

The Pipeline vs. Rail Team

***Summary presentation of scientific and
socio-political perspectives submitted in
the 2018 Dragon's Den Competition***

****Not peer-reviewed and not intended for public distribution or citation****



The ReDeveLoP Challenge
Calgary, Alberta
Apr.30 – May 4, 2018



PIPELINE VS RAIL

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Outline

- Framing the problem
- Cost to the Society
- Indigenous participation
- Concluding Remarks and Acknowledgements

May 1, 2018

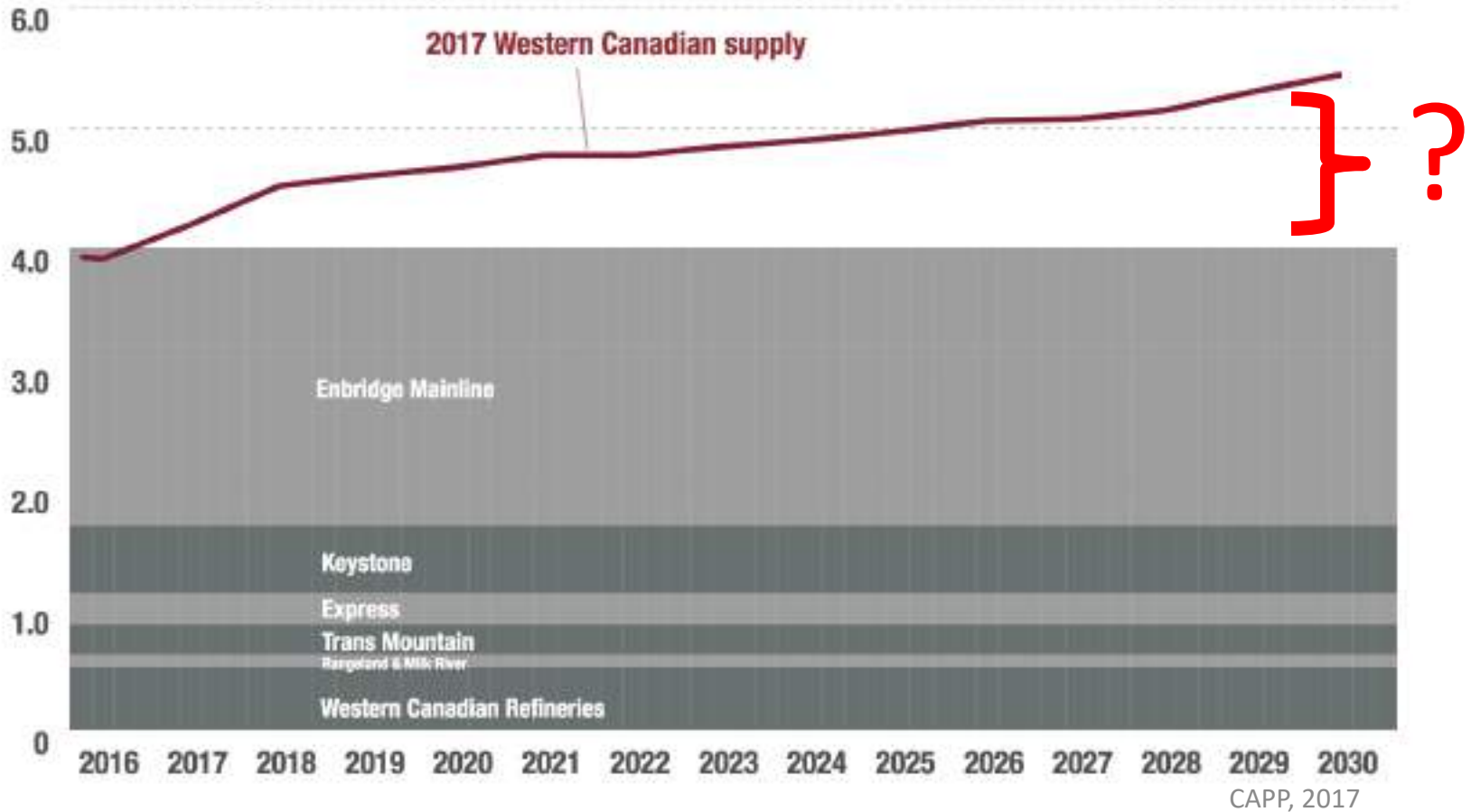
Pipeline vs Rail



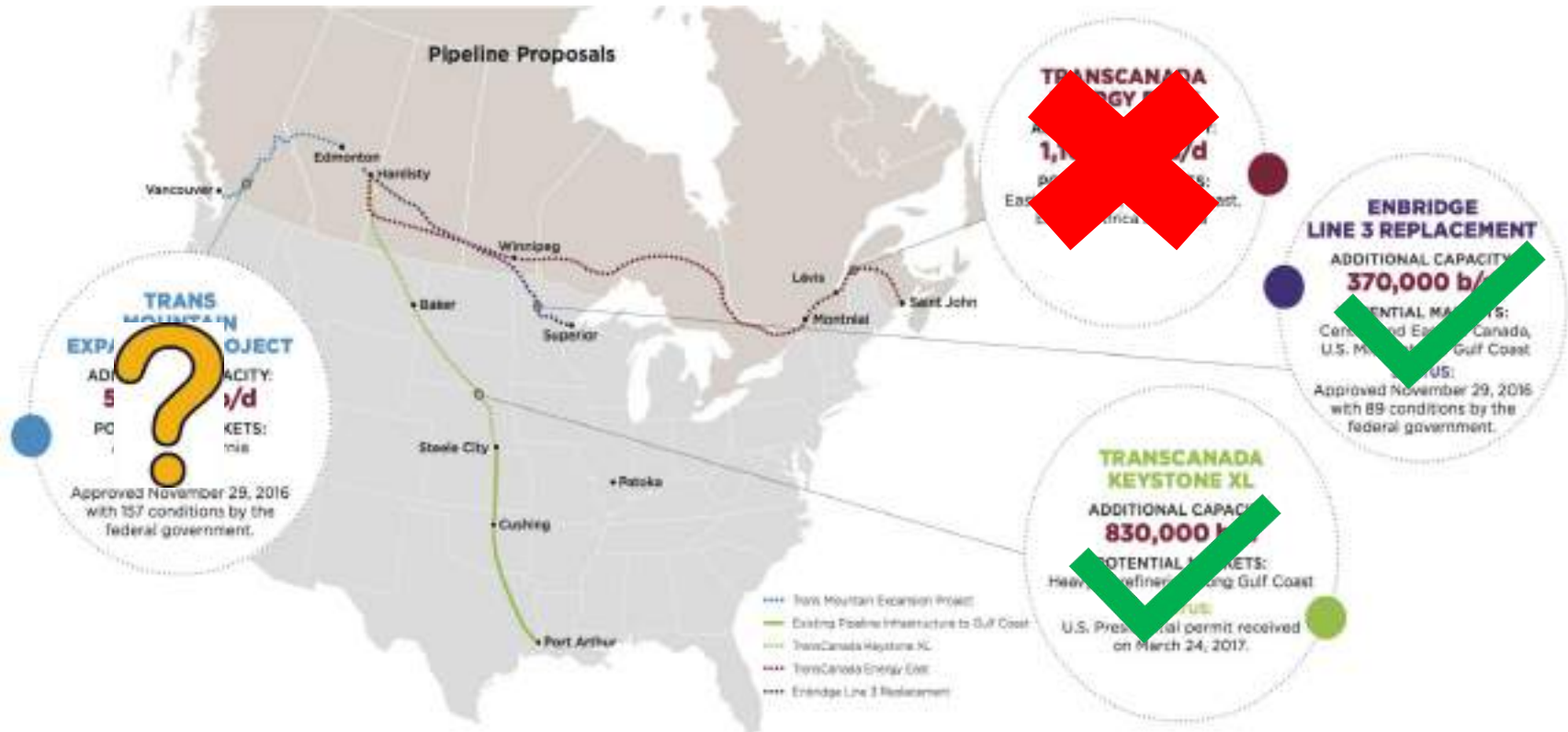
FRAMING THE PROBLEM

EXISTING TAKEAWAY CAPACITY FROM WESTERN CANADA VS. SUPPLY FORECAST

million barrels per day



Major Pipeline Proposals



Modified from CAPP, 2017

INTRODUCTION

Purpose of our research:

1. Estimate the costs of air pollution, greenhouse gases, and spill and accident costs associated with the long-distance movement of petroleum products
2. Explore new approaches to governance with respect to our Indigenous communities and their relationship with the oil and gas industry

Rail and Pipeline Safety Data

RAIL

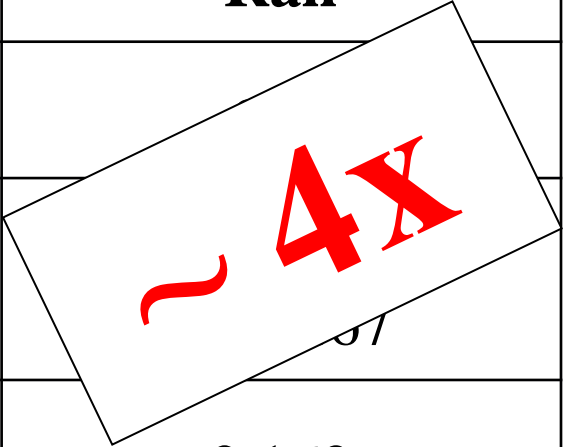
- What we needed:
 - Crude oil shipped by rail
 - Spills and Accidents
- What we received from Transport Canada:
 - Addendum 2016
 - Number of occurrences

PIPELINE

- What we needed:
 - Crude oil shipped by pipeline
 - Spills and Accidents
- What we downloaded from NEB:
 - Number and description of occurrences

Pipeline vs Rail (Safety)

Years 2008-2016	Pipeline	Rail
Occurrences	590	
Petroleum products transported (Mboe)	15,980	
Occurrences per Mboe	0.037	0.162



Cost to society

Pipeline

Greenhouse gases
generated at the power plants

Greenhouse
Gases

Rail

Greenhouse gases
generated by the locomotive

Air Pollution

Air pollution is gene-
rated at the power plants

Air Pollution is
generated by the locomotive

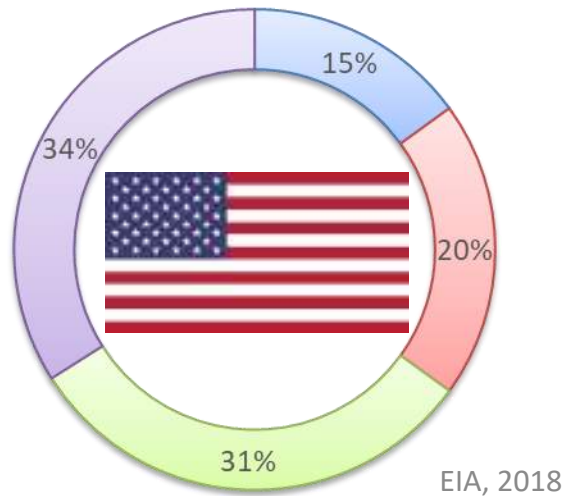
Spills and
Accidents

HCA vs non-HCA cost
estimates from Econometrica,
2015. Applied to Canada.

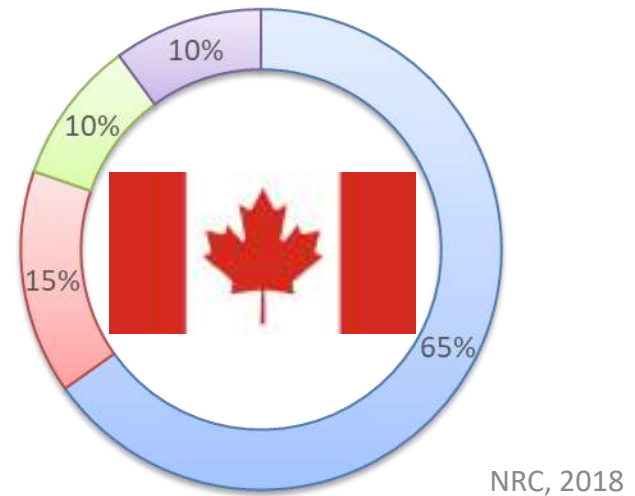
PHMSA (2015)
presents a range of social costs
converted into barrel mile

Electricity Generation

Electricity Generation by Source
(2016)



Electricity Generation by Source
(2015)



■ Renewables ■ Nuclear ■ Coal ■ Natural Gas and Oil

■ Renewables ■ Nuclear ■ Coal ■ Natural Gas and Oil

Cost to Society

Type of cost	Pipeline (million-barrel miles, CAD)	Rail (million-barrel miles, CAD)
Greenhouse Gases	\$100	\$201
Air Pollution	\$347	\$564
Spills and Accidents	\$64	\$484
Total cost to society	\$510	\$1,248

POLICY CONTEXT

Canada is struggling to reconcile Indigenous concerns while keeping pace with oil development

- Legal challenges (the duty to consult)
- Environmental and health protection
- Desire for more decision-making power

As a result, Indigenous peoples have traditionally played a minimal role in the energy sector

BUT THIS IS CHANGING...

Over the past two decades, Indigenous participation in Canada's energy sector has been increasing:

- Collaborative agreements with industry
- Equity-buy in to large projects



Source: Calgary Herald, 2017

Result: long-term partnerships that can sustain substantial revenue streams for Indigenous communities and unlock Canada's oil development potential

CHALLENGES TO INDIGENOUS PARTICIPATION

- Minimal economic income supports:
 - Lack of access to capital funding to support business development
 - Lack of equity or debt financing options
- Lower education rates, high unemployment



ABORIGINAL FINANCIAL INSTITUTIONS

Purpose: to provide developmental lending and business financing and support services to Indigenous peoples:

BUSINESS LOANS

FINANCIAL AND MANAGEMENT
CONSULTING

BUSINESS START-UP SUPPORT



Source: NACCA

AFI'S ARE LACKING NECESSARY CAPITAL

Markets are diversifying

Indigenous businesses are growing



Limited ability for AFI's and the FNFA to finance growing demand for loan applications and business support

POLICY RECOMMENDATION

#1



**FINANCIAL SUPPORT TO INDIGENOUS BUSINESSES
OR COMMUNITIES PARTICIPATING IN RESOURCE
DEVELOPMENT**



RECOMMENDATION #1(A):

Federal loan guarantees for large-scale infrastructure projects

- Facilitate **equity participation** in resource projects
- Provides **assurance** to lenders
- Obtain **lower interest rates**
- Generate **revenue streams** to be reinvested back into their communities

RECOMMENDATION #1(B):

Strengthen the capacity of Aboriginal Financial Institutions to support small-scale business development

- Locating sources of funding is the largest challenge to Indigenous entrepreneurs (CCAB, 2016)
- Expand federal investments into AFI's
- Bring awareness
- Support early-stage and long-term business development

POLICY RECOMMENDATION

#2

**EXPECTED GROWTH IN OIL SANDS
DEVELOPMENT MAY INCREASE THE LEVEL OF
ENVIRONMENTAL RISK TO INDIGENOUS
REGIONS**

RECOMMENDATION #2:

Educational support for environmental monitoring and management training

- Implementation of a **certified** modular based program
- Provide **technical skills** required for **equal** employment and business opportunities
- Current programs **lack funding** for multiple trainees per community
- Beneficial to industry: access to **local knowledge**, services, and labour force

CONCLUDING REMARKS

To keep pace with the rising supply of oil in Western Canada, we must minimize the impacts of resource transportation to society and maximize societal benefits:

- Develop export capacity to tidewater
 - Establish a coordinated and collaborative approach between the government and Indigenous groups

ACKNOWLEDGEMENTS

Dr. Jennifer Winter
Dr. Maurice Dusseault
Mike Johnson – NEB
Kevin Olson – Fluor
James Auld – CN Rail
Dale Swampy – Swampy Consulting
Matt Vickers – G7G
Jonathan Rose – Transport Canada
Dr. Martin Mintchev
Thiago Valentin de Oliveira
NSERC CREATE



QUESTIONS?

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REGULATORY COMPARISON

Pipeline

Rail



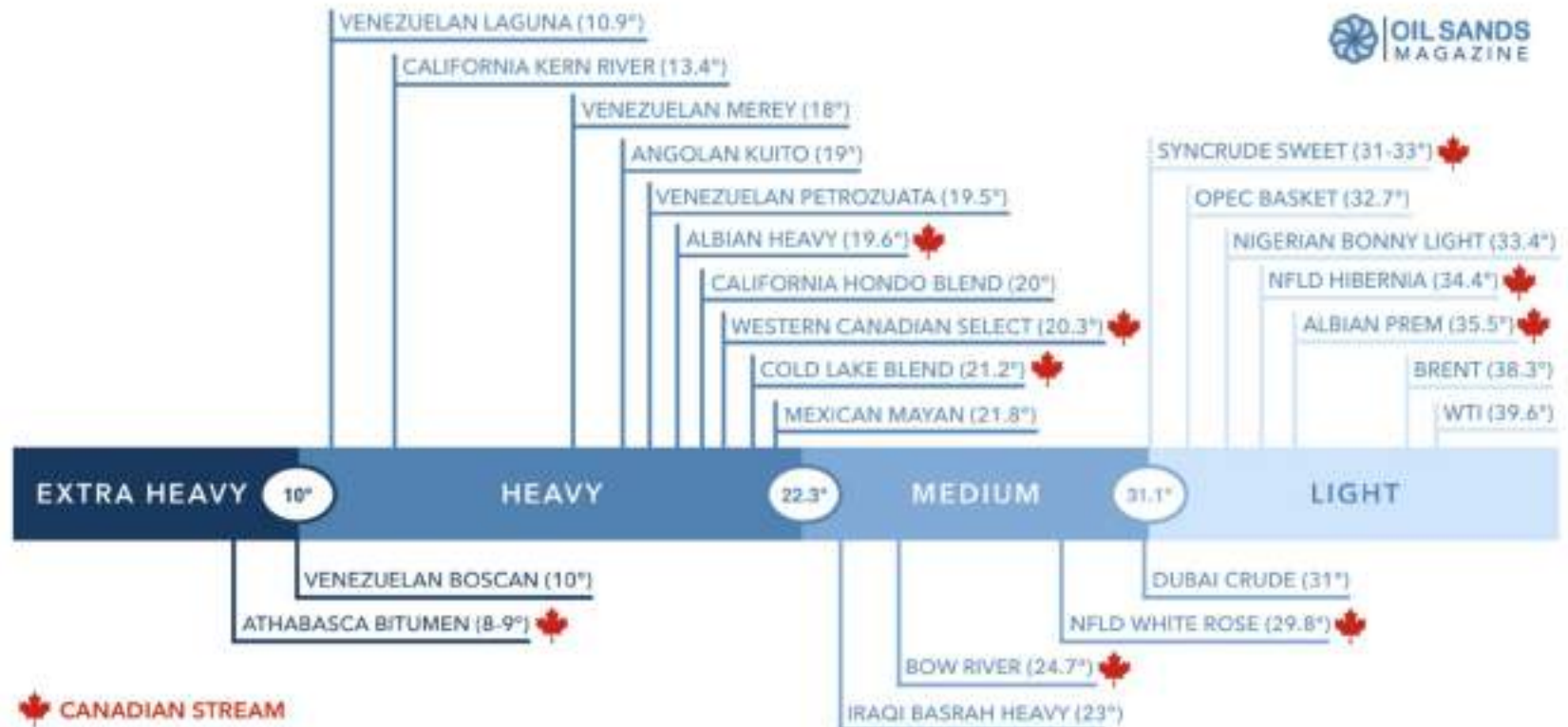
EXAMPLES IN ONTARIO

Aboriginal Loan Guarantee Program (2009):

- In 2015, Ontario leveraged nearly \$200 million in approved loan guarantees since inception (McMillan)
- Supported investments of 11 communities, representing more than 16,000 First Nations peoples
 - Alderville First Nations: obtained a FIT contract with Ontario for a solar farm - representing \$56 million equity over 20 years (McMillan)
- Moose Cree First Nation: 25% stake in a \$2.5 billion hydro project in Ontario (McMillan)

References: McMillan. “2015 in Review: Significant Increase in Leveraged Investments by the Aboriginal Loan Guarantee Program.” December 2015.

TYPES OF OIL



Dangerous Goods Shipments on Rail, 2007-2016

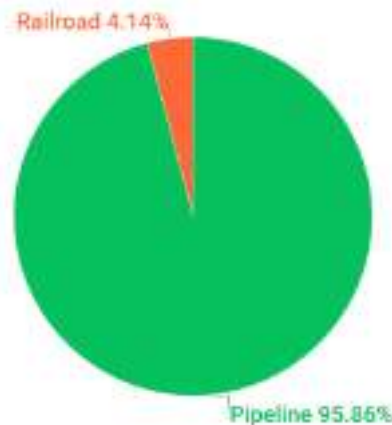
	(Thousands of tonnes)									
Petroleum Products	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015^R</i>	<i>2016^P</i>
Crude Oil ¹	1	0	8	24	375	4,344	10,620	16,517	12,554	6,087
Ethanol or Ethanol Mix ²	3,492	3,356	3,359	3,500	5,055	6,170	6,781	6,704	5,781	5,810
All Other Petroleum Products ^{3,4}	15,970	16,538	16,240	17,862	17,119	18,466	17,281	17,296	17,754	19,456
Dangerous Goods										
Minerals, Ores & Concentrates	2,271	2,349	1,623	2,459	2,770	2,486	2,478	2,013	2,226	1,845
Other Manufactured & Miscellaneous Goods	774	785	733	724	816	861	960	876	775	707
Petroleum Products ⁵	13,532	13,705	13,749	14,212	14,700	20,360	25,096	30,372	26,965	22,036
Plastic & Chemical Products ⁵	11,648	11,330	9,554	10,901	11,448	11,638	12,927	13,230	12,261	11,786
Waste & Scrap	122	187	197	195	216	241	260	249	209	216
Other Commodities ⁵	701	747	593	1,115	1,887	1,814	1,785	1,637	1,669	1,862
Total	29,047	29,103	26,449	29,606	31,837	37,401	43,506	48,378	44,105	38,452
All Goods										
All Dangerous Goods	29,047	29,103	26,449	29,606	31,837	37,401	43,506	48,378	44,105	38,452
Non-Dangerous Goods	250,739	240,386	207,896	237,726	249,812	256,394	256,884	260,775	260,803	258,983
Grand Total	279,785	269,489	234,345	267,332	281,648	293,795	300,390	309,153	304,908	297,435
Reportable occurrences	29	21	21	21	22	27	38	30	26	33

Transport Canada, Rail Traffic Database

FRAMING THE PROBLEM



Crude Oil Exports by Transport Mode



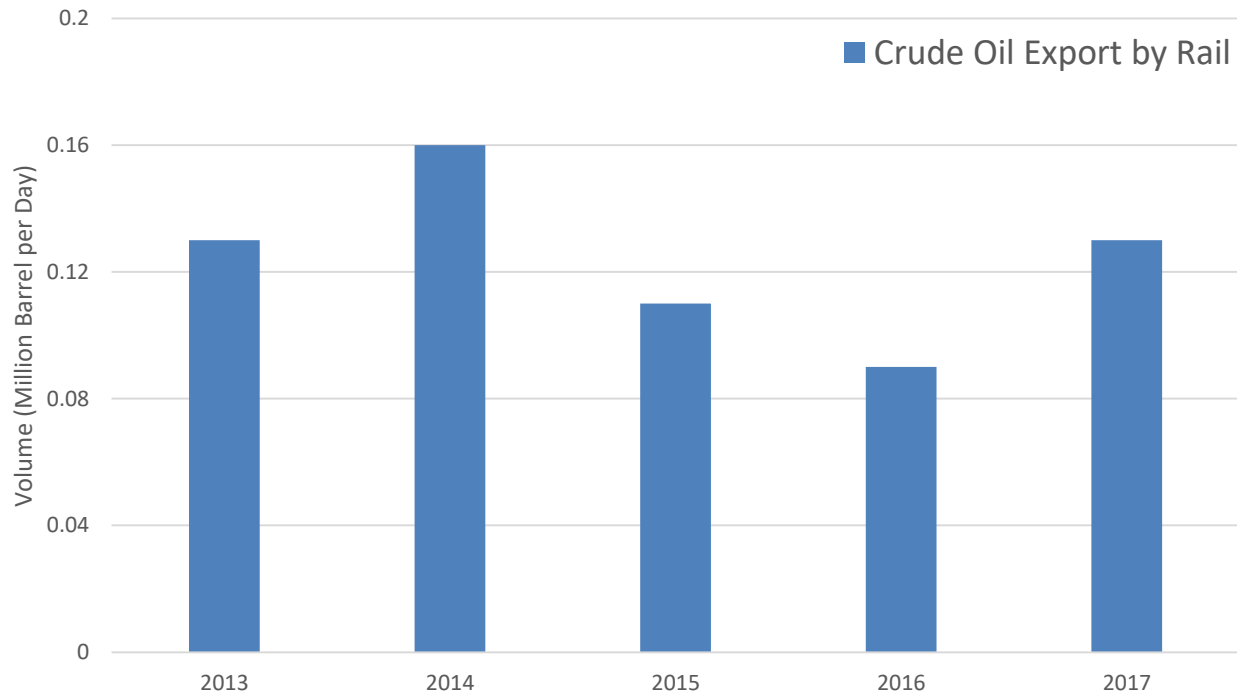
Cost to the society

- Air Pollution:
 - Occurs along transportation route by locomotives
 - It is more harmful
 - Estimated Value: **563.88 CAD** per million-barrel mile

Cost to the society

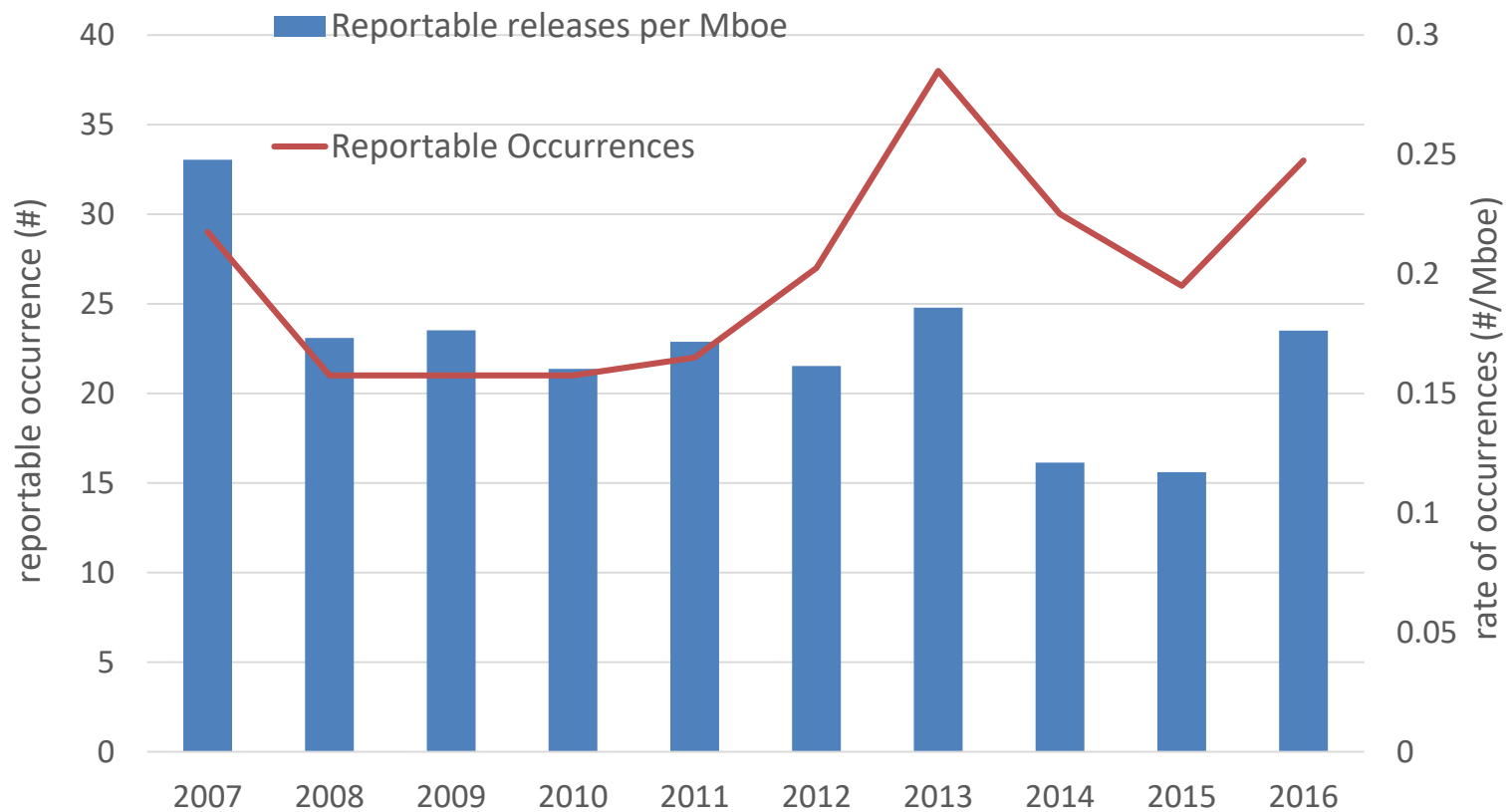
- Greenhouse Gas:
 - Social cost of carbon 50cad/tonne
 - There is a mixture of greenhouse gases that is being released
 - Estimated Value: **200.69** CAD per million-barrel mile

Crude Oil Export by Rail



National Energy Board

Rail Occurrences



Cost to the society

- Spills and Occurrences
 - includes:
 - property damage
 - cleanup costs
 - injury costs
 - mortality costs
 - Estimated Value: **483.87** CAD per million-barrel mile

ANOTHER EXAMPLE:

1. First Nations' led \$17-billion Eagle Spirit Energy pipeline and energy corridor between AB and the BC coast
 - Support from 35 First Nations along the proposed route; the bands are entitled to at least 35% ownership in exchange for the land use
2. Generating for Seven Generations has proposed a rail project to move AB oil to tidewater
 - Extensive First Nations' support
 - 50% equity stake for directly affected First Nations