Railway Association of Canada | Association des chemins de fer du Canada

How railways can be part of Canada's climate change solution

A submission provided by the Railway Association of Canada

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Acronym Table

AMT	Agence métropolitaine de transport
CO_{2e}	CO_2 equivalent
COP	Conference of Parties
CDP	Carbon Disclosure Project
GHG	Greenhouse Gases
MOU	Memorandum of Understanding
Mt	Megatonnes
PEET	Programme d'efficacité énergétique dans le domaine du transport
PETMAF	Programe d'aide à l'améloration de l'efficacité du transport maritime, aérien et ferroviaire en matière de réduction ou d'évitement des émissions de gaz à effet de serre
PREGTI	Programme visant la réduction ou l'évitement des émissions de gaz à effet de serre par le développement du transport intermodal
RAC	Railway Association of Canada
RTK	Revenue Tonne Kilometer
TTCI	Transportation Technology Center Inc.
U.S.	United States

Please accept these comments on behalf of the Railway Association of Canada (RAC) and its members.

RAC represents freight and passenger railway companies that move 75 million people and more than $280 billion worth of goods in Canada each year. As the voice of Canada's railway industry, the RAC advocates on behalf of its members to ensure that the rail sector remains globally competitive, sustainable, and safe.

This submission underscores that the railway industry is well placed to support Canada's commitment to combat climate change and reduce transportation-related emissions. It recommends that:

- The pan-Canadian approach to addressing climate change should allocate $165 million (M) to support rail-infrastructure programs that incent modal shift and supports reoccurring emission reductions of approximately 1.2 Mt CO_{2e} per year or 5.8 Mt over five years;
- A $10 M research program is created for Canada's railway supplier and clean-tech community to enable access to the Transportation Technology Center located in Pueblo, Colorado; and
- Federal and provincial governments work together to develop a common framework for federally regulated railways, and develop modal shift protocols that can be linked across multiple jurisdictions.

Appendix A provides a list of RAC members in support of this submission.

1 Canada's railway sector

Canadian railways provide multiple services to more than 10,000 customers each year by using finite resources, including track infrastructure, right of ways, yards, locomotives, and crews. More than 4 M carloads of freight are moved by approximately 2,700 locomotives and 33,200 dedicated railroaders across 43,000 kilometers of track that spans nine provinces, one territory and several points throughout the continental United States (U.S.).

This impressive network consists largely of two Canadian owned and operated Class I railways, U.S. Class I carriers and more than 30 local and regional railways that intersect with multiple transportation service providers including ports, terminal operators, truckers and other logistics providers.

As part of this complex network, Canadian freight railways strive to operate as efficiently as possible by operating 24/7 and 365 days a year. This involves maximizing long-haul movements and train lengths, and consolidating traffic flow, as well as minimizing car handlings, switching and the number of times a car must be handled in a yard.

Passenger railways reflect services provided predominantly by VIA Rail, GO Transit, Agence métropolitaine de transport (AMT) and West Coast Express. Each year nearly 70 M people in the Vancouver, Greater Toronto, and Montreal areas commute to work by rail and an additional 5 million travel with VIA rail each year.

Figure 1: Canada's rail franchise

Management of this network results in immediate benefits for all customers who are served by it. These benefits include access to a highly efficient and safe railway network that enables economic competitiveness, and an emission friendly mode of transportation for travelling and commuting to work for all Canadians.

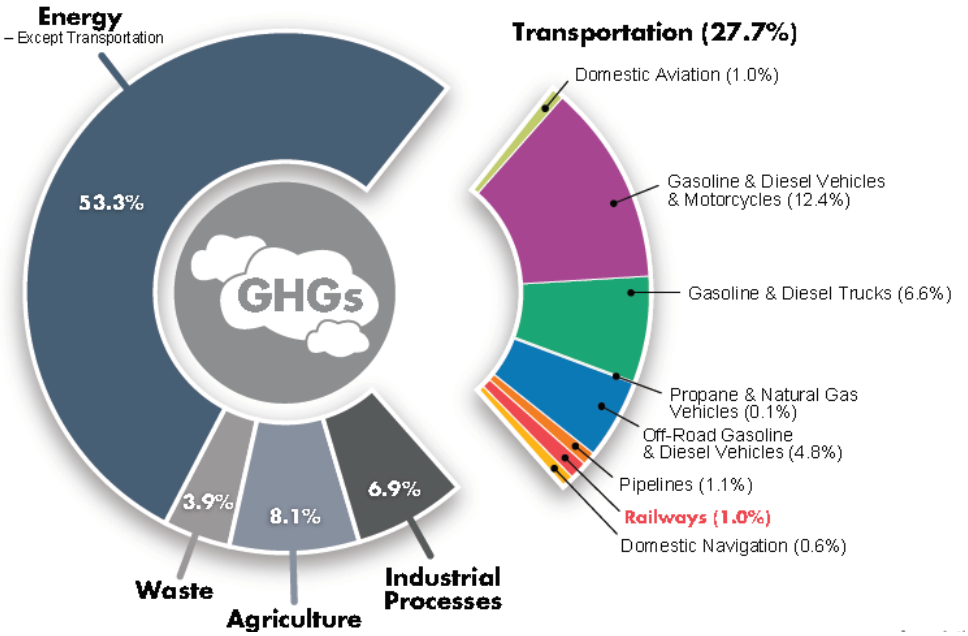
Climate change policy in the transportation sector

While Canada's engagement in COP 21 and commitment to the Paris Agreement underscores the federal government's intentions to play a more instrumental role in driving down emissions nationally and internationally, several regional climate change initiatives have emerged, and in doing so, have set a price on carbon that effects transportation carriers.

Whether through the taxation-based system in British Columbia, or the market-based cap and trade approach underway in Quebec and soon to be implemented in Ontario (January 2017), carbon pricing aspires to reduce emissions at the lowest possible cost to Canadians. Under all systems, a railway is subject to compliance costs as a fuel user, which typically translates into increased fuel costs for railways and their respective freight and passenger customers.

The rapid development of provincial initiatives has created two shortcomings that must be addressed in the context of developing a national vision for climate change that includes a comprehensive approach to reducing emissions produced by the transportation sector – which, as reflected in **Figure 2**, reflects approximately 30 per cent of Canada's GHG emissions[i].

Figure 2: Canada's emissions profile



First, the approach to managing transportation-related emissions through provincial initiatives has been fragmented and is not receptive to the operational aspects of interprovincial railways. The resulting effect is a requirement for interprovincial railways to participate in a series of regional initiatives that lack cohesion and have not been introduced in a coordinated way.

Second, market-based initiatives do not address all transported-related emissions within their jurisdictions, creating an uneven playing field for freight and passenger railways. For example, marine and air carriers are exempt from Quebec and Ontario's cap and trade systems.

Furthermore, while Quebec and Ontario's cap and trade systems allow (or in the case of Ontario, intend to allow) for carbon offsets, only sectors not covered by the cap (e.g. organic waste management, forest projects, etc.) are allowed to create carbon offsets[ii]. As a result, railways cannot generate offset credits for shippers who choose to transport their products by rail over other more intensive modes of transportation. The underlying effect is that modal shift becomes an implicit rather than explicit instrument for driving down transportation related emissions in Canada.

Additional information about the potential for modal shift to reduce emissions is presented in the subsequent section.

2 How railways can be part of Canada's climate change solution

The movement of goods and people by rail continues to be a highly efficient and GHG friendly mode of transportation. In Canada, rail can move one tonne of freight 215 kilometers on a single litre of fuel[iii]. Furthermore, a single freight train is capable of removing over 300 trucks from our congested road and highway network[iv,v].

An evaluation completed by the U.S. Federal Railroad Administration in 2009 took a deeper look at the fuel efficiency of rail and truck. The study examined 23 freight movements and took into consideration multiple distances and commodities that could be moved by truck and rail[vi]. For each movement, fuel consumption for each mode was estimated and circuity was taken into account. This evaluation concluded that rail was more fuel efficient than truck on all 23 movements and that fuel savings from using rail are significant.

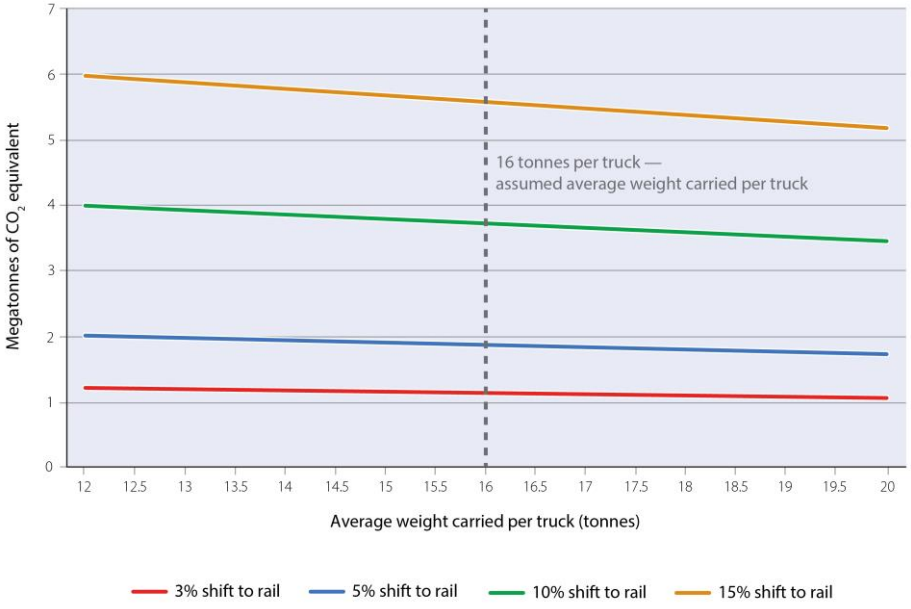
With respect to fuel savings, rail fuel efficiency varies from 156 to 512 ton-miles per gallon, while truck fuel efficiency ranges from 68 to 133 ton-miles per gallon[vii]. The rail-truck fuel efficiency ratios ranged from 1.9 to 5.5 for all movements (with circuity taken into account) and 0.8 to 8.5 (without circuity), with 3.7 and 3.9 as the respective averages[viii] . For movements involving intermodal, the rail-truck fuel efficiency ratio was 4.0. In other words, transportation by rail was found to be roughly 4 times more fuel efficient than truck.

Embracing modal shift as an option for reducing transportation-related GHGs

Climate change policy in Canada has yet to proactively embrace the potential for reducing GHGs from the increased use of rail. **Figure 3** highlights the potential GHG savings associated with shifting 3, 5 and 10 per cent of truck traffic in Canada to rail (detailed worksheets are available upon request).

The potential GHG savings for a 3, 5, and 10 per cent shift of truck traffic to rail are estimated to be 1.1, 1.9, or 3.7 Mts of CO_{2e}[1]. Additional benefits include reduced congestion and less wear and tear on the country's road and highway system. By comparison British Columbia's taxation system is estimated to could reduce emissions in 2020 by up to 3 Mts of CO_{2e} annually[ix].

Figure 3: Estimated emissions reductions associated with transferring truck traffic to rail



[1] Differs from the original submission filed with the Government of Canada on May 31, 2016. Updated in July 2016.

Similar opportunities exist for the movement of people where rail is generally 2.5 to 5 times more fuel efficient than a compact car or Sport Utility Vehicle[x].

Getting GHG reduction technology to market in the rail sector

Innovative approaches to reducing emissions are moving forward and signaling that emission performance in the rail sector will continue to improve. For example, the AMT's Deux Montagnes line is fully electric and the railway continues to assess opportunities to electrify segments of its network. Similarly Metrolinx launched the Transit Project Assessment Process in July 2015 to consult on its proposed approach for the electrification of the GO Rail Network[xi].

In the freight railway sector, the transition away from diesel-powered locomotives to alternative fuel sources such as liquefied natural gas (LNG) is also evolving, albeit at a slower pace. In Canada, CN was the first railway in North America to pioneer an LNG-powered locomotive as part of a pilot study from 2012 to 2013 that moved freight between Edmonton and Fort McMurray, Alberta[xii]. In the U.S., the Burlington Northern Santa Fe Railway has also piloted an LNG-locomotive[xiii]. However, long-refuel processes and higher than expected maintenance costs, as well as the recent drop in diesel fuel prices, have stalled the mainstream application of this technology in the railway sector[xiv].

Commodity mixes carried by railways are adjusting to new realities and the global demand for Canada's natural resources. The resulting effect is a transition away from traditional heavier commodities such as coal and metals, and towards lighter commodities such as container traffic. For example from 2005 to 2014, coal and metal car loadings have increased on average of 0.7 per cent per year, while intermodal traffic has increased by 2.1 per cent per year over the same period[xv]. In general, a lighter commodity portfolio requires more fuel per unit of workload[xvi].

While these items highlight that progress is being made, there are challenges and barriers that need to be overcome to ensure that railway emission performance remains positive in the long-term. These challenges will need to be addressed through collaborative arrangements between railways, governments, and the railway supplier and clean-tech communities to identify new solutions to reduce emissions even further.

Furthermore, new innovative and modern technologies require a clearer pathway to the Canadian railway marketplace. For example, Alstom Transport and Hydrogenics are seeking opportunities to pilot their hydrogen fuel cell locomotive in Canada, but are doing so in the absence of a state of the art pilot and testing facility.

Unlike the U.S. railway sector, Canada does not benefit from a facility dedicated to supporting the research and development of new emerging technologies to improve the safety and environmental performance of rail transportation.

Currently American railways and their respective suppliers benefit from the Transportation Technology Centre Inc. (TTCI) – a world class research facility located in Pueblo, Colorado and owned by the Federal Railroad Administration[xvii]. Since its inception in 1974, this facility has played a pivotal role in enhancing the environmental performance of U.S. railways by providing approximately 50 miles of test track to trial and test emerging technologies associated with infrastructure and track integrity, freight car design, and high speed testing. As a result, the U.S. clean-tech community has a clear pathway for designing, testing and piloting innovation and technology for the railway sector.

Canada's railway suppliers and clean-tech entrepreneurs would be best served by a government-sponsored research program that enables access to and leverages the expertise of TTCI.

3 Policy considerations for the future

Canada's economic future is deeply connected to its ability to export its resources and finished products to offshore markets. Yet when faced with identifying options for growing the economy within an increasing carbon-constrained world, policy makers are inevitably faced with the challenge of identifying transportation options that enable competitiveness and support climate change goals.

As a low-rate, efficient, safe and exceptionally fuel efficient mode of transportation, rail is well-placed to support Canada's economic objectives while meeting national and international targets for reducing emissions. Thus, the GHG advantage that rail maintains over other modes of transportation requires deep consideration from policy makers across all levels of government as they contemplate carbon management strategies within their jurisdictions.

Although carbon pricing aspires to reduce emissions at the lowest possible cost, questions remain as to whether it will lead to substantive emissions reductions in the transportation sector while the introductory price per tonne for carbon remains relatively low[xviii]. By comparison, **Figure 3** above highlights that modal shift of truck freight to rail offers a near-term solution to reducing GHG emissions while supporting economic prosperity. Other instruments such as road pricing and tolling also hold the potential to reducing congestion and GHGs in Canada's most densely populated cities, yet these items have yet to be included in any regional or national climate change strategy[xix].

Looking forward, policy makers should view rail as part of the climate change solution and consider the approach undertaken in Quebec. In this case, the Government of Quebec has recognized the significant GHG savings that rail can deliver and has assured that revenues generated from its cap and trade system are directed towards the Green Fund. These revenues are eventually directed into the rail sector.

The Green Fund supports the province's sustainable development and climate change objectives through policies implemented by the Minister of Sustainable Development, Environment and Parks and other key Ministries such as transport[xx]. In the case of transport, a portion of the Green Fund has been allocated to the Ministry of Transport, Sustainable Mobility and Transport Electrification to implement two programs: the program for the reduction or avoidance of greenhouse gas emissions through the development of intermodal transport (PREGTI, formerly PARAGES); and the program to improve the efficiency and emissions of maritime, air and rail transportation (PETMAF, formerly PEET)[xxi].

PREGTI aims to reduce GHGs freight transportation emissions by creating intermodal projects that promote the use of rail and marine transportation. Recent projects sponsored by the Government include investments into railway track, transload facilities and reload centres. From 2011 to 2015, $30.4 M was awarded to rail and intermodal infrastructure projects, resulting in reductions of approximately 210,000 tonnes of CO_{2e} per year. This works out to a cost per tonne reduction of $14 when considering a 10-year project period.

PREGTI has also provided funding opportunities for projects to commit to 5-year modal shifts in the absence of infrastructure investment – i.e. behavioural change modal shift. This program funding has been challenged by the short distances present in the province. In order for an individual shipper to have a modal shift project sufficiently large enough to justify the administrative expense of receiving funding, shipping distances for modal shift must be long, typically in the order of 1000 plus kilometers, or the price of carbon must be very high.

PETMAF strives to reduce GHGs generated from rail transportation (and other modes including marine and air) by facilitating improvements to railway locomotives and other assets to improve fuel efficiency and

emission performance. Over time, the program has provided funding to Class I and shortline freight railways to support emerging fuel efficient and emission reduction technologies.

Both programs demonstrate how revenues generated from carbon pricing programs can be invested into rail as a means to reducing transportation-related emissions.

Lastly, and with respect to the movement of people between Toronto, Ottawa and Montreal, our country is at a pivotal point in history. Presently 11 M people reside in this corridor where 80 per cent of trips continue to be made by car. VIA rail's dedicated track project proposal aims to reduce carbon emissions by 10.8 Mt of CO_{2e} (upon completion in 2050) which is equivalent to removing 2.4 M cars from the Canadian car pool.

4 Railway emissions management programs and performance

Canada's railway industry has a long history of working with the federal government to reduce emissions produced by locomotives. Since 1995, the industry has held a series of Memorandum of Understanding (MOU) with the Federal Minister of Transport that has provided the platform for identifying pragmatic solutions for reducing emissions intensity.

The sector is currently working through its third MOU which establishes voluntary GHG emission reduction targets from 2011 to 2016 for Class I freight, shortline, and intercity passenger railways[xxii]. All signatory railways report their GHG and criteria air contaminants performance annually, and performance reports are peer reviewed and available to the public from the RAC website.

Performance under the MOU agreements has been positive with railways demonstrating that investments in technology and more efficient operating practices are improving fuel economy and reducing emissions. Investments in new Tier-locomotives, anti-idling devices, and trip-optimization software have reduced emissions, while innovative operational practices such as distributed power and the use of longer, heavier trains have helped achieve optimal results.

Table 1 includes a list of common technologies and management strategies used by railways to reduce their emissions.

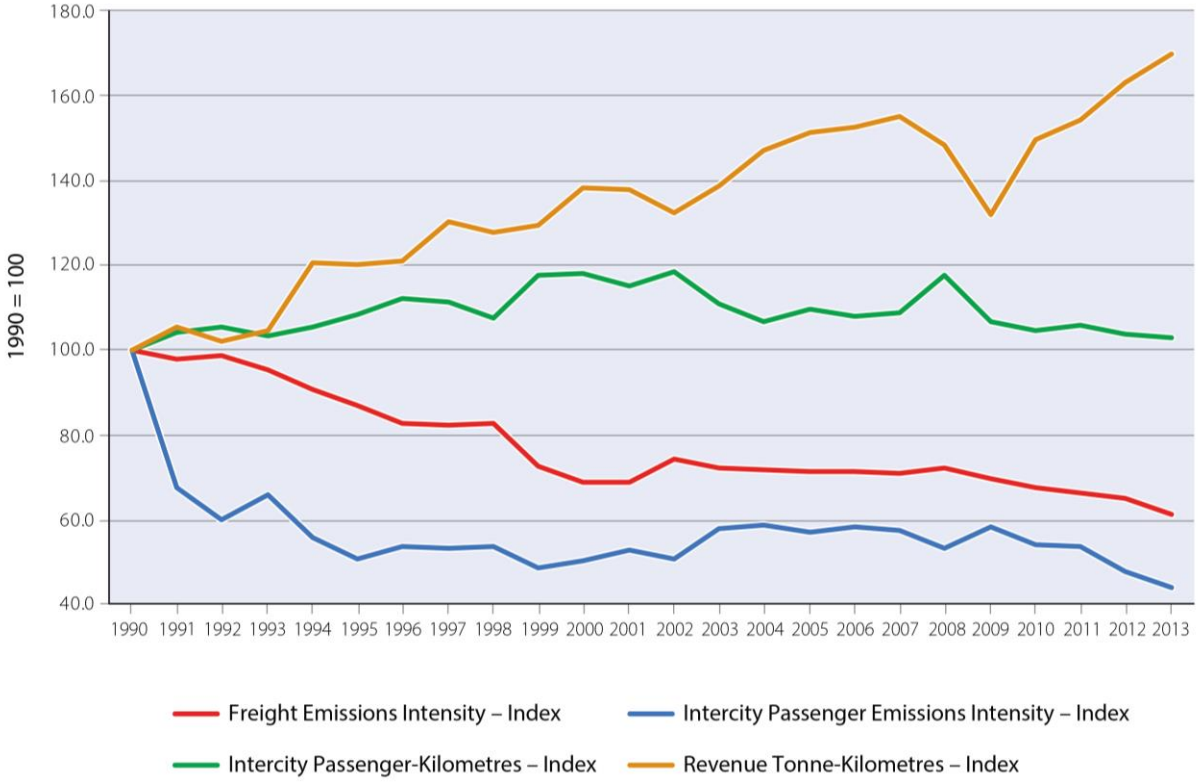
Table 1: Technologies and management strategies used by railways to reduce emissions

Longer Trains	Use of Ultra-Low Sulphur Diesel Fuel
Dynamic Brakes	Engine Retrofits
Anti-Idling Devices	Distributed Power
Rail Lubrication	Trip Optimizer Technology/Driver assistance programs
Top-of-Rail Friction Control	Yard Optimization Practices

Figure 4 highlights that freight railways have reduced their GHG intensity (kg of CO_{2e} per 1,000 revenue tonne-kilometer) by nearly 40 per cent since 1990, while experiencing an 83.4 per cent increase in revenue-tonne-kilometers[xxiii]. Similarly intercity passenger railway emissions (kg of CO_{2e} per passenger-kilometer) have decreased by approximately 56 per cent while ridership has decreased by 2 per cent over the same period[xxiv].

However, since 2002, the exceptional growth of the commuter railway industry in Vancouver, Toronto and Montreal areas, and the need to offer commuter trains at non-peak times, has led to an increase of emissions (kg of CO_{2e} per passenger) of approximately 9 per cent, while traffic has increased by 43.3 per cent. Regardless, the growth of the commuter railway industry in Canada is a success story highlighting that millions of people are choosing to leave their cars at home and travel by train to work every day.

Figure 4: GHG Emissions Intensity for Canadian Railways – 1990-2013



In addition to their participation under the MOU, the RAC and its Class I freight railway members have been engaged in the U.S.-Canada Regulatory Cooperation Council initiative since its inception. Under this initiative, the rail industry works directly with representatives from Transport Canada and the U.S. Environmental Protection Agency to identify opportunities to align greenhouse gas protocols and coordination on air pollutant regulations for locomotives in Canada and the U.S.

Lastly, CN and CP are also active participants in the internationally recognized Carbon Disclosure Project (CDP). Created in the United Kingdom in 2000, the CDP encourages greater transparency about GHGs produced by corporations, as well as disclosure of a company's climate change strategy and targets to reduce GHGs. The CDP holds the largest collection of self-reported climate change data in the world with nearly 2,000 businesses reporting climate change data to the organization in 2014.

In 2015, both CN and CP were awarded positions on the Canada Climate Disclosure Leadership Index in recognition of their efforts to disclose high quality carbon emissions and energy data to the CDP's climate change program[xxv].

5 Our recommendations

The railway sector hopes that the pan-Canadian Framework for climate change and clean growth will view rail as an important tool for driving down transportation-related emissions and transitioning towards a low-carbon economy. Below is a series of recommendations for policy makers to consider.

Modal shift is a mitigation opportunity for Canada

This submission highlights how the increased use of rail can reduce emissions in Canada. The estimated benefits are significant, and if just 10 per cent of truck traffic was transferred to rail, Canada would reduce its emissions by 3.7 Mts.

Similar opportunities exist for the movement of people, where rail continues to maintain an emission advantage over the personal automobile.

Revenues collected from carbon pricing strategies should be reinvested into rail

The development of the pan-Canadian framework provides an opportunity to reconsider how transportation emissions are regulated and what governments can do with revenues collected from their respective carbon pricing strategies.

RAC and its members recommend that governments direct the revenues collected from carbon pricing programs to rail - just like the Government of Quebec has done in shaping its Green Fund.

RAC is asking for an investment of $165 M over five years to support new rail and intermodal infrastructure projects across Canada. We propose that this program should be based on the PAREGES/PREGTI program adopted in Quebec and made available to as many provinces as possible.

As previously stated, approximately $30.4 M was spent to achieve a reduction of 210,000 tonnes of CO_{2e} per year, or 1.05 Mt over a five year period. We propose to replicate this model fully in British Columbia, Alberta and Ontario, and reduce it by 50 per cent in Saskatchewan, Manitoba and the Maritimes.

Table 2: Proposed modal shift reinvestment program

Jurisdiction	Funding	Estimated CO_{2e} reductions over 5 years
QC, BC, ALB, ON	$120 M ($30 M each)	4.2 Mt
SK, MN, Maritimes	$45M ($15 M each)	1.6 Mt
Total	**$165 M**	**5.8 Mt**

A program of this size would support modal shift and reduce transportation-related emissions by approximately 5.8 Mt of CO_{2e} over five years.

With respect to incenting modal shift without an infrastructure investment, RAC is asking that a federal program be implemented to award shippers for their efforts to transport their products by rail. Previous attempts (i.e. in British Columbia and Alberta) to implement modal shift protocols have fallen short due to the limited availability of track within provincial jurisdictions. A federal program that links provincial modal shift protocols, or creates a separate federal GHG-reduction based incentive, will help realize the lowest cost of reduction achievable by modal shift (as mentioned above, short distances will require higher

carbon prices to cover administrative costs). This program could be initiated at Canada's average carbon price.

In addition to this program, governments should consider providing support to railways, specifically shortline railways, with the resources to ensure that their locomotives are equipped with the best available fuel-efficient and low emitting technologies. Again, we recommend that the PETMAF program adopted in Quebec provides the basis for this program's design.

RAC argues that the approach to managing transportation-related emissions in Canada has been fragmented and devoid of a national vision for reducing carbon within the sector. Looking forward, policy makers should recognize the extensive reach of the Canadian railway network and strive towards harmonizing and creating jurisdictional linkages to address the emissions produced by interprovincial railways. RAC recommends that the Minister consider developing a definition for federally regulated railways that should comply and report directly to the federal government.

The Government needs to support clean technology and innovation in the rail sector

This submission highlights several areas where government can work directly with railways, suppliers, and Canada's vibrant clean-tech community to proactively identify solutions to some of the challenges and barriers to reducing emissions in the railway sector.

The RAC recommends that the Government creates a dedicated funding program of $10 M over five years for the country's railway supplier and clean-tech community to leverage the capacity of the Transportation Technology Centre Inc. (TTCI) in Pueblo, Colorado. This program would help alleviate barriers to entry to the Canadian marketplace.

6 Concluding remarks

This submission puts forward a number of concepts to be considered in the design and eventual implementation of a pan-Canadian framework for reducing emissions and addressing climate change. As a critical component to growing the economy, and with a long-standing commitment to reducing emissions, Canada's railway industry can deliver prosperity while becoming part of the country's climate change solution.

If you have any questions or comments, please contact Michael Gullo, Director Policy, Economic and Environmental Affairs for the Railway Association of Canada at 613 564 8103 or mgullo@railcan.ca.

Appendix A: List of RAC Members

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Agence métropolitaine de transport
Alberta Prairie Railway Excursions
Amtrak
ArcelorMittal Infrastructure Canada s.e.n.c.
Barrie-Collingwood Railway
Battle River Railway, NGC Inc.
BCR Properties Ltd.
Big Sky Rail Corp
BNSF Railway Company
Boundary Trail Railway Co.
Cape Breton & Central Nova Scotia Railway
Capital Railway
Carlton Trail Railway
Central Maine & Québec Railway Canada Inc.
Central Manitoba Railway Inc.
CN
Compagnie du Chemin de Fer Lanaudière inc.
CP
CSX Transportation Inc.
Eastern Maine Railway Company
Essex Terminal Railway Company
Goderich-Exeter Railway Company Limited
Great Canadian Railtour Company Ltd.
Great Sandhills Railway Ltd.
Great Western Railway Ltd.
Hudson Bay Railway
Huron Central Railway Inc.
Keewatin Railway Company
Kettle Falls International Railway, LLC
Knob Lake and Timmins Railway
Last Mountain Railway
Metrolinx
New Brunswick Southern Railway Company Limited
Nipissing Central Railway Company
Norfolk Southern Railway
Ontario Northland Transportation Commission
Ontario Southland Railway Inc.
Orangeville Brampton Railway
Ottawa Valley Railway
Prairie Dog Central Railway - Vintage Locomotive Society Inc.
Québec Gatineau Railway Inc.
Québec North Shore and Labrador Railway Company Inc.
Roberval and Saguenay Railway Company, The
Romaine River Railway Company
Société du chemin de fer de la Gaspésie
South Simcoe Railway
Southern Ontario Railway
Southern Railway of British Columbia Ltd.
St. Lawrence & Atlantic Railroad (Québec) Inc.
Stewart Southern Railway
Sydney Coal Railway
Toronto Terminals Railway Company Limited, The
Train Touristique de Charlevoix Inc.
Trillium Railway Co. Ltd.
Tshiuetin Rail Transportation Inc.
VIA Rail Canada Inc.
West Coast Express Ltd.
White Pass and Yukon Route Railroad

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