



Report on Canadian National Railway Company (GHG) Statement

For the year ended December 31, 2017

Prepared in accordance with:

International Standard on Assurance Engagements 3410, Assurance Engagements on Greenhouse Gas Statements ('ISAE 3410')

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**SECTION I: Independent practitioner’s limited assurance report on
the emissions of the Canadian National Railway
Company’s Greenhouse Gas (GHG) statement**

To the Board of Directors and Management of Canadian National Railway Company

We have undertaken a limited assurance engagement of the accompanying GHG statement of Canadian National Railway Company (the “Company” or “CN”) for the year ended December 31, 2017, comprising the emissions inventory and the explanatory notes. This engagement was conducted by a multidisciplinary team including assurance practitioners, engineers and individuals with environmental experience.

Canadian National Railway Company’s Responsibility for the GHG Statement

Canadian National Railway Company is responsible for the preparation of the GHG statement in accordance with the Greenhouse Gas (GHG) Protocol and the Operational Control approach (the “Applicable Criteria”), applied as explained in the GHG statement. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation of a GHG statement that is free from material misstatement, whether due to fraud or error.

Inherent Uncertainty

GHG quantification is subject to inherent uncertainty because of incomplete scientific knowledge used to determine emissions factors and the values needed to combine emissions of different gases.

Our Independence and Quality Control

We have complied with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

The firm applies International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Our Responsibility

Our responsibility is to express a limited assurance conclusion on the GHG statement based on the procedures we have performed and the evidence we have obtained. We conducted our limited assurance engagement in accordance with International Standard on Assurance Engagements

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3410, *Assurance Engagements on Greenhouse Gas Statements* ('ISAE 3410'), issued by the International Auditing and Assurance Standards Board. That standard requires that we plan and perform this engagement to obtain limited assurance about whether the GHG statement is free from material misstatement.

A limited assurance engagement undertaken in accordance with ISAE 3410 involves assessing the suitability in the circumstances of Canadian National Railway Company's use of the Applicable Criteria as the basis for the preparation of the GHG statement, assessing the risks of material misstatement of the GHG statement whether due to fraud or error, responding to the assessed risks as necessary in the circumstances, and evaluating the overall presentation of the GHG statement. A limited assurance engagement is substantially less in scope than a reasonable assurance engagement in relation to both the risk assessment procedures, including an understanding of internal control, and the procedures performed in response to the assessed risks.

The procedures we performed were based on our professional judgment and included inquiries, observation of processes performed, inspection of documents, analytical procedures, evaluating the appropriateness of quantification methods and reporting policies, and agreeing or reconciling with underlying records.

Given the circumstances of the engagement, in performing the procedures listed above we:

- Through inquiries, obtained an understanding of CN's control environment and information systems relevant to emissions quantification and reporting, but did not evaluate the design of particular control activities, obtain evidence about their implementation or test their operating effectiveness.
- Evaluated whether CN's methods for developing estimates are appropriate and had been consistently applied. However, our procedures did not include testing the data on which the estimates are based or separately developing our own estimates against which to evaluate CN's estimates.
- Checked the mathematical accuracy of the calculation related to the GHG emissions variations on the comparative period January 1, 2016 to December 31, 2016 reported in the the verification statement. This did not imply any assurance procedures on GHG emissions for the period January 1, 2016 to December 31, 2016.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had we performed a reasonable assurance engagement. Accordingly, we do not express a reasonable assurance opinion about whether Canadian National Railway Company's GHG statement has been prepared, in all material respects, in accordance with the Applicable Criteria applied as explained in the GHG statement.

Limited Assurance Conclusion

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the emissions of Canadian National Railway Company's GHG statement for the year ended December 31, 2017 is not prepared, in all material respects, in accordance with the Applicable Criteria applied as explained in the GHG statement.



Restriction on use

This report, including the conclusion, has been prepared for the Board of Directors and Management of Canadian National Railway Company, to assist Management in reporting on the Company's performance and activities. We permit the disclosure of this report within the accompanying GHG statement for the year ended December 31, 2017, to enable Management to demonstrate that they have discharged their governance responsibilities by commissioning an independent assurance report on the selected information contained in the Report. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than Management of CN for our work or this report, save where terms are expressly agreed and with our prior consent in writing.

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PricewaterhouseCoopers LLP

June 15, 2018

Montréal (Quebec)

¹CPA auditor, CA, public accountancy permit No. A113424



SECTION II: GREENHOUSE GAS (GHG) STATEMENT

Introduction

Using an operational control approach, Canadian National Railway Company (hereafter 'CN') has determined its GHG emissions and energy consumption for the calendar year ended December 31, 2017 as outlined in the following table:

GHG inventory - January 1, 2017 to December 31, 2017			
Scope	GHG sources	GHG (tCO ₂ e)	Energy (MWh)
Scope 1	Diesel (locomotive) Fuel Consumption	4,865,352	17,754,169
Scope 2	Electricity	172,341	545,201
Scope 3	Diesel Fuel Production	1,618,431	
Scope 3	Purchased goods & services	474,130	
Scope 3	Capital goods	574,681	
Scope 3	Upstream transportation & distribution	13,913	

In addition, CN calculated the following year over year over year changes in emissions:

GHG inventory - Year over year changes				
Scope	GHG Sources	2017	Change vs previous	2016
		GHG (tCO ₂ e)	year	GHG (tCO ₂ e)
Scope 1	Diesel (locomotive) fuel consumption	4,865,352	10.4%	4,405,606
Scope 2	Electricity	172,341	-8.7%	188,843
Scope 3	Diesel fuel production	1,618,431	10.7%	1,461,421

Methodology and Assumptions

Scope 1

These emissions are calculated based on the actual volumes of diesel consumed in relation to locomotives as follows:

- Volumes of diesel fuel consumed (liters) in 2017 by CN were extracted from the fuel data in SAP.
- Emissions were calculated by multiplying these diesel fuel volumes by the diesel train emission factor (combustion) taken from the Environment Canada National Inventory Report (National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada, Part 2).
- The total emissions, in tonnes of CO₂ equivalent, were calculated by multiplying the masses of each gas (N₂O, CH₄ and CO₂) by its global warming potential (GWP) and summing the total. GWPs used are from the IPCC Fifth Assessment Report, 2013, excluding climate-carbon feedbacks (GWP of CO₂ = 1, GWP of CH₄ = 28 and GWP of N₂O = 265).
- Diesel fuel emissions were then adjusted to reflect the renewable fuel component based on Canadian and U.S. renewable fuel regulations. The renewable fuel component was estimated based on the best available information (fuel purchase volumes, locations of purchases, seasonality of biodiesel blending, etc.).

Scope 2 (emissions and energy consumption)

Scope 2 emissions are calculated based on the best estimate of the electricity consumption for all the CN sites and buildings and is determined as follows:

- SAP cost data was provided by Accounting covering electricity invoices across the CN network by specific address.
- The cost data was summarized by province or state based on the address.
- Invoice cost data was then converted to estimated energy consumption (MWh) using average electricity prices for the province or state. Canadian average prices by province were obtained from the Hydro Quebec comparison report - April 1, 2017, using the General Service (large power) 5,000 kW, 3,060,000 kWh, 25 kV rates. US average prices by state were obtained from the EIA electric power monthly report with data to November 2017, ytd Nov 2017 average price by state in US\$ (table 5.6b) - Industrial price.
- The energy consumption numbers by province or state were then converted to estimated CO₂e emissions using average emission factors for the province or state. Canadian emission factors were sourced from the National Inventory Report - (1990-2015 - part 3, Annex 13). U.S. emission factors were sourced from the eGrid2016 edition, state file - 2016 data.

Scope 3 (diesel fuel production)

These emissions are calculated based on the actual volumes of diesel fuel purchased in relation to locomotives as follows:

- CN's diesel fuel purchases were summed by region of purchase. A percentage by region was then derived based on the total diesel purchase volume.
- The GHGenius model (Version 4.03a) was used to calculate the life cycle GHG emissions for diesel purchased from various locations across Canada and the US.
- The model was run for each geographic region. A weighted average diesel production emission factor of 968.61 g CO₂e/L was calculated by multiplying the percent purchased in each region by the emission factor for each region. This production emission factor was multiplied by the total volume of diesel fuel consumed by CN in 2017.

Scope 3 (purchased goods and capital goods)

These emissions are calculated based on the actual quantities and weight of goods purchased:

- CN's key goods purchases were identified based on spend and value to the business. These include: locomotives, freight cars, containers, rail ties, ballast, and rail and other track materials.
- Quantities and weights of goods purchased by source location were calculated by summing supplier invoice data from SAP.
- Representative materials for each type of good were identified. Emissions factors for each material and source location were then applied to the corresponding total weight of goods purchased. Emissions factors applied were taken from various sources including: GREET 2017, ICE V2.0, Athena Sustainable Materials Institute, and studies on primary aluminum production in China (Han Hao, Yong Geng and Wen Hang), and railroad cross ties (Christopher Bolin and Stephen Smith).
- The split of Scope 3 emissions between capital goods and other goods purchased was derived based on 2017 capital vs operating expenses for CN vendors with spend greater than \$2 million.

Scope 3 (purchased services and upstream transportation and distribution)

Emissions from purchased services are quantified following a spend-based methodology as follows:

- 2017 spend by vendor was extracted from SAP for vendors with a spend greater than \$2 million to capture top areas of spend.
- From this extract, spend dollars for purchased services were categorized by industry sector which was then mapped to a relevant economic sector.
- Economic input-output emission factors were developed based on emissions and GDP per economic sector for Canada from the World Input Output database. GDP data was adjusted for inflation and converted to Canadian dollars.
- These emission factors were applied to the 2017 CN spend by economic sector to calculate the estimated CN scope 3 emissions from purchased services.
- Emissions from the "Inland transport" economic sector were separated from other purchased services into the "Upstream transportation and distribution" scope 3 category.

Locomotives diesel fuel energy consumption

The energy consumption in MWh related to diesel fuel consumed by CN's locomotives is calculated as follows:

- Volumes of diesel fuel consumed (liters) in 2017 by CN were extracted from the fuel data in SAP.
- The diesel energy conversion factor in TJ/Ml was taken from the Environment Canada National Inventory Report (National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada, Part 2, Table A4-2). This factor was converted into MWh/l by multiplying by 277.8 (International Energy Agency unit converter, <https://www.iea.org/statistics/resources/unitconverter/>).
- Energy consumption in MWh was calculated by multiplying the diesel fuel volumes in liters by the diesel energy conversion factor in MWh/l.
- Diesel fuel energy consumption was then adjusted to reflect the renewable fuel component based on Canadian and U.S. renewable fuel regulations. The renewable fuel component was estimated based on the best available information (fuel purchase volumes, locations of purchases, seasonality of biodiesel blending, etc.).

Year on year changes in emissions

The year on year changes in emissions are calculated as follows:

- The Scope 1 locomotive fuel emissions in 2016 were subtracted from the Scope 1 locomotive fuel emissions in 2017 to determine the year on year absolute difference. This number was then divided by the Scope 1 locomotive fuel emissions in 2016 to determine the year on year percent change in emissions.
- The Scope 2 electricity emissions in 2016 were subtracted from the Scope 2 electricity emissions in 2017 to determine the year on year absolute difference. This number was then divided by the Scope 2 electricity emissions in 2016 to determine the year on year percent change in emissions.
- The Scope 3 fuel production emissions in 2016 were subtracted from the Scope 3 fuel production emissions in 2017 to determine the year on year absolute difference. This number was then divided by the Scope 3 fuel production emissions in 2016 to determine the year on year percent change in emissions.

Chantale Despres, Director Sustainability

Signature:



Date:

15/06/2018