Carbon Disclosure Project 2017

Table of Contents

Introduction

Introduction

CN is a world-class transportation leader engaged in the rail and related transportation business. Our network of approximately 20,000 route miles of track spans Canada and mid-America, uniquely connecting three coasts: the Atlantic, the Pacific and the Gulf of Mexico. We offer fully integrated rail and other transportation services, including intermodal, trucking, freight forwarding, warehousing and distribution.

Our freight revenues are derived from seven commodity groups representing a diversified and balanced portfolio of goods transported between a wide range of origins and destinations, positioning us to handle economic fluctuations and enhance our potential for growth opportunities. On an annual basis, we handle over C$250 billion worth of goods and carry more than 300 million tons of cargo, serving exporters, importers, retailers, farmers and manufacturers. Some of these goods are being transformed into sustainable products, enabling us to play a key role as the true backbone of the clean economy and the lifeblood of healthier communities.

By providing our customers with one of the most environmentally friendly ways to move their goods, we not only contribute by moving the clean economy, but also by driving its efficiency. Over the past 20 years, we have improved our fuel efficiency by 37%. Today, we continue to lead the North American rail industry in terms of efficiency, consuming approximately 15% less fuel per gross ton-mile than the industry average.

With approximately 84% of our GHG emissions generated from rail operations, our focus is to continuously improve our fuel efficiency and reduce our carbon emissions. Our emission reductions take place on several levels, from our asset lean Precision Railroading initiatives to our Fuel Management Excellence program, which includes fleet acquisitions, fuel efficient train handling, and new innovative technology applications and enhanced analytical capabilities. As a result of these programs, since 2005, we have reduced our rail locomotive GHG emissions intensity (tCO_2e/GTM) by 21%. In support of keeping the global temperature increase below 2 degrees Celsius compared to pre-industrial temperatures, we have now set a new science-based target to reduce our GHG emission intensity (tCO_2e/million tonne kilometres) by 29% by 2030 based on 2015 levels. This target covers emissions from all aspects of our business, including rail locomotives, other fleets, and our buildings and yards.

In addition to providing a fuel-efficient transportation service, we believe that rail can be an integral part of the climate change solution offering both environmental and economic advantages. Compared to other transportation modes, rail is the most fuel efficient method of moving freight over land – on average, trains are approximately four times more fuel efficient than trucks. To leverage these benefits, we offer our customers intermodal freight shipping, which combines the resources of different transportation modes, such as trucking and rail – allowing each mode to be used for the portion of the trip to which it is best suited. As a result, intermodal helps lower transportation costs, reduce emissions, traffic congestion, accidents, and the burden of an overstressed public road transportation infrastructure. Over the past year, we continued to work with many of our customers to help them determine their carbon savings from switching freight from truck to rail, using a carbon calculator based on our industry leading modal shift quantification protocol.

We also continued to invest significantly in building a robust and safe network that is resilient to changing climatic conditions. In 2016, we invested approximately C$1.6 billion to maintain the safety and integrity of our network, which includes the maintenance of our tracks and yards and the execution of seasonal readiness plans, natural hazard warning systems, and other weather-related emergency preparedness protocols.

In support of all of these initiatives, we engage our network of 23,000 employees through our EcoConnexions program, giving them practical knowledge and tools to reduce our carbon footprint, while adapting to a changing climate.

Building on the momentum of our 20-year tradition of continuous improvement, we will be focused on accelerating our pace of innovation to grow our company into the leading most sustainable North American transportation and logistics company that drives economic prosperity in a low carbon environment.

CN - Canadian National Railway Company and its operating railway subsidiaries - spans Canada and mid-America, from the Atlantic and Pacific oceans to the Gulf of Mexico, serving the ports of Vancouver, Prince Rupert, B.C., Montreal, Halifax, New Orleans, and Mobile, Ala., and the key metropolitan areas of Toronto, Buffalo, Chicago, Detroit, Duluth, Minn./Superior, Wis., Green Bay, Wis., Minneapolis/St. Paul, Memphis, and Jackson, Miss., connections to all points in North America. For more information on CN, visit the company's website at ***www.cn.ca****. Information on delivering responsibly, including climate change is available at:* ***http://www.cn.ca/en/delivering-responsibly***

Management

Management

1. Governance

1.1 - 1.1a
Highest level of direct responsibility for climate change and position of individual or name of committee with this responsibility

The Environment, Safety and Security (ESS) Committee of the Board of Directors (which is made up of Board members) has the highest level of responsibility for climate change in the Company. The ESS Committee is responsible for providing oversight on strategic climate change issues and reviewing the progress of the company's carbon strategy, management and performance during its regular meetings.

At the executive level, the Assistant Vice-President of Environment and Sustainability, Mr. Normand Pellerin, has direct responsibility for climate change within the company. He reports directly to the Vice-President, Safety and Sustainability, Mr. Mitch Beekman, who in turn reports to the Executive Vice-President and Chief Operating Officer, Mr. Mike Cory. The team reports regularly to the Executive Leadership Team and Chief Executive Officer on strategic environmental initiatives, including matters related to our emissions and energy efficiency strategy.

The Assistant Vice-President of Environment and Sustainability is responsible for ensuring the effective deployment of our emissions and energy efficiency strategic initiatives, as defined through the sustainability action plan, against set objectives, targets and performance expectations. Reporting to the Assistant Vice-President for Sustainability is a cross-functional sustainability committee with senior representation from CN's departments. The sustainability committee meets quarterly to define and align CN's sustainability and climate change priorities with the business strategy, and monitor and communicate performance as identified in our sustainability action plan.

1.2 - 1.2a
Incentives for management of climate change issues, including attainment of targets

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comments
Chief Executive Officer	Monetary reward	Other: Environmental benefits of rail	CN's President and Chief Executive Officer (CEO) has integrated sustainability into his individual objectives, which includes promoting the environmental benefits of shipping rail amongst policy makers, customers, and the public at large.
Chief Operating Officer	Monetary reward	Emissions reduction target Energy reduction target	The Executive Vice President and Chief Operating Officer has included into his Employee Performance Scorecard (EPS) the energy efficiency strategy and the year over year rail fuel efficiency target of 1.5%, which aligns with our science based GHG emission intensity (tCO_2e/million tonne kilometres) target of 29% by 2030, based on 2015.
Management group	Monetary reward	Emissions reduction target Energy reduction target	Various management employees are responsible for executing our emissions and energy efficiency strategy. The performance indicators are included within their respective EPS objectives. For example: The fuel management team performance is tied to our annual year over year fuel efficiency target of 1.5%. The Facility management team performance is tied to the year over year target of reducing our overall energy spend by 2%. Both these targets align with our overall science based target to reduce our GHG emission intensity (tCO_2e/million tonne kilometres) (which includes fuel consumption from locomotives, shipping vessels, trucks, company vehicles and operating equipment, and buildings and yard energy consumption) by 29% by 2030, based on 2015 levels. Our sustainability management team's performance is tied to the implementation of our emissions and energy efficiency strategy and the execution of our climate change communications. The achievement of the above performance indicators are linked to employee recognition as well as the individual's annual compensation and bonus reward.
All employees	Recognition (non-monetary)	Emissions reduction project Emissions reduction target Energy reduction project Energy reduction target Efficiency project Efficiency target	Fuel efficiency, emission and energy reduction initiatives can be recognized through CN's President Awards for Excellence within the sustainability category. Employees are also recognized for their efforts through the CN EcoConnexions program and many other internal communications.

Management

2. Strategy

Risk Management Approach

Our risk management procedures regarding climate change risks and opportunities are integrated into multi-disciplinary company-wide risk management processes.

2.1 - 2.1a
Risk management procedures regarding climate change risks and opportunities

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
Annually	Board or Individual/Sub-set of the Board or committee appointed by the Board	Given the location of our business, we predominantly focus our risk process on North America covering Canada and the United States. We also consider risks in other regions, including Europe, Asia and South America.	> 6 years	Climate change risks and opportunities are integrated into our multi-disciplinary enterprise-wide risk management (ERM) process. A detailed climate risks and opportunities assessment is conducted annually and the results are integrated into the ERM process. The assessment includes a consideration of regulatory risks, changing weather patterns, customer requests, fuel price volatility, and reputational issues. Significant climate change risks and opportunities are integrated into the ERM process, and further assessed and classified within CN's company-wide risk categories.

2.1b
How risk and opportunity identification processes are applied at both company and asset levels

Company level perspective

At the company level, climate change risks and opportunities are assessed annually by the sustainability department based on information from our various departmental functions, and in consideration of changing policies, strategic objectives and market trends. The assessment considers a broad range of climate risks and opportunities that could impact the entire company. Examples of company level risks and opportunities includes reputational impacts from more robust carbon disclosure, business continuity and network fluidity from extreme weather events, new cleaner fuel efficient technologies, changing policies and regulations on emissions, carbon markets/pricing and uptake of cleaner fuel alternatives. The assessment results are communicated to our internal audit risk team to be considered for inclusion into the enterprise risk management process.

Asset level perspective

At the asset level, the climate change risks and opportunities are assessed departmentally on an annual basis, or more frequently as necessary. The departmental assessments are more specific in nature and relate to the risks and opportunities that could occur from a functional, business unit and regional perspective. For example, the Network Transportation and System Engineering functions consider natural disasters and network disruptions due to severe weather conditions that could impact specific buildings and yards on CN's network. The sustainability function reviews the changing regulations related to climate change that could impact our business within specific provinces and states in North America. The results of these assessments are also communicated to the risk team to be considered for inclusion in the enterprise risk management process.

2.1c
Prioritizing identified risks and opportunities

The prioritization of climate change risks and opportunities is based on our understanding of the likelihood and severity of the potential impacts on our operations and business. We consider a broad range of impacts, including financial, operational, physical, reputational, and organizational impacts. We evaluate the impacts using qualitative ratings of low, medium and high. Risks and opportunities that result in a medium or higher rating are prioritized.

The high priority risks are then integrated into the enterprise-wide risk management (ERM) process and re-assessed. Climate change information that could be material is presented in the MD&A section of our annual report. Strategic climate change programs are integrated, tracked and monitored through the sustainability committee's action plan.

2. Strategy

Business Strategy

2.2 - 2.2a
Climate change is integrated into our business strategy

How the strategy is influenced (the internal process for collecting and reporting information to influence the strategy)

Climate-related information is integrated into the strategic planning process on an annual basis. The information is compiled by the sustainability committee on a broad range of climate-related topics, including fuel, emission and energy efficiency performance reports, technology innovation and data analytics reports, fleet renewals and upgrade reports, climate risk and opportunity assessments, GHG regulatory reviews, and stakeholder requests. The information is used to update our sustainability action plan. Strategic climate-related information is also reported to the Executive team to inform the company-wide business strategy. For example, based on this information, our strategic business plan would be updated with objectives and programs related to fuel and energy efficiency, and GHG emissions.

Climate change aspects that have influenced the strategy (e.g. need for adaptation, regulatory changes, opportunities to develop green process)

Both climate risks and opportunities have influenced our strategy. The climate change risks that influenced our strategy include changing locomotive emission standards, severe and extreme weather events impacting network infrastructure and track operating efficiency, and increasing building energy costs. Climate change opportunities that influenced our strategy include changing customer requests for low carbon fuel efficient service offerings, favourable government subsidies that promote cleaner technologies, clean energy and carbon market dynamics, new innovative technologies, alternative fuel options and the 2015 Paris Agreement global accord to combat climate change.

Most important components of the short-term strategy influenced by climate change (short-term can mean current)

Fuel and emission efficiency of our rail locomotive operations has continued to be the most important part of our short-term (2016-2019) strategy influenced by climate change. With 84% of our GHG emissions generated from rail operations, we believe that the single best way we can improve productivity performance while positively impacting the environment is by continuously improving our rail fuel efficiency. Today, we continue to lead the North American rail industry by being approximately 15% more fuel efficient per gross-ton-mile than the industry average. Building on the momentum of our 20-year tradition, we are committed to continuously improving and have now set a science based target to reduce our GHG emission intensity (tCO_2e/million tonne kilometres) by 29% by 2030, based on 2015 levels. To meet our targets, we are accelerating the pace of innovation.

For example, we are now targeting approximately C$200 million on equipment expenditures, as well as an additional C$100 million for 22 high-horsepower locomotives and other projects to support growth. We are also now ensuring that our new locomotive acquisitions include enhanced analytical capabilities and new innovative technology applications to improve fuel efficiency, such as Trip Optimizer, Automatic Engine Start / Stop devices, Locomotive Telemetry, which wirelessly communicates operational data from locomotives to a central system, and Horse Power Tonnage Analyzer (HPTA), which uses the data collected by Locomotive Telemetry to optimize a locomotive's horsepower-to-tonnage ratio. These advancements will enable us to meet our 2017 1.5% fuel efficiency improvement target, and our science-based GHG intensity (tCO_2e/million tonne kilometres) reduction target.

Most important components of the long-term strategy influenced by climate change (or if there is none this has been stated)

The most important part of our long-term business strategy (2018-2025) influenced by climate change is our strategic priority to build for the future and increase capacity, resilience and fluidity across our rail network. Weather-related operational challenges are an important consideration in this strategy, as we adapt our network to minimize exposure and improve recovery from extreme weather events such as extreme cold, floods, mud slides and culvert washouts. We are now building an even more robust network. For example, in 2016 we spent C$1.6 billion to improve track infrastructure and have planned another C$1.6 billion for track infrastructure in 2017, which includes proactive inspections, maintenance, readiness plans, and emergency planning. These advantages will enable us to run a climate resilient network, improve fluidity and greatly help us recover from weather-related operational challenges.

2. Strategy

Business Strategy (continued)

How the Paris Agreement has influenced the business strategy (e.g. the process of transition planning alongside the ratcheting of Intended Nationally Determined Contributions)

Following the Paris Agreement, we strengthened our communications with federal, provincial, and state governments in North America on our low carbon services and the benefits of moving goods by rail as part of the climate change solution. We continued customer communications on the carbon footprint of our services, educating them on the carbon savings from switching freight from truck to rail through our industry leading carbon calculator. We had discussions with fuel suppliers on cleaner fuels and initiated discussions with our locomotive manufacturers on the testing of these fuel options to power our rail locomotive engines.

How this approach is gaining a strategic advantage over competitors (or if there is none this is stated)

Integrating climate change considerations into our business strategy is helping us gain a strategic advantage as follows:

- Industry-leading fuel and carbon efficient transportation services. For example, CN is 15% more fuel efficient than the industry average. In 2016, we achieved fuel savings of 2% representing approximately C$19 million of savings in fuel operating costs.
- Growth of our intermodal business, leveraging the environmental benefits of rail for long-haul freight. Since 2012, revenues from our intermodal business segment have increased by 26%.
- Strong reputation on climate strategy and fuel efficiency. In 2016, we were named to the DJSI North America for the eighth consecutive year and were the only North American railroad to be listed on the DJSI World for the fifth year in a row. We scored 100% on our climate strategy.

Use of forward-looking scenario analyses, including a 2 degree Celsius scenario, to inform business, strategy, and/or financial planning

In support of keeping the global temperature increase below 2 degrees Celsius compared to pre-industrial temperatures, we are collaborating with the Science-Based Targets Initiative (SBTI) on a science based target setting approach within the rail freight sector. We used the SBTI rail freight sector model to determine our target pathway, which is based on sector specific emission forecasts from the International Energy Agency - Energy Technology Perspectives 2016 document.

In setting our target, we made forward-looking business growth projections, and applied key assumptions on the types of efficiency gains that could be made by our fleet and in our buildings and yards, with the future goal of transitioning to the use of cleaner more sustainable fuels.

The most substantial business decisions made during 2016 that were influenced by climate change included:

- Investing C$550 million for equipment expenditures, including 90 new high horsepower locomotives. These investments are enabling us to increase fuel efficiency, reduce GHGs, meet climate-related regulatory requirements for more efficient and tier compliant locomotives and support business growth.
- Investing C$1.6 billion to ensure the safety and integrity of our rail infrastructure, including approximately C$30 million to respond to extreme weather events.
- Investing C$5 million annually in an EcoFund to support and engage employees on energy reduction projects through the EcoConnexions program.

2.2c - 2.2d
An internal price of carbon

CN has incorporated an internal price of carbon on the volume of locomotive diesel fuel purchased, which represents approximately 87% of our Scope 1 emissions. The price is used by our Supply Management Department to inform fuel-related procurement decisions, by our sales and marketing department to price transportation and logistics services for the customer, and by our taxation department to comply with carbon tax payments.

We have also projected carbon price future scenarios based on the location of our fuel suppliers within various jurisdictions in Canada, taking into consideration Federal and provincial carbon price ranges from C$16 to C$30 per tonne of CO_2. Internalizing the price of carbon for our fuel supply will be used to drive investment decisions into fuel efficiency and alternative cleaner energy sources.

2. Strategy

Engagement with Policy Makers

2.3 and 2.3a
Direct engagement in activities to influence policy makers on climate change

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Cap and trade	Support	We engage with various Canadian federal and provincial governments (Quebec, Ontario, British Columbia, Alberta, Saskatchewan, and the Western Climate Initiative) on their cap and trade and carbon tax regulatory regimes to position rail freight as a viable low carbon transportation solution.	We support provincial and state carbon markets within Canada and the U.S. We believe that involvement with leading policy makers on carbon markets moves the transportation sector forward in identifying practical solutions that contribute to, and support, future policy developments in a manner that will foster low carbon economic growth, while ensuring significant GHG emission reductions.

2.3b and 2.3c
Trade associations CN belongs to which are likely to take a position on climate change legislation.

Trade association	Is your position on climate change consistent with theirs?	Please describe the trade association's position	How have you, or are you attempting to, influence the position?
Railway Association of Canada (RAC)	Consistent	The RAC represents rail businesses within Canada on various issues, including environmental sustainability. The RAC supports and encourage sustainable transportation systems to serve the nation and its regions.	We engage with Environment Canada, through our role as the chair of the Railway Association of Canada. CN believes in working with both Canadian and U.S. governments to identify technically feasible options to meet greater efficiency standards for locomotives.
Association of American Railroads (AAR)	Consistent	The AAR is a standard setting organization for North America's railroads, focused on improving safety and productivity of rail transportation. It supports affordable, efficient and environmentally responsible transportation.	We engage with the AAR as a member of the organization, and support them in promoting a cleaner, greener, efficient, and environmentally-responsible transportation solutions.

2.3d
Public disclosure of research organizations we fund

Yes, we publicly disclose a list of all the research organizations we fund.

2. Strategy

Engagement with Policy Makers (continued)

2.3e
Details of other engagement activities we undertake.

Description:

We play an active role in the advocacy of rail as part of the climate change solution with federal, provincial and state governments in North America. Rail transportation is approximately four times more fuel efficient than truck, translating into a 75 per cent reduction in greenhouse gas emissions for an equivalent volume of freight. CN firmly believes that solutions to meet Canada's emission reduction targets should include encouraging shippers to use the most carbon-friendly transportation option available.

Method of engagement:

We have engaged with the federal, provincial and state governments in North America through individual meetings, as well as through the Railway Association of Canada.

Topic of engagement:

The topic of engagement is how railways can help meet jurisdictional emissions reductions targets.

Nature of engagement:

Our engagement relates to educating the federal, provincial and state governments on the environmental benefits of shipping by rail vs. truck through discussions as well as through the submission of a written brief outlining these benefits and the proposed actions that can be taken to encourage the shipment of freight by rail.

Action advocated as part of engagement:

Actions advocated include allocating funds to support modal shift from truck to rail, investment in rail fuel efficiency technologies and innovation, investment in rail infrastructure, and harmonizing the regulatory regime for carbon regulations and markets in North America.

2.3f
Processes to ensure all direct and indirect activities that influence public policy are consistent with our overall climate change strategy

The direct and indirect activities that could influence public policy are typically reviewed by the Government and Public Affairs department on an annual basis to ensure alignment with the strategic direction of the business, including our climate change strategic focus areas. Public policy decisions that could impact our overall climate strategy are communicated to the sustainability team to be validated for consistency with our climate strategy. Where inconsistencies are noted, recommendations are proposed to ensure alignment.

3. Targets and Initiatives

Targets

3.1 - 3.1b
Our target

ID	Scope	% of emissions in Scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Target year	Is this a science-based target?	Comments
001	1 and 2 (location-based)	100%	29%	tCO_2e per million tonne kilometres	2015	16.07 tCO_2e/million tonne kilometres	2030	Yes	This target relates to emission reductions from the use of our locomotives, shipping vessels, trucks, company vehicles and operating equipment, as well as reductions in energy consumption at our buildings and yards.

3.1c
Change in absolute emissions our intensity target reflects

ID	Direction of change anticipated in absolute Scope 1 + 2 emissions at target completion	% change anticipated in absolute Scope 1 + 2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion	% change anticipated in absolute Scope 3 emissions	Comments
001	Decrease	9%	N/A	N/A	Our intensity target is expected to bring our absolute emissions to 9% below 2015 levels by 2030.

3.1e
Our progress towards our target

ID	% complete (time)	% complete (emissions or renewable energy)	Comments
001	7%	6%	CN has just completed the first year of our new 15 year science-based target. In 2016 we achieved an emission intensity reduction of 1.6% from fuel consumption related to locomotives and other fleets and energy consumption at our buildings and yards (tCO_2e / million tonne km) based on 2015 levels.

3. Targets and Initiatives

Emission Reduction Initiatives

3.2 - 3.2a
How our service directly enables GHG emissions to be avoided by third parties

Level of aggregation	Description of product	Low-carbon products or avoided emissions	Taxonomy, project or methodology used to classify products as low-carbon or to calculate avoided emissions	% revenue from low-carbon products	R&D in low-carbon products in the reporting year	Comments
Product	The rail freight service we provide, representing 94% of our business, enables our customers to move goods over land in the most efficient and environmentally friendly way. On average, trains are approximately four times more fuel-efficient than trucks. They also reduce highway congestion, lower GHG emissions and reduce air pollution.	Low-carbon products	Low-Carbon Investment (LCI) Registry Taxonomy	94%	Less than or equal to 10%	We continue to invest in greener and cleaner technologies and more efficient practices, to strengthen our low-carbon rail freight service, enabling our customers to reduce GHG emissions.
Product	Our intermodal freight shipping service combines the resources of different transportation modes, such as trucking and rail. Intermodal helps our customers reduce emissions by shifting their truck freight to rail.	Avoided emissions	Other – see comment	24%	Less than or equal to 10%	Moving freight by rail instead of truck lowers GHG emissions by 75%. To leverage these benefits, we work with many of our customers, providing them with a GHG calculator, based on our industry leading modal shift quantification protocol, which allows them to determine their carbon savings from switching heavy long-haul freight from truck to rail.

3. Targets and Initiatives

Emission Reduction Initiatives (continued)

3.3, 3.3a and 3.3b
Emission reduction initiatives active within the reporting year

Stage of development	Number of projects	Total estimated annual CO_2e savings (tCO_2e)
Under investigation	0	0
To be implemented	0	0
Implementation commenced	0	0
Implemented	5	332,805
Not to be implemented	0	0

Activity type	Description of activity	Estimated annual CO_2e savings (tCO_2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency)	Investment required (unit currency)	Payback period	Estimated lifetime of the initiative	Comments
Transportation: fleet	We continued implementation of four projects in 2016 related to our rail locomotive emissions and energy efficiency strategy, which represent 84% of our greenhouse gas emissions. This includes new locomotive acquisitions, fuel management system enhancements, and the installation of new locomotive technologies such as Trip Optimizer and CN's locomotive telemetry system.	329,854	Scope 1	Voluntary	19,100,000	550,000,000	21-25 years	> 30 years	These emission savings relate to Scope 1 emissions covering our rail locomotives. These projects will help us achieve our science based emission intensity reduction target of 29% in 2030, based on 2015 levels.
Energy efficiency: building services	We invest in energy efficiency projects at our buildings and yards, including HVAC, lighting and air compressor upgrades.	2,951	Scope 2	Voluntary	600,000	4,120,000	4-10 years	11-15 years	We continue to work to reduce Scope 2 emissions from electricity consumption at our buildings and yards. This includes investing in a C$5 million dollar EcoFund to support energy and emission reduction projects.

3. Targets and Initiatives

Emission Reduction Initiatives (continued)

3.3c
Methods used to drive investment in emission reduction activities

Method	Comments
Compliance with regulatory requirements/standards	Through the US EPA and Environment Canada Locomotive Emission Standards, CN continues to follow-through on its commitment to acquire, retire and upgrade locomotives so as to improve air quality, enhance rail fuel efficiency and reduce rail GHG emission intensity. Based on this obligation, we assess our locomotive fleet annually through financial optimization calculations to determine the budget that would be necessary to meet our commitments in the context of our business needs. For example, in 2016 we invested C$550 million for equipment expenditures, including 90 new high-horsepower locomotives. In 2017, we have targeted C$200 million on equipment expenditures, as well as an additional C$100 million for 22 high-horsepower locomotives and other projects to support growth.
Dedicated budget for energy efficiency	We invest in the efficiency of our locomotive fleet beyond our regulatory compliance obligations. This includes new rail technologies such as Trip Optimizer, Automatic Engine Start / Stop devices, Locomotive Telemetry, which wirelessly communicates operational data from locomotives to a central system, and Horse Power Tonnage Analyzer (HPTA), which uses the data collected by Locomotive Telemetry to optimize a locomotive's horsepower-to-tonnage ratio.
Employee engagement	Our employees are integral to our ability to reduce energy consumption. Through the EcoConnexions program, we set up an EcoFund to provide the necessary resources to enable the execution of carbon and energy efficiency projects, including education and awareness.
Dedicated budget for energy efficiency	Energy efficiency is part of our science based target to reduce our GHG emission intensity by 29% by 2030, based on 2015 levels. To meet this objective, we identified processes and equipment where the biggest reductions were possible by reviewing our energy management data information. Once identified, we conducted a business analysis to determine the key projects that could support our reduction initiatives. We then assessed the projects based on saving potentials, investment needs and return on investment calculations. Feasible projects are financed through a dedicated energy management budget, facility specific budgets and through subsidies / grants. We have also established a dedicated EcoFund budget of C$5 million annually for our emission and energy reduction activities as identified in the sustainability action plan.
Internal incentives/ recognition programs	Through our Employee Performance Scorecard, a percentage of the bonus structure is allocated to meeting corporate objectives, including our fuel efficiency objectives. These incentive contributions vary according to employee levels within the organization, and the extent to which the employee contributes to meeting objectives.

4. Communications

Climate Change and GHG Emission Performance

4.1
Information CN has published relating to our response to climate change and GHG emissions performance

Publication	Status	Page/section reference	Attach document	Comment
In mainstream reports (including an integrated report) but have not used the CDSB framework	Complete	Pages 14 to 15 / Embedding Sustainability section	Insert the PDF	2017 Investor Fact Book
In mainstream reports (including an integrated report) but have not used the CDSB framework	Complete	Page VI / Innovation is part of the Climate solution, page 50 / Management's Discussion & Analysis	Insert the PDF	2016 Annual Report
In Voluntary Communications (complete)	Complete	Page 1 of 1	Insert the PDF	GHG emissions performance report - http://www.cn.ca/en/delivering-responsibly/environment/emissions

Risks and Opportunities

Risks and Opportunities

5. Climate Change Risks

Climate Change – Regulatory Risks

Inherent climate change risks (current or future that have the potential to generate a substantive change in our business operations, revenue or expenditure include risks driven by changes in regulation, changes in physical climate parameters as well as those driven by changes in other climate-related developments.

5.1 - 5.1a
Risks driven by changes in regulations

ID	Risk driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
01-REG	Air pollution limits	**Locomotive Emission Standards** More stringent locomotive air emission standards can expose the company to compliance, technological and financial risks. For example, in the US, CN's locomotive emissions are regulated by the US Environmental Protection Agency (EPA), which sets emission standards for newly manufactured and re-manufactured off-road engines. In recent years, the EPA adopted even more stringent locomotive Tier 4 emission standards with an additional requirement that mandates the application of idle emission controls on newly manufactured and remanufactured engines. In Canada, the Memorandum of Understanding signed in 2013 between the Railway Association of Canada and Transport Canada sets sector-based GHG emission intensity reduction targets which were extended to the end of 2016. There are also proposed Canadian regulations, similar to the US EPA, related to emission standards for locomotives. The more stringent emission standards and GHG targets could expose CN to additional costs and affect the pace at which we acquire, retire and upgrade locomotives.	Increased operational cost Increased capital cost	3 to 6 years	Direct	Very likely	Medium-high	Non-compliance with locomotive emissions standards and sector specific GHG reduction targets could expose the Company to a loss of business in the event of locomotive shutdowns and could hamper possible revenue growth. In 2016, we did not experience any non-compliance issues resulting in locomotive shutdowns. The financial implications are minimal ($0 in 2016) and not being felt by CN given that we are pro-actively ensuring compliance of our fleet. In the future, we would expect similar impacts with similar business conditions.	To meet emission standards, we purchase tier-compliant engines as part of our strategy to acquire, retire and upgrade locomotives. For example, in 2016, we added another 90 new high-horsepower locomotives to our fleet. We have installed various fuel efficiency technologies on our current locomotive fleet, including CN's locomotive telemetry system, Trip Optimizer, and Automatic Engine Start / Stop devices. These advancements will enable us to meet our 2017 1.5% fuel efficiency improvement target, and our 29% science-based GHG emission intensity reduction target by 2030, based on 2015 levels.	The costs associated with the locomotive acquisitions, upgrades and fuel-efficient operations change annually. For example, in 2016, we spent C$550 million for equipment expenditures, including 90 new high-horsepower locomotives. In 2017, we have targeted C$200 million on equipment expenditures, as well as an additional C$100 million for 22 high-horsepower locomotives and other projects to support growth.

5. Climate Change Risks

Climate Change – Regulatory Risks (continued)

5.1 - 5.1a
Risks driven by changes in regulations

ID	Risk driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
02 -REG	Other regulatory drivers	**Climate Change Legislation** Climate change legislation impacts CN from both an operational cost and commodity mix perspective. It affects operating costs due to regulatory compliance requirements. It could also affect the markets for, or the volume of, the goods the Company carries thereby resulting in an adverse effect on operations, financial position, results of operation or liquidity. In Canada, in 2017 we are impacted by the Quebec and Ontario GHG Reporting and Verification requirements, and carbon taxes in British Columbia and Alberta. Looking forward, we expect similar carbon legislation from other Canadian provinces, to meet federal carbon price requirements. Specifically, in October 2016, the federal government announced its planned approach to pricing carbon emissions in Canada. Under the new plan, all Canadian jurisdictions will be required to have carbon pricing in place by 2018. The carbon price is expected to start at a minimum of $10 per tonne in 2018, and rise annually by $10 a year to reach $50 per tonne in 2022. Emission limits could further increase legal costs related to defending and resolving legal claims and other litigation related to climate change. In addition, it could affect certain commodities moved by CN, including its utility coal customers due to coal capacity being replaced with natural	Reduced revenue	3 to 6 years	Indirect	About as likely as not	Medium-high	From an operational perspective, we have estimated the cost impact of climate-related regulations to be approximately, C$24.5 million in 2016. This cost estimate includes: flow through costs from fuel distributers, carbon taxes, and cap and trade allowance purchases associated with the import fuel. From a commodity perspective, in the event that GHG regulations impacted CN's thermal coal customers, to the extent that all coal shipments ceased, it would reduce CN's rail freight revenues by approximately 3% which in 2016 was approximately C$338 million. In the future, we would expect a similar figure with similar business conditions.	From an operational perspective, a majority of our current carbon costs (B.C carbon tax) is flowed through to our customers. Within British Columbia, CN's current fee is C$0.04 per mile and C$5.65 per intermodal unit. In Alberta, the fee came into effect in January 2017. CN's carbon tax fee within Alberta is C$0.03 per mile shipped and C$2.75 per intermodal unit. From a commodity perspective, CN freight revenues are derived from the movement of a diversified and balanced portfolio of goods, including petroleum and chemicals, grain and fertilizers, coal, metals and minerals, forest products, intermodal and automotive. The commodity and geographic diversity better position the Company to face changing GHG regulations.To manage this risk we continue to maintain a diversified and balanced portfolio of goods. For example, in 2016, no individual commodity group accounted for more than 24% of total revenues. We also continued to grow our intermodal business, positioning the positive environmental benefits of long haul rail shipments for our customers. For example, since 2012, revenues from our intermodal business segment have increased by 26%, of which a percentage was due to modal shift from truck to rail. Our intermodal business has continued solid growth since 2005, and is the largest single business unit with 2016 revenues of approximately C$2.8 billion.	Responsibility for tracking, modelling and accounting for CN's carbon tax fees fall under CN's Sustainability, Finance and Sales & Marketing Departments. We have estimated the resource is approximately 25% of the 1 FTE annually, equivalent to C$30,000. There are no costs associated with maintaining a diversified and balanced portfolio. A balanced portfolio is a function of our franchise. Investments in the intermodal business are part of the overall 2016 C$2.75 billion spend on our capital program. For example, we are planning to build a C$250 million intermodal and logistics hub in Milton, Ontario, which will help us efficiently handle growing intermodal traffic.

Risks and Opportunities

5. Climate Change Risks

Climate Change – Physical Risks

5.1b
Risks driven by changes in physical climate parameters

ID	Risk driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
01-PHY	Change in temperature extremes	Extreme temperatures can present a risk to our network infrastructure. Rail misalignments and track buckling are possible from thermal rail expansions. In addition, extreme cold can result in track freezing, leading to greater frequencies of broken rails, frozen switches, and high rates of wheel replacements. Changes in temperature extremes could affect the operation of our network. For example, there have been cases when CN has had to shut down significant portions of the network for a period of time, exposing the Company to operational and financial risks. Temperature extremes can also expose CN to operational and financial risks from episodes of flooding, landslides in unstable mountainous regions, and mud slides. In addition, flooding from spring melt can be damaging to rail bed support structures and cause overflows onto tracks. Landslides and mud slides can be especially damaging to our rail tracks. Temperature extremes can also impact our sites and networks located within the US Tornado Belt, Midwest and New Orleans area, making us vulnerable to increases in tornado occurrences and intensity. In 2016, CN's network was exposed to heavy early rains through much of the U.S. Midwest and Gulf regions leading to flooding in some areas and forcing the closure of a bridge in Louisiana. In Western Canada, extremely dry conditions led to issues with wildfires, particularly in the Fort McMurray, AB area, forcing the closure of areas of track close to the fires.	Increased operational cost Increased capital cost	Up to 1 year	Direct	Virtually certain	High	The financial implications of extreme temperature conditions and changes in precipitation extremes vary depending on the degree of damage. In 2016, the financial impact of extreme weather events on our business was approximately C$30 million. These trends could continue into the next year, and result in similar capital expenditures.	**Extreme weather readiness plans** – Our summer and winter readiness plans include procedures for train speed, train length and weight, inspections, rail replacements, de-stressing, and fire-prevention and response. We also installed weather stations to monitor outside temperatures and humidity. **Emergency Response Planning Program** – Our emergency response planning procedures address extreme weather patterns, including hurricanes. This has resulted in the redesign of fuelling station locations as well as providing the necessary back-up IT systems. Our operating teams have ready access to a 24-hour Smartrad weather warning service. In addition, in 2016, our Bridges & Structures crews developed a portable fire suppression system to help protect timber bridges across our Network in high risk locations.	Year over year, CN expends considerable costs towards the maintenance of its infrastructure to protect the company assets from wear and tear that could be attributable to changes in climate. For example, in 2016, CN invested approximately C$1.6 billion into its track infrastructure. Between C$50-100 million of our operating expenditures are directed towards proactive inspections, maintenance, readiness plans, emergency response planning, and network infrastructure upgrades.

5. Climate Change Risks

Climate Change – Other Risks

5.1c
Risks driven by other climate-related developments

ID	Risk driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
01-OTH	Other drivers	CN is susceptible to the volatility of fuel prices due to changes in the economy or supply disruptions, which could result from climate-related events. Fuel shortages could be impacted by climate-related events, which could in turn result in rising fuel prices that could materially adversely affect CN's results of operations, financial position or liquidity. As such, CN has implemented a fuel surcharge program with a view to reducing the company's financial exposure to fuel price volatility.	Increased operational costs	1 to 3 years	Direct	About as likely as not	Medium-high	CN's reliance on fossil fuel could expose our customers to fuel price volatility and increases, adversely impacting business demand. Our fuel surcharge program quantifies these price increases. In 2016, due to the decrease in fuel price combined with weaker freight volumes, our fuel surcharge revenues decreased by C$316 million, which benefitted our customers.	Our fuel surcharge program has been implemented with a view to offsetting the impact of rising fuel prices. In addition to the fuel surcharge program, we are also committed to exploring renewable alternatives by supporting and monitoring research towards cleaner alternative energy sources, including natural gas, and bio-diesel fuels. For example, we are working with manufacturers to design and build the best possible Compressed Natural Gas (CNG) shunt tractors (instead of diesel) for our intermodal operations. We are targeting to add 10 new CNG shunt tractors by the end of Q3 2017.	The costs associated with monitoring the implementation of our fuel surcharge is part of the budget of our sales and marketing department, which is estimated to be approximately C$500,000. This includes resource time and communications with customers. The costs of investing in the newly redesigned CNG shunt tractors are part of our 2017 C$200 million equipment expenditure budget.

6. Climate Change Opportunities

Climate Change – Regulatory Opportunities

We have identified inherent climate change opportunities driven by changes in regulation (current or future) that have the potential to generate a substantive change in our business operation, revenue or expenditure due to changes in regulation, in physical climate parameters and changes in other climate-related developments.

6.1 - 6.1a
Opportunities driven by changes in regulation

ID	Opportunity driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
01-REG	Voluntary agreements	**Air Emission Limits** As part of our obligations under the US EPA locomotive emission standards, and in support of the Canadian Memorandum of Understanding on GHG reduction targets, opportunities exist to realize long-term carbon efficiencies and significant fuel savings through our locomotive fleet renewal strategy. Our strategy to acquire, retire and upgrade locomotives to meet compliance objectives will enable us to not only meet our compliance objectives but also drive even greater fuel and cost saving efficiencies across our business. These efforts combined with our Precision Railroading operating practices, have contributed to our leadership on fuel efficiency in the North American rail industry. For example, In 2016, we consumed approximately 15% less fuel per gross-ton-mile than the industry average.	Reduced operational cost	Up to 1 year	Direct	Virtually certain	Medium-high	By updating and acquiring new locomotives within our rail locomotive fleet, and through enhanced locomotive handling procedures, we achieved fuel savings of 2 % in 2016, representing approximately C$19 million of savings in fuel operating costs. Our target for 2017 is 1.5% improvement in fuel efficiency.	We continue to upgrade existing locomotives and acquire new locomotives enabling us to not only meet our compliance objectives but also benefit from even greater fuel efficiencies. For example, in 2016, we added 90 new high-horsepower locomotives to our fleet, and expect to take delivery of another 22 high-horsepower locomotives in 2017.	The costs associated with our locomotive renewal strategy differ annually. For example, in 2016 we spent C$550 million for equipment expenditures, which included our new high-horsepower locomotives. In 2017, we are targeting approximately C$200 million for equipment expenditures, as well as an additional C$100 million for 22 high-horsepower locomotives and other projects to support growth.

6. Climate Change Opportunities

Climate Change – Regulatory Opportunities (continued)

ID	Opportunity driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
02-REG	Cap and Trade Schemes	**Climate Change Legislation** For CN, the movement towards a carbon market in North America presents opportunities given the environmental benefits that rail offers for long haul shipments of freight over other modes of transport. CN has developed a carbon calculator that provides a method for customers to calculate the carbon emission reductions that occur from shifting baseline truck freight traffic to rail.	Increased demand for existing products/ services	Up to 1 year	Direct	Virtually certain	Medium-high	Modal shift provides an opportunity for CN to grow revenue within its intermodal business segment from customers looking for greater fuel efficiencies by shifting freight from truck to rail. For example, since 2012, revenues from our intermodal business segment have increased by 26%. Furthermore, in 2016, CN customers shipping commodities that could have moved by truck represented approximately 62% of revenue ton miles, which covers approximately 71% of our freight revenues. These shipments represent over 8 million tonnes of avoided emissions by shipping rail instead of truck. Over time, this number could continue to increase as we grow our market share from truck to rail freight.	We continued to invest in the growth of our intermodal business and engaged with existing and potential customers to position the positive environmental benefits of long haul rail shipments for our customers. For example, through our EcoConnexions Partnership program, CN customers pledge to work to reduce their carbon emissions and increase energy efficiency. This includes leveraging modal shift from truck to rail as a carbon emission reduction strategy. We also continue to engage with governments and our customers to position the environmental benefits of rail and promote government subsidies that encourage customers to switch freight from truck to rail.	Investments in the intermodal business are part of the overall 2016 C$2.75 billion spend on our capital program. For example, we are planning to build a C$250 million intermodal and logistics hub in Milton, Ontario, which will help us efficiently handle growing intermodal traffic. The costs associated with communicating with our customers, and exploring modal shift is included in the marketing and sustainability functional budgets. The costs associated with internal resource time, advertising, and consultants are estimated to be approximately C$500,000.

6. Climate Change Opportunities

Climate Change – Regulatory Opportunities (continued)

ID	Opportunity driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
03-REG	Indirect Exposure through customer and supplier requirements	**Customer and Supplier Requirements** There are growing pressures from our customers to manage the carbon impacts throughout their supply chain. Leading multinational and manufacturing companies are already setting environmental pre-selection criteria for their suppliers, which includes requirements to understand the carbon impact of the supply chain. Suppliers that can demonstrate an efficient carbon footprint of the supply chain are well positioned with their customers to maintain and grow existing business. For CN, we have seen increasing requests from our customers on transportation-related carbon footprints, including questions regarding our reduction targets and performance. These requirements are presenting an important opportunity for CN to enhance our reputation and gain market share by demonstrating to our customers and other stakeholders CN's low carbon rail freight transportation solution. We are also being asked to complete the CDP supply chain questionnaires on behalf of some of our larger customers.	Increased demand for existing products/ services	Up to 1 year	Direct	Very likely	Medium-high	The financial implication of exposure to customer requirements can vary depending on the level of direct engagement. For example, in 2016, customers interested in our sustainability practices represented more than C$1.1 billion of our revenues. These customers had directly requested information from us on our carbon footprint and management practices. Over time, this number could continue to increase as more of our customers demand low carbon freight options.	In order to optimize this opportunity we are proactively engaging with our customers to position the carbon benefits of our services. For example, in 2016, we continued to engage large customers on carbon-related impacts, including requests to complete the CDP supply chain questionnaire. We are also providing our customers with a web-based carbon calculator to measure the emissions from rail, marine and truck transportation; the first of its kind in the industry. In 2016, we had over 1600 requests for carbon emission calculations using our web calculator, an increase of 48% over the last 2 years. Our ongoing strategic partnerships and engagement with customers, as well as our own operational efficiency, has significantly improved our visibility and reputation as a leader in fuel efficiency with our customers.	The costs associated with communicating with our customers, and exploring opportunities to position CN's carbon efficient rail service is included in the marketing and sustainability functional budgets. The costs associated with internal resource time, advertising, and consultants are estimated to be approximately C$500,000.

6. Climate Change Opportunities

Climate Change – Regulatory Opportunities (continued)

ID	Opportunity driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
04-REG	Government policies supporting rail freight	**Favourable Government Policies** Opportunities exist from increasing government subsidies for technologies that support low carbon transportation and logistics services in their efforts to improve energy efficiency and lower GHGs. This has been the case for North American states and provinces, including Québec, Ontario, British Columbia, New Brunswick, Illinois, Minnesota, and Wisconsin. These types of government subsidies are presenting CN with important opportunities to accelerate fuel efficient rail and building technologies. For example, the Québec government PEET and PETMAF programs have enabled CN to further accelerate its uptake of fuel efficient rail technologies such as: CN's locomotive telemetry system, Trip Optimizer, and automatic engine start / stop devices. Furthermore the PREGTI program provides funding for businesses to build infrastructure to access rail and/or shift their transportation of goods from truck to rail.	Reduced operational cost	Up to 1 year	Direct	Virtually certain	Medium	Under the PEET and PETMAF programs, CN obtained subsidies that contributed to the acquisition of new locomotives and new fuel efficiency technologies. In 2016, CN achieved fuel efficiency savings of 2% representing approximately C$19 million of savings in fuel operating costs, which was in part due to the Quebec government PEET and PETMAF programs. Over time, this number could increase as we continue to gain efficiency from these newly acquired locomotives and fuel efficiency technologies, as well as the opportunity to benefit from other government incentives. Furthermore, we could increase our revenues from businesses that have received funding through the PREGTI program.	In order to maximize the opportunity, we are continuing to measure our fuel efficiency gains from the acquisition of new locomotives and fuel efficiency technologies, which was in part due to the Quebec government PEET and PETMAF program. We continue to monitor funding opportunities from other provincial and federal clean technology grant programs. Furthermore, we will be working with existing and potential customers who could benefit from the PREGTI program to position the environmental and economic benefits of our rail and intermodal services.	Over the past few years, (2012-2015) we have invested approximately C$12.4 million from the PEET and PETMAF program funding to acquire new locomotives and fuel efficiency technologies. In 2016, we continued to monitor performance on our efficiency gains and engage with government on various climate change agendas, including funding and subsidies. The cost associated with this opportunity is integrated into CN sustainability department budgets, which is estimated at C$250,000.

6. Climate Change Opportunities

Climate Change – Physical Opportunities

6.1b
Opportunities driven by changes in physical climate parameters

ID	Risk Driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
01-PHY	Other physical climate change opportunities	A warmer climate could lengthen growing seasons and increase the availability of agricultural crop production. These opportunities could be especially important within the prairie regions of Canada, lengthening growing seasons and increasing crop production in northern regions where suitable soils exist. Over the past several years, we continue to see growth within our grain business unit revenues.	Increased revenue	3 to 6 years	Direct	About as likely as not	Medium	Longer growing seasons and a warmer climate, in addition to improved crop yields, contribute to the increase in revenues we have seen in our grain business segment. For example, since 2012, revenues from our grain business segment have increased approximately 30%, of which a percentage was tied to longer growing seasons. In 2016, grain represented 14% of our total revenues. Over time, this number could continue to increase as we grow our market share from the grain business segment.	As crop yields increase, the grain and fertilizer supply chains need to adapt to ever-increasing demand for freight capacity to move product to market. CN works closely with customers to support their investment activities and develop win-win supply chain solutions that drive even greater efficiencies in the grain business segment. For example, CN is working closely with new and existing Canadian grain customers to develop efficient loop-track elevators allowing unit trains of 130+ cars to load in less than 24 hours. Combined with new terminals being built in Vancouver, this unique end-to-end design lowers cycle times and increases capacity.	The costs associated with collaborating with our customers to support their growth are included in our capital program budgets. In 2016, our capital program spend was C$2.75 billion, of which a proportion was allocated to supporting growth in the grain business segment.

6. Climate Change Opportunities

Climate Change – Other Opportunities

6.1c
Opportunities driven by changes in other climate-related developments

ID	Risk Driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
01-OTH	Reputation	Environmental responsibility, particularly carbon management, is becoming a top issue on corporate agendas as companies grapple with the complexities associated with creating meaningful eco-efficient operations. As a result, there are growing pressures to not only manage the impacts controlled by the company but also those it influences through the supply chain network. These pressures could present opportunities to enhance CN's reputation by demonstrating to our customers and other stakeholders the value of rail as a low carbon freight transportation solution. CN has already started to be affected by this opportunity, as more and more of our customers request information from us on the carbon footprint of their supply chain with respect to Scope 3 emissions from freight transportation. Through these requests, we have been able to capitalize on customer engagements to not only demonstrate the economic and environmental advantages of rail over other modes of transport, but also work together to explore the use of our GHG calculator and modal shift opportunities. These collaborations continue to build and enhance our reputation with our customers. We are also being recognized by various stakeholders, including rankings on the Dow Jones Sustainability Index, Corporate Knights 50 Best Corporate Citizens, and the Global Challenges Index.	Increased demand for existing products/ services	Up to 1 year	Direct	Virtually certain	Medium	The recognition we receive for our carbon management strategies positions the company positively with customers who have sustainability commitments and are interested in understanding how we can help them achieve their emission reduction goals. For example, in 2016, customers interested in our sustainability practices represented more than C$1.1 billion of our revenues. These customers had directly requested information from us on our carbon footprint and management practices. A similar figure would be expected with similar business conditions in the future.	In order to position our carbon efficient transportation services, we continue to actively engage with our stakeholders. For example, in 2016, we continued to engage with various customers on carbon-related impacts, including responses to specific customer requests to complete the CDP supply chain questionnaire. We are also providing our customers with a web GHG calculator to measure the GHGs from rail, marine and truck transportation; the first of its kind in the industry. In 2016, we had over 1600 requests for GHG emission calculations using our web calculator, an increase of 48% over the last 2 years. To better position our fuel efficiency and carbon management programs to a broad range of stakeholders, we have enhanced disclosures in our Annual Report, Sustainability Report, website, as well as through specific targeted investor questionnaires. In 2016, we continued to be recognized for our sustainability efforts. For example, we were listed on the Corporate Knights 50 Best Corporate Citizens, Jantzi Social Index, FTSE4Good Index, Global Challenges Index, and the Dow Jones Sustainability Index.	The cost associated with this opportunity is integrated into CN sustainability budgets, including internal resources, advertising, marketing, and external resources. The costs associated with this opportunity is estimated at $C250,000.

6. Climate Change Opportunities

Climate Change – Other Opportunities (continued)

6.1c
Opportunities driven by changes in other climate-related developments

ID	Risk Driver	Description	Potential impact	Time frame	Direct/ indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
02-OTH	Other - market opportuni-ties	With increasing pressure to reduce our reliance on non-renewable sources of energy, opportunities exist for CN to become the backbone of the clean economy by moving more sustainable energy sources. For example, our revenues in the forest products market segment could increase from demand for wood pellets as an energy source. Similarly, our revenues in the petroleum and chemical markets could increase from demand for biodiesel, and our revenues from the grain market could increase from demand for ethanol. Shipments of wind turbine parts are another potential source of revenue growth.	Increased demand for existing products/ services	> 6 years	Direct	About as likely as not	Medium	Moving more sustainable energy sources, as well as the equipment required to generate clean energy, has the potential to positively impact our revenues. For example, we noted that the conversion of European energy production from coal to more sustainable solutions such as wood pellets and wood chips, particularly in the U.K., is driving growth in the forest product segment. Since 2012, revenues from our forest products market segment have grown by 34%, of which a percentage is related to increased wood pellets demand. In 2016, forest products represented 15% of our total revenues. We are also seeing increasing demand for shipment of wind turbine parts and are expecting solid revenue growth in this market in 2017.	We are working closely with our customers to further develop these business opportunities. This includes pro-actively engaging with these customers to market the environmental benefits of shipping by rail.	The costs associated with communicating with our customers, and exploring opportunities to position CN`s service is included in the marketing and sustainability functional budgets. The total costs associated with internal resource time, advertising, and consultants are estimated to be approximately CND$ 500, 000.

Emissions

7. Emissions Methodology

Base Year

7.1
Base year and base-year emissions (Scopes 1 and 2)

Scope	Base year	Base-year emissions (metric tonnes CO_2e)
Scope 1	2015	5,368,257
Scope 2 (location-based)	2015	193,613
Scope 2 (market-based)	N/A	N/A

Methodology

7.2
Protocol used to calculate Scope 1 and 2 emissions

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

7.3
Source for global warming potentials used

Gas	Reference
CO_2	IPCC 2013 Fifth Assessment Report
CH_4	IPCC 2013 Fifth Assessment Report
N_20	IPCC 2013 Fifth Assessment Report
Electricity Canada	Environment Canada National Inventory Report (1990-2015)
Electricity USA	Energy Information Administration State Average CO_2 emission coefficients for Electric Utilities (eGrid2014)

7. Emissions Methodology

7.4
Emissions factors applied and their origin

Fuel/material/energy	Emission factor	Unit	Reference
Diesel (locomotive)	2959.2	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-12
Diesel (others)	2733.1	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-12
Propane	1544.3	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-3
Gasoline	2383.6	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-12
Furnace oil	3176.3	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-4
Stove oil	2761.4	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-4
Kerosene	2568.4	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-4
Natural gas (m^3)	1956.5	grams CO_2e per m^3	Environment Canada National Inventory Report 1990-2015, part 2, Table A6-1 and A6-2
Biodiesel	269.2	grams CO_2e per liter	Environment Canada National Inventory Report 1990-2015, Part 2, Table A6-12
Electricity Canada	Based on provincial emission factors	grams CO_2e per kwh	Environment Canada National Inventory Report - (1990-2015) - Annex 13, generation intensity
Electricity USA	Based on state emission factors	lbs CO_2e per MWh	Energy Information Administration State Average CO_2 emission coefficients for Electric Utilities (eGrid 2014)

8. Emissions Data

Boundary

8.1
Boundary used for Scope 1 and Scope 2 greenhouse gas inventory

Operational control

Scope 1 and 2 Emissions Data

8.2
2016 gross global Scope 1 emissions

5,064,024 metric tonnes CO_2e

8.3
Approach to reporting Scope 2 emissions

Scope 2, location-based	Scope 2, market-based	Comment
We are reporting a Scope 2, location-based figure	We have no operations where we are able to access electricity supplier emissions factors or residual emissions factors and are unable to report a Scope 2, market-based figure	

8.3a
2016 gross global Scope 2 emissions – location-based

188,843 metric tonnes CO_2e

8.4 - 8.4a
Sources (e.g., facilities, activities, geographies) of Scope 1 and Scope 2 emissions not included in this disclosure

None.

8. Emissions Data

Data Accuracy

8.5
Level of uncertainty of the total gross global Scope 1 and Scope 2 figures supplied and sources of uncertainty

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	Less than or equal to 2%	Metering/measurement constraints	We currently apply a combination of both generic mass balance and metering measurement methodology in the compilation of our locomotive fuel consumption data. A reconciliation between the fuel consumption data from our invoices and the fuel consumption data from mass balance and metering measurements revealed a 1.5% variance. The 1.5% variance is mostly a result of the fuel evaporation losses at the dispenser fuel tanks.
Scope 2 (location-based)	Less than or equal to 2%	Extrapolations Published emission factors	*Extrapolations made to estimate MWh* – At this time, most invoices from utilities that are uploaded into our SAP system provide costs only. This data includes administrative costs as well as consumption costs, which impacts the level of accuracy in our data. Furthermore, in order to calculate the MWh consumption numbers, we have applied generic cost per MWh factors, as provided by the Hydro Quebec Analysis and the US Energy Information Administration. Data uncertainty could exist where utility cost variances occur based on the time of use of electricity as opposed to the quantity of use of electricity. *Use of generic factors to calculate GHG emissions* – Conversions into GHG emissions are based on the generic GHG emission factors as provided through the Canadian GHG National Inventory and the US Environmental Protection Agency eGRID data and not the utility factors.

External Verification or Assurance

8.6
Verification/assurance status for our Scope 1 emissions

Third party verification or assurance process in place.

8.6a
Details of verification/assurance for Scope 1 emissions

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Annual	Complete	Limited	Done	7	ISAE 3410	87%

8.7
Verification/assurance status for our Scope 2 emissions

Third party verification or assurance complete.

8. Emissions Data

External Verification or Assurance (continued)

8.7a
Details of verification/assurance for Scope 2 emissions

Location-based or market-based figure	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Location-based	Annual	Complete	Limited	Done	7	ISAE 3410	100%

8.8
Data points verified as part of third party verification work other than reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Year-on-year change in emissions (Scope 1) Year-on-year change in emissions (Scope 2) Year-on-year change in emissions (Scope 3)	The year-over-year changes in our Scope 1, Scope 2 and Scope 3 emissions have been verified by a third party.

8.9 - 8.9a
Carbon dioxide emissions from the combustion of biologically sequestered carbon

57,578 tCO_2e

Emissions

9. Scope 1 Emissions Breakdown

9.1 - 9.1a
We have Scope 1 emission sources in Canada and the U.S.

Country/region	Scope 1 metric tonnes CO_2e
Canada	3,550,185
U.S.	1,513,839

9.2
Our total gross global Scope 1 emissions by activity

Activity	Scope 1 metric tonnes CO_2e
Locomotives	4,405,606
Intermodal trucks	140,804
Shipping vessel fleet	204,067
On Company Service fleet	86,273
Miscellaneous fuel consumption	194,465
Intermodal equipment	32,810

10. Scope 2 Emissions Breakdown

10.1 - 10.1a
We have Scope 2 emission sources in Canada and the U.S.

Country/region	Scope 2, location based (metric tonnes CO_2e)	Scope 2, market-based (metric tonnes CO_2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Canada	57,271	N/A	332,204	N/A
U.S.	131,571	N/A	224,517	N/A

Emissions

11. Energy

11.1
Percentage of total operational spend on energy

More than 15% but less than 20%.

11.2
Heat, steam and cooling consumed during reporting year

Energy type	MWh
Heat	0
Cooling	0
Steam	0

11.3
Amount of fuel in MWh consumed (for energy purposes) during the reporting year

18,809,291

11.3a
Fuel type breakdown

Fuels	MWh
Diesel (locomotives)	16,045,338
Diesel (others)	1,892,183
Propane	109,531
Gasoline	229,894
Furnace oil	3,526
Stove oil	1,674
Kerosene	988
Natural gas	527,157

Emissions

11. Energy

11.4 Electricity, heat, steam or cooling accounted at low-carbon emission factor in the market-based Scope 2 figure you provided in CC8.3a

Basis for applying a low-carbon emission factor	MWh associated with low-carbon electricity, heat, steam or cooling	Emissions factor (in units of metric tonnes CO_2e per MWh)	Comments
No purchases or generation of low carbon electricity, heat, steam or cooling accounted with a low carbon emissions factor	N/A		

11.5 Electricity produced and consumed

Total electricity consumed	Consumed electricity that is purchased	Total electricity produced	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
556,720	556,720	0	0	0	As a freight railway company, we do not produce electricity.

12. Emissions Performance

Emission History

12.1 and 12.1a
Gross global emissions (Scopes 1 and 2 combined) compared to the previous year and reasons for any change

Compared to the previous year, our gross global emissions have decreased.

Reason	Emission value (percentage)	Direction of change	Please explain and include calculation
Emission reduction activities	6%	Decreased	The carbon emissions from locomotives decreased due to continued implementation of projects in 2016 related to our rail locomotive emissions and energy efficiency strategy, which represent 84% of our greenhouse gas emissions. This includes new locomotive acquisitions, fuel management system enhancements, and the installation of new locomotive technologies such as Trip Optimizer and CN's locomotive telemetry system. In addition, we achieved emissions savings from energy efficiency projects implemented at our key yards. This includes lighting and HVAC upgrades, as well as upgrades to air compressors. We calculated a reduction of approximately 332,805 tCO_2e from emission reduction activities related to locomotive fuel efficiency and energy efficiency in our buildings and yards. Our total Scope 1 and Scope 2 emissions in 2015 were 5,561,870 (restated) and in 2016, were 5,252,867. Based on the carbon reductions, we calculated a 6% reduction in emissions (332,805 / 5,561,870) * 100 = 6.0% decrease.
Change in output	0.4%	Increased	CN experienced increases in emissions due to increased volumes for our Great Lakes Vessel fleet, as well as with our intermodal business unit including our CNTL truck fleet. We calculated an increase of approximately 23,801 tCO_2e from changes in output. Our total Scope 1 and Scope 2 emissions in 2015 were 5,561,870 (restated) and in 2016, were 5,252,867. Based on the changes in output, we calculated a 0.4% increase in emissions (23,801 / 5,561,870) * 100 = 0.4% increase.

Our calculations are based on a location-based Scope 2 figure.

12.2
Gross combined emissions in metric tonnes of CO_2e per unit currency of total revenue

Intensity figure	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.000436	Metric tonnes of CO_2e	12,037,000,000	Location-based	1.1%	Decrease	We reduced our emission intensity against revenue due to emission reduction activities relating to locomotive fuel efficiency as well as energy reduction projects at our key yards.

12.3
Additional intensity (normalized) metric appropriate to our business operations

Intensity figure	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
15.81	Metric tonnes of CO_2e	Other – tonne kilometres (millions)	332,241	Location-based	1.6%	Decrease	We reduced our emission intensity against tonne kilometres due to emission reduction activities relating to locomotive fuel efficiency as well as energy reduction projects at our key yards.

13. Emissions Trading

13.1 Participation in emission trading schemes

We do not participate in any emissions trading schemes and we do not currently anticipate doing so in the next two years.

13.2 Origination of projects based on carbon credits

We have not originated any projects based on carbon credits or purchased any within the reporting period.

14. Scope 3 Emissions

14.1
Sources of Scope 3 emissions

Sources of Scope 3 emissions	Evaluation status	Metric tonnes of CO_2e	Emissions calculation methodology	Percentage of emissions calculated using primary data	Explanation
Purchased goods and services	Relevant, calculated	403,568	Emissions for purchased goods were calculated using volumes of key purchased goods by type of material applied against applicable emission factors from the Greet 2016 and ICE 2.0 models. Emissions for purchased services were calculated following an environmental economic input-output methodology using data from the World Input Output database. Emission factors on a tCO_2e per $ basis were calculated by economic sector. The sector- appropriate emission factor was then applied against the 2016 expenditures for that sector to calculate total emissions.		
Capital goods	Relevant, calculated	750,274	Emissions for capital goods were calculated using volumes of key capital goods by type of material applied against applicable emission factors from the Greet 2016 and ICE 2.0 models.		
Fuel- and energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	1,461,421	Upstream emissions from the production of diesel fuel used to operate our locomotives were calculated using the GHGenius calculation tool.		
Upstream transportation and distribution	Relevant, calculated	32,865	Emissions were calculated following an environmental economic input-output methodology using data from the World Input Output database. Emission factors on a tCO_2e per $ basis were calculated by economic sector. The sector-appropriate emission factor was then applied against the 2016 expenditures for upstream transportation to calculate total emissions.		
Waste generated in operations	Relevant, calculated	58,927	Emissions were estimated using standard emission factor multiplied by activity level formulas. Tons of waste generated by disposal method for 2016 were obtained from internal data sources. Emission factors were obtained from various sources including Canada's National Inventory Report, 1990-2015, 2006 IPCC Guidelines for National Greenhouse Gas Inventories Metal Industry Emissions, and the Ecoinvent database V3.		
Business travel	Relevant, calculated	33,613	Compilation from corporate travel service providers		
Employee commuting	Not relevant	N/A	N/A		Employee travel to and from work using road transport. The scope 3 emissions are not considered significant when compared to other sources of scope 3 emissions such as fuel production.

14. Scope 3 Emissions

14.1
Sources of Scope 3 emissions
(continued)

Sources of Scope 3 emissions	Evaluation status	Metric tonnes of CO_2e	Emissions calculation methodology	Percentage of emissions calculated using primary data	Explanation
Upstream leased assets	Not relevant, but calculated	275	Emissions were calculated following an environmental economic input-output methodology using data from the World Input Output database. Emission factors on a tCO_2e per $ basis were calculated by economic sector. The emission factor for the applicable transport sector was then applied against the 2016 expenditures for that sector to calculate total emissions.		We lease rail cars and some rail equipment. These scope 3 emissions are not considered significant when compared to other sources of scope 3 emissions such as fuel production.
Investments	Not relevant	N/A	N/A		Investments of pensions are conducted through the pension committee. These scope 3 emissions are not considered significant when compared to fuel production.
Downstream transportation and distribution	Not relevant	N/A	N/A		As a transport and logistics company, we are part of the transportation supply chain. These scope 3 emissions are not considered significant when compared to other sources of scope 3 emissions such as fuel production.
Processing of sold products	Not relevant	N/A	N/A		As a transport and logistics company, we do not process a sold product.
Use of sold products	Not relevant	N/A	N/A		We do not process a sold product that is then used by third parties. We offer a transportation and logistics service.
End-of-life treatment of sold products	Not relevant	N/A	N/A		We do not process a sold product where the end of life treatment of sold products is relevant.
Downstream leased assets	Not relevant	N/A	N/A		We do not lease assets downstream.
Franchises	Not relevant	N/A	N/A		We do not own any franchises.
Other (upstream)					
Other (downstream)					

14. Scope 3 Emissions

14.2
Verification/assurance status for our Scope 3 emissions

Third-party verification or assurance complete.

14.2a
Details of verification/assurance for Scope 3 emissions

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual	Complete	Limited	Done	8	ISAE 3410	53%

14.3 and 14.3a
Scope 3 emissions compared to previous year

Sources of Scope 3 emissions	Reason for change	Emissions value percentage	Direction of change	Comments
Business travel	Emissions reduction activities	9.0	Decrease	In 2016 we continued to encourage employees to limit business travel, leveraging conference calls, WebEx meetings and video conferencing technologies to reduce emissions.
Fuel production	Emissions reduction activities	4.4	Decrease	In 2016, our emissions related to fuel production decreased as a result of increased locomotive fuel efficiency (less fuel consumed) as well as a decrease in business activities.

14.4 and 14.4a
Engagement with elements of our value chain on GHG emissions and climate change strategies

Suppliers

Method of engagement

We engage with our suppliers through one-on-one meetings, supplier forums, focused questionnaires and railway association forums, including the Railmarketplace Partners.

Strategy for prioritizing engagement

We prioritize our suppliers based on a diverse range of criteria, including single source suppliers, suppliers of a critical component, non-substitutable suppliers and the volume of spend on the supplier. These suppliers include equipment manufacturers, such as rail locomotives and technology suppliers, fuel service providers, transportation solution providers, as well as building efficiency technology suppliers.

Measures of success

We measure the number of suppliers engaged, and the business and environmental benefits that we have been able to achieve through these engagements, including promoting the use of more sustainable materials, reducing packaging and increasing recycling and reuse. Over the past few years, we have been working with a new service provider through an innovative waste reduction service agreement to enable us to better track our waste volumes, meet our waste from landfill diversion targets, and ultimately reduce our scope 3 GHG emissions.

Customers

Method of engagement

We engage with our customers through one on one meetings, customer surveys, customer forums and through our innovative EcoConnexions Partnership program.

Strategy for prioritizing engagement

We prioritize customers based on the following criteria:

- Customers that have placed formal requests to CN to communicate on our GHG emissions and carbon management strategies.
- Customers that are leading in sustainability initiatives to identify opportunities to communicate our carbon and energy management performance through one-on-one account meetings.
- Customers in our EcoConnexions Partnership Program, who are recognized for their sustainable business practices and, in particular, carbon efficiencies. In 2016, CN planted 100,000 trees in honour of 22 of its customers for their sustainable business practices.

Measures of success

We measure the number of customers reached, as well as the number of customers recognized through the EcoConnexions Partnership Program.

14. Scope 3 Emissions

14.4b
Suppliers with whom we are engaging and their proportion of our total spend.

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
Other: Quality, price, reliability, compliance and sustainable products	62	51%	Through our engagement with our critical suppliers, we continue to ensure our compliance requirements are met, including requirements related to environmental, social and governance issues. We also continue to collaborate with relevant suppliers to promote more sustainable products and services.

Sign Off

15. Sign Off

15.1
Sign off for our CDP report

Name	Job title	Corresponding job category
Luc Jobin	Chief Executive Officer	Chief Executive Officer (CEO)