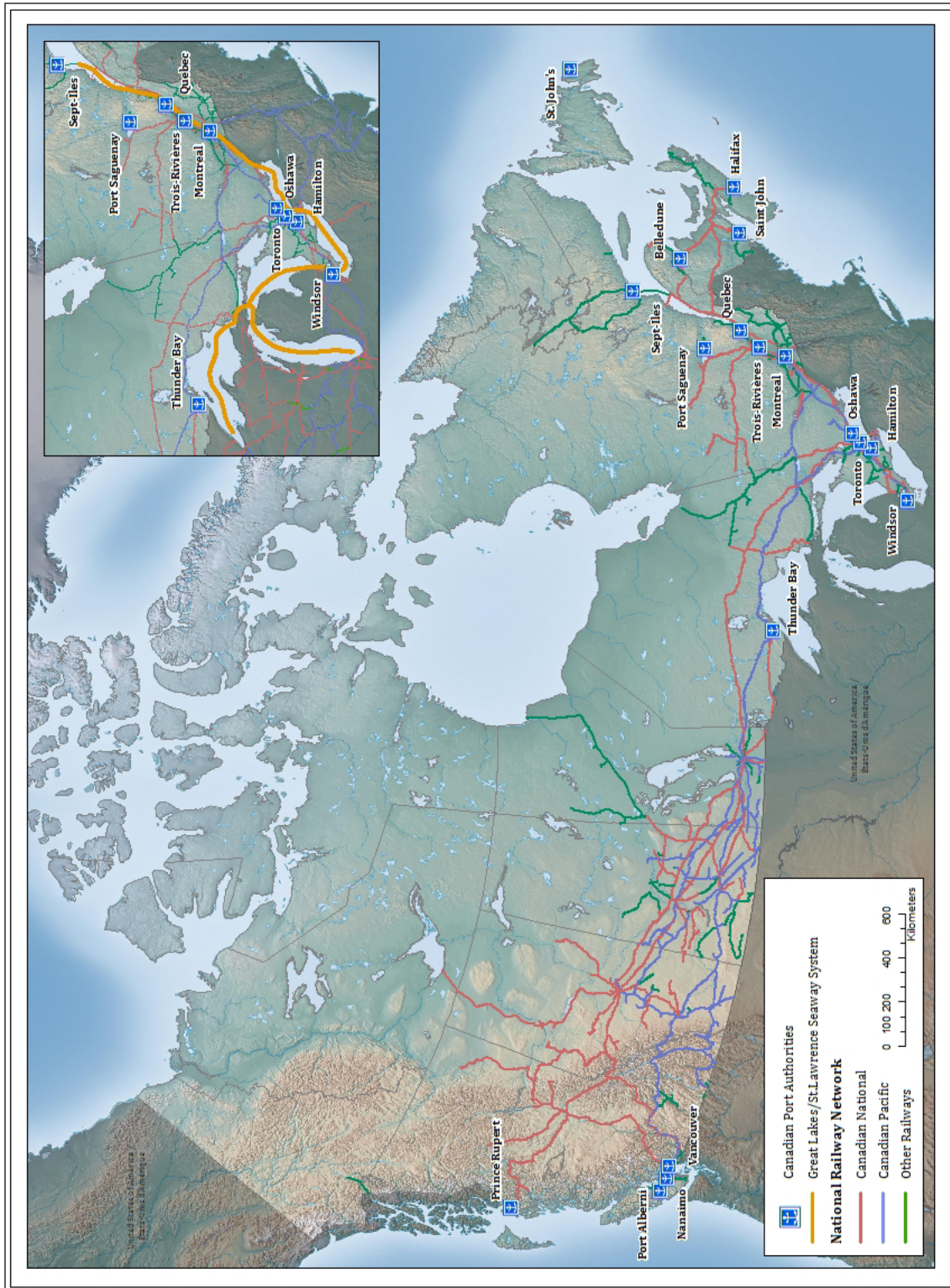
Map 5: Rail System Flow Comparison – Intermodal Traffic 2016 Compared to 3-Year Average



Map 6: Highway and Air Infrastructure



Map 7: Rail and Port Infrastructure



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