CLT SharePoint Site Folder Contents: NG Working Group Background Materials

Postet: September 22, 2015

#	Information Request	Background Information	Web Link
01	CAPP supply-demand forecast	**CAPP Crude Oil Forecast, Markets & Transportation - June 2015**	
02	BC Offset Supply analysis	**British Columbia Offset Supply Estimates Results**	
03	IEA NG production forecast for 2-degree scenario.	**IEA Energy Technologies Perspectives 2015** (*see figure 1.3, page 8 in PDF file attached*)	

04. Electrification in Oil and Gas Sector: Response below prepared by Ben Brunnen (CAPP)

Are there any other jurisdictions focusing on electrification?

Norway, Qatar, Saudi Arabia, Malaysia, Russia, Canada and Australia are all looking at upstream electrification.

05. Capital stock turnover at NG facilities in BC: Response below prepared by Oil and Gas Commission

- ***What is the typical replacement timeline for equipment such as wellheads? Is the NG capital stock in BC on the older side (i.e. near replacement timeline) or relatively newer?***

  There is very little turnover of installed equipment, it is commonly placed in service for decades and maintained/refurbished as necessary. Valves can definitely be refurbished as they will be re-certified. The extent that old wells are having their parts put on new Montney wells is likely very low (experts at the Commission are not aware of this happening). That said, a valve may get fracked through and then get repaired, inspected, re-certified and the re-used.

- ***Do NG companies in BC typically stockpile replacement parts so that the same part replaces the part that wears out, or would they buy replacements over time as needed?***

  Some major valve components are kept as 'customer property' or the installed valves mentioned above. Unless the components are highly specialized and have long lead times, the wellhead or valve companies would have the stock available to replace etc.

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British Columbia Offset Supply Estimates

Results

April 9, 2013

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  - Fuel Switching
  - Oil and Gas
  - Other / Innovative

Scope of Engagement

- The goal of this study is to estimate the potential supply of offsets from a range of emission reduction opportunities in British Columbia.
- Estimates were developed using the best available data and information to obtain an overall picture for offset generation within the province; further analysis for specific offset types is possible and is recommended for offset types that contribute large amounts to the total. This may include project and facility specific feasibility studies to refine higher level assumptions that have been applied through this analysis.
- The study investigates the future potential for offset generation between 2013 and 2050 for nineteen offset types in five categories:
  - Forest Sequestration
  - Acid Gas Injection
  - Fuel Switching
  - Oil and Gas
  - Other / Innovative
- A spreadsheet based model was developed to estimate three outcomes: Aggressive, Moderate and Conservative scenarios, based on a maximum offset opportunity derived from publically available data, information provided by the Pacific Carbon Trust (PCT), Climate Action Secretariat (CAS), the Ministry of Forestry, Lands and Natural Resource Operations (FLNRO), Ministry of Transportation & Infrastructure; B.C. Ferries and opinion from industry experts.

** Please note the disclaimer on final page of this presentation*

Important Considerations

- The study period extends from 2013 to 2050. Forward looking estimates of offset potential post 2020 are challenging to predict due to the pace of technological advancement, changes to environmental and energy policy, commodity prices and the uncertain rate and extent of development of British Columbia's resource-based economy and associated infrastructure (e.g. forest products, natural gas, LNG facilities, oil & gas pipelines).

- Offsets are not credited in advance; they are generated only after the emission reduction is achieved ("ex-post" crediting).

- The term "offset" is typically used in conjunction with a cap and trade system, where some economic activities are assigned emission reduction targets (the "cap"), and are ineligible to generate offsets. Economic activities that create abatement of GHG emissions outside of the cap are eligible to generate offsets that can be sold to entities conducting capped economic activities and used to meet regulated reduction targets (the "trade"). While significant emission reduction opportunities exist within public sector organizations (PSO), they are ineligible to create offsets under the Emissions Offset Regulation (EOR). The sector level estimates contained herein contain a small quantity of offsets originating from PSOs because PSO operations were not segregated from the rest of industry.

- Supply estimates are based on prices of $25, $50, $100 and >$100 per tonne CO_2e. While these estimates rely on the assumption of a known offset price over time, there is little precedent with offset prices exceeding $25 per tonne CO_2e (there are international examples of carbon taxes exceeding $100 per tonne CO_2e applied to fossil fuel combustion).

- The estimates assume that offsets meet the requirements of the *Emissions Offset Regulation* (EOR) and that the government of British Columbia promotes an enabling environment for offsets, reducing barriers (e.g. streamlined protocol approvals, performance standards, clear guidance) to offset generation as much as possible.

- Offset projects will have to demonstrate a technological, financial and/or other barrier to implementation. Activities that are known to be or are likely to be required by regulation are ineligible to generate offsets. The estimates produced in this study include existing projects that are already generating offsets and offsets from projects forecast to be implemented in 2013 and beyond.

- The term of the credit period (the length of time that a project may generate offsets before that particular project is considered to be "business as usual") and sustained offset prices are very important to project financing; the estimates assume a ten year crediting period for all project types except Forest Sequestration (25 or 60 years); Acid Gas Injection (25 years); Blue Carbon (25 years) and some types of fuel switching (20 years).

- Provided the project type faces a barrier to adoption, a "common practice" constraint is not applied to new projects over the study period (i.e. a new project may generate offsets regardless of whether that practice is considered "business-as-usual" in that sector).

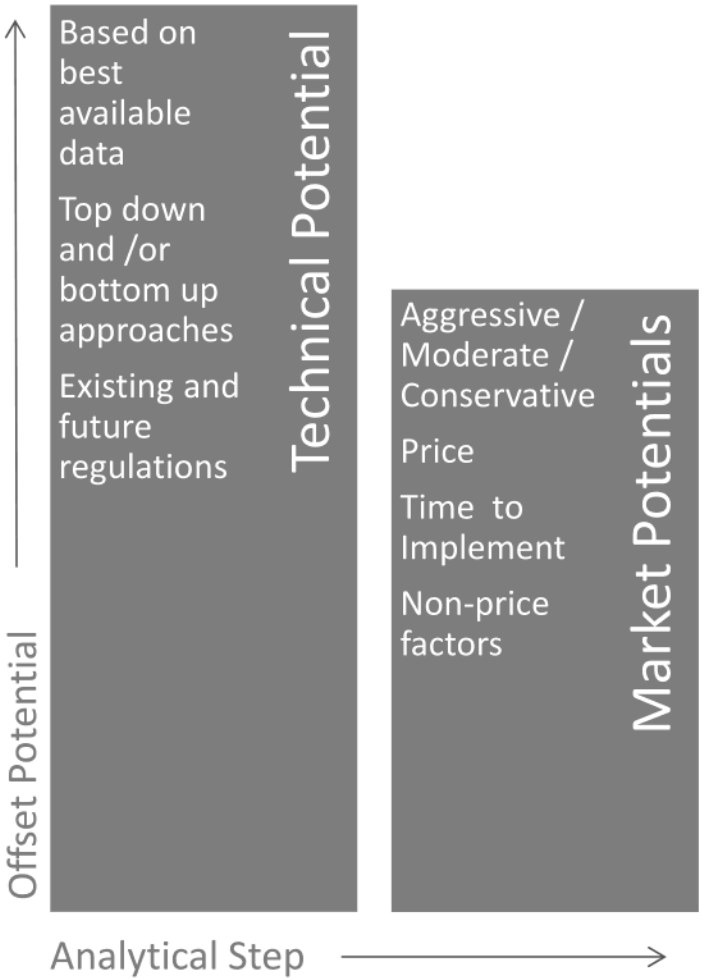
General Data & Information Sources

- Pacific Carbon Trust
  - Existing and expected offset project forecasts; offset estimates
  - General and offset type specific information and guidance (including economic analyses; natural gas production projections; emission factors)
- B.C. Government
  - Finance: BC population forecast (2012-2035)
  - Expert input and information from the PCT, CAS, Ministry of Forests, Lands and Natural Resource Operations; Ministry of Transportation & Infrastructure; B.C. Ferries
  - 2011 B.C. GHG Reporting Regulation Data
  - Compressor and well inventories from B.C. Oil and Gas Commission Data
- Natural Gas Production National Energy Board High Case (Energy Futures 2035) adjusted upwards for proposed LNG facilities (131 million m^3/day in 2013; 402 million m^3/day in 2050)
- Commodity Prices
  - Energy Futures 2035 (straight average 2013 to 2050): Retail Natural Gas ($8/GJ), Raw Natural Gas ($4.20/GJ), Commercial Gasoline ($1.36/L), Commercial Diesel ($1.30/L),
  - BC Hydro Transmission Rate Schedule; long term growth based on Energy Futures 2035 (straight average 2013 to 2050): $140/MWh
  - Biomass and alternative fuels such as construction waste (price assumptions are specific to offset types)
- Emission Factors
  - Western Climate Initiative, Final Essential Requirements for Mandatory Reporting – Amended for Canadian Harmonization
  - Environment Canada National Greenhouse Gas Inventory

Offset Types

- Forest Sequestration
  - Afforestation
  - Improved Forest Management – Logged to Protected
  - Improved Forest Management – Extended Rotation
  - Improved Forest Management – Low to High Productivity
- Acid Gas Injection
- Fuel Switching
  - Cement & Lime Fuel Switch
  - Industrial Forestry Fuel Switch
  - Large Facilities (>100 kt) Fuel Switch
  - Commercial Fleets to Natural Gas
  - BC Ferries to Natural Gas
- Oil and Gas
  - Compressor Electrification
  - Pump Conversion
  - Engine Fuel Management
  - High / Low / No Bleed and Instrument Air
  - Compressor Vent Gas Capture
- Other / Innovative
  - Buildings Energy Efficiency – Natural Gas
  - Manufacturing Energy Efficiency – Natural Gas
  - Waste Diversion
  - Blue Carbon

Approach



- "Discount Factors" are percentage reductions that are applied to the Technical Potential to determine the Market Potential; they represent barriers that may prevent the offset activity from occurring; The Discount Factors represent barriers to the activity represented by each offset type.
- Within each offset type, Discount Factors used for the Aggressive Market Potential are typically lower than those applied to determine the Moderate or Conservative Market Potentials (resulting in a higher Market Potential in the Aggressive case).
- Three general barriers have been considered: Price, Time Required to Implement and Non-Price:
- Price
  - Based on (a) estimated net present value (NPV) and simple payback periods using commodity prices; (b) estimated price per tonne CO_2e or (c) expert opinion and guidance. For (a) and (b), the results are typically pass/fail (0% or 100%), while for (c) the Discount Factor may include other percentages.
- Time to Implement
  - Represents time required to implement the activity or new (greenfield) equipment; delays may be caused by equipment turnover rates, internal organizational bureaucracy, capital requests , maintenance schedules, limited expertise, equipment, skilled labour.
- Non-Price
  - Social and market factors may prevent the generation of offsets; for instance, risk aversion to new or unknown technologies, organizational/corporate priorities, internal financial hurdle rates, unforeseen technical factors.

Approach

- Best available information was used to estimate Technical Potential over time (i.e. the maximum possible).
  - Due to variation in the quality and quantity of data, the approach used to arrive at the Technical Potential varies from offset type to offset type, and should be considered when reviewing results.
- Technical Potential is designed to be a reasonable representation of maximum potential within the context of the parameters of this study; there is far greater uncertainty concerning the Market Potentials, due to the wide array of factors that influence offset realization that cannot be predicted with confidence.
- Discount Factors applied to each offset type are highly dependent on the intrinsic assumptions within the data and approach used to determine the Technical Potential.
- A comparable modeling approach has been used by ICF Marbek to estimate offset potential in for the provinces of Alberta and Saskatchewan, as well as for a cross-Canada study.

Potential	Price ($/t CO_2e)	Time to Implement	Non-Price Factors
Technical	>$100	N/A	N/A
Aggressive	$100	Rapid implementation of projects (relatively low Discount Factor that decreases over time).	Fewer non-price barriers to achieve Market Potential (relatively low Discount Factor).
Moderate	$50	Moderate time required to implement offset projects (moderate Discount Factor that decreases over time).	Some non-price barriers to reach Market Potential (moderate Discount Factor).
Conservative	$25	Slow implementation of projects (relatively high Discount Factor that decreases over time).	Significant non-price barriers to reach Market Potential (relatively high Discount Factor).

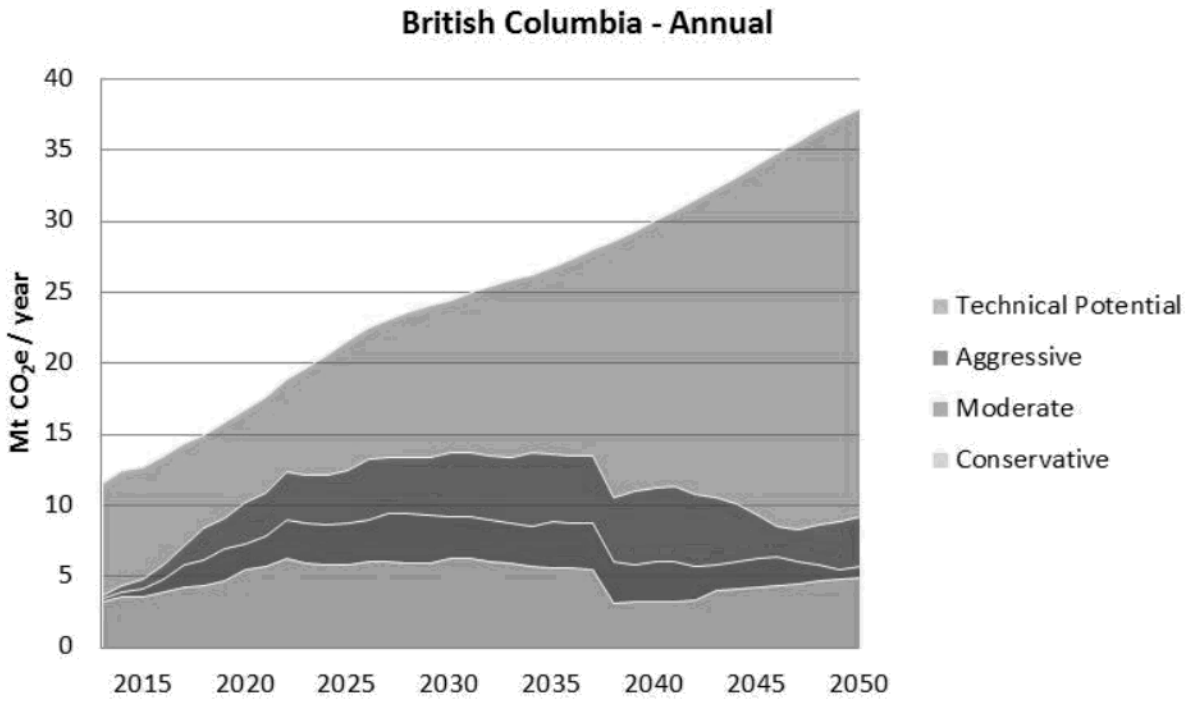
Summary – Annual

Market Potentials increase quite rapidly as new projects are implemented. In the mid-term, contributions from offset types with shorter crediting periods (10 to 20 years) peak and begin to decrease. By the end of the study period, Market Potential begins to increase again as the contribution of forest sequestration offset types grows over longer crediting periods (25 to 60 years).

British Columbia reported emissions of approximately 60 Mt in 2010. Offsets can be generated via emission reductions captured within or outside of the boundaries of the provincial inventory (Blue Carbon and Improved Forest Management, which together represent about 30% of the Technical Potential).

In a business-as-usual scenario, provincial greenhouse gas emissions are expected to grow over time; for instance, LNG facilities in planning or construction could add in excess of 50 Mt CO_2e per year by 2025 (including upstream and processing emissions), based on information provided by the CAS and publically available information on proposed and planned LNG facilities. New natural gas activity in the province represents approximately 20% of the Technical Potential.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	12.7	16.7	21.6	24.5	26.7	30.8	34.8	38.0
Aggressive	4.8	10.2	12.4	13.7	13.6	11.2	8.5	9.1
Moderate	4.1	7.3	8.8	9.2	8.9	6.1	6.4	5.7
Conservative	3.6	5.5	5.8	6.3	5.6	3.2	4.4	4.9



Summary – Cumulative

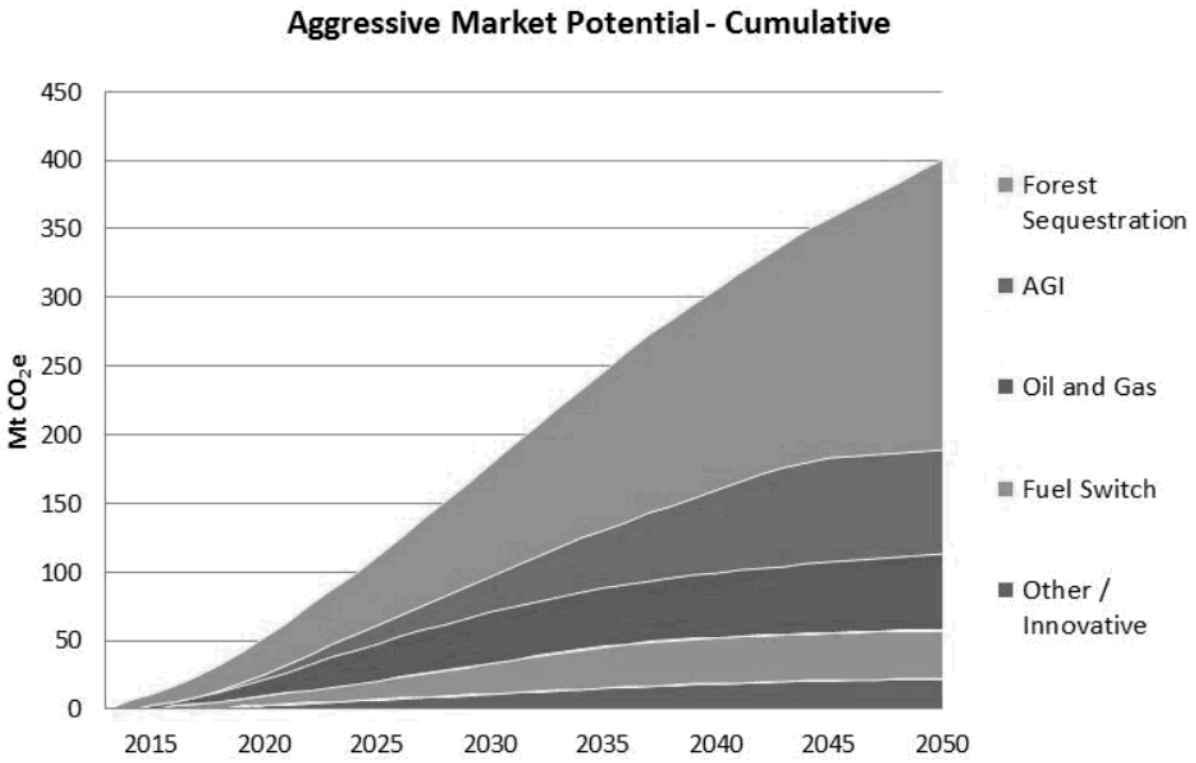
Note that the table summarizes the cumulative Technical and Market Potentials, while the graph provides the cumulative Aggressive Market Potential by offset category.

Overall, cumulative Technical and Market Potentials grow steadily over time.

By 2050, Cumulative Technical Potential reaches almost 1,000 Mt CO_2e, while Aggressive Market Potential increases to over 400 Mt CO_2e.

In 2050, Forest Sequestration contributes the largest cumulative quantity of offsets under the Aggressive Market Potential at 52% of the total, followed by the Oil and Gas category at 19%, the Acid Gas Injection category at 14% and the combination of Fuel Switching and Other/Innovative at 15%.

Mt CO_2e	2015	2020	2025	2030	2035	2040	2045	2050
Technical	37	112	211	328	458	632	797	945
Aggressive	13	53	113	180	247	318	367	402
Moderate	11	42	85	132	176	217	247	270
Conservative	10	33	62	92	122	145	165	184

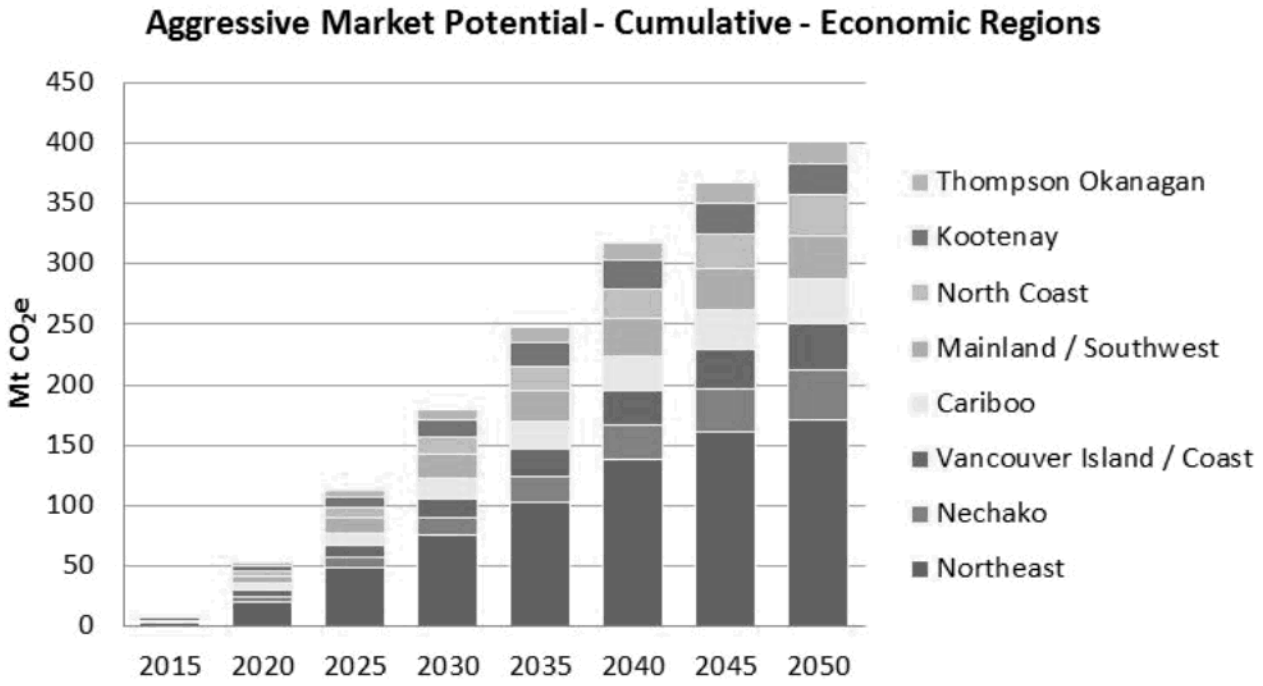


Summary – Aggressive Market Potential

In the graph to the right, the Economic Regions are ordered by cumulative offsets in 2050 from largest at the bottom (Northeast; about 170 Mt CO_2e), to smallest at the top (Thompson Okanagan; about 18 Mt CO_2e).

Over the study period, just under half of the cumulative Aggressive Market Potential occurs in the Northeast, due to the significant oil and gas and forestry sequestration activity in that Economic Region.

Five Economic Regions (Nechako, Vancouver Island / Coast, Cariboo, Mainland / Southwest, North Coast) are similarly sized: by 2050, each are estimated to generate between 34 Mt CO_2e and 42 Mt CO_2e. Finally, Kootenay generates about 27 Mt CO_2e, while Thompson Okanagan contributes just under 20 Mt CO_2e by 2050.



Summary – Aggressive Market Potential

The Other / Innovative category includes Natural Gas Energy Efficiency in Buildings and Manufacturing, Waste Diversion and Blue Carbon.

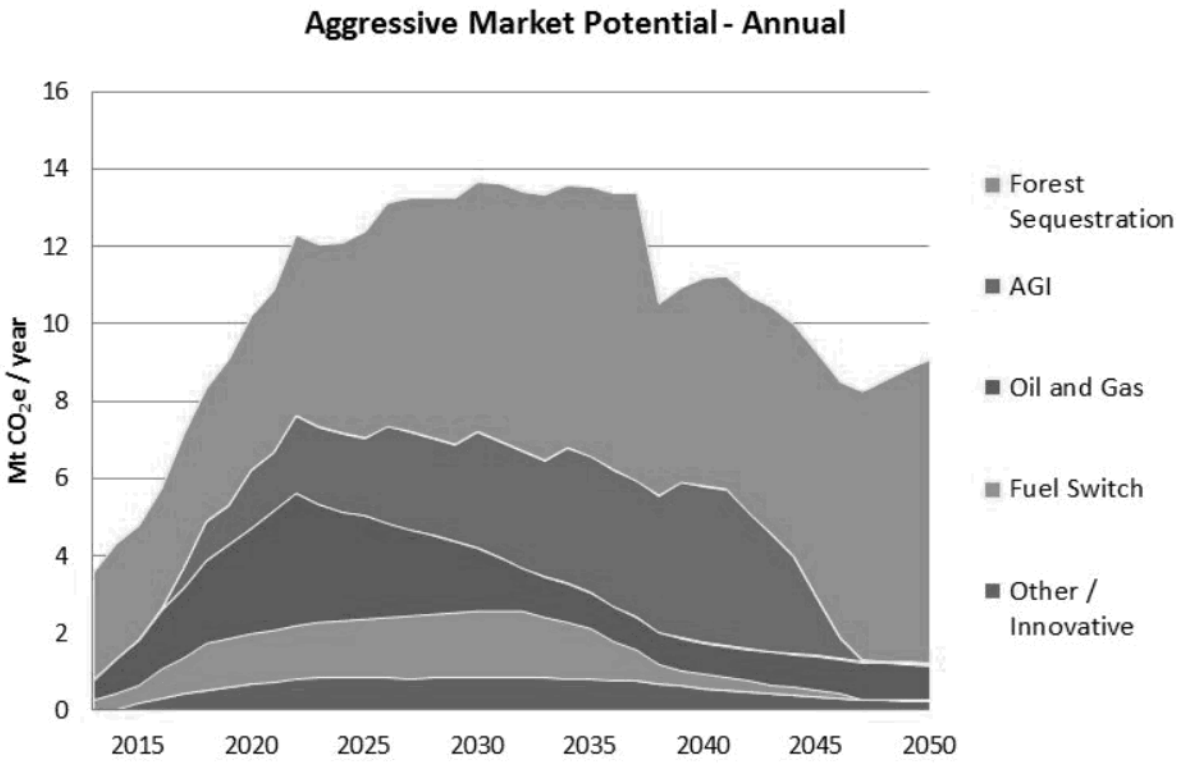
Prior to 2030, the Oil and Gas, Fuel Switch and Other / Innovative categories combine to make up between 2/5 and 1/2 of the Aggressive Market Potential.

Post 2030, the sequestration type offsets (Forest Sequestration and Acid Gas Injection) account for over 80% of the Aggressive Market Potential as project types with shorter crediting periods end.

Forest Sequestration drops sharply in the late 2030's as the Coastal First Nations projects end.

The largest single contributor to the annual Aggressive Market Potential varies over time. Extended Rotation is the largest contributor to 2030, followed by Acid Gas Injection until the early 2040's. Acid Gas Injection is finally exceeded by Improved Forest Management – Low to High Productivity (as trees planted decades earlier begin to sequester carbon more rapidly with growth).

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Forest Sequestration	2.9	4.0	5.3	6.5	7.0	5.4	6.3	7.9
AGI	0.0	1.5	2.0	3.0	3.5	4.0	1.5	0.0
Oil and Gas	1.1	2.7	2.6	1.6	0.9	0.8	0.9	0.9
Fuel Switch	0.5	1.3	1.5	1.7	1.3	0.4	0.2	0.1
Other/Innovative	0.2	0.7	0.9	0.9	0.8	0.6	0.4	0.2



Afforestation

Description: The establishment of forest or stand in an area where there was previously no forest; these estimates assume that hybrid poplar is planted exclusively.

Key Assumptions: Available land, sequestration rate.

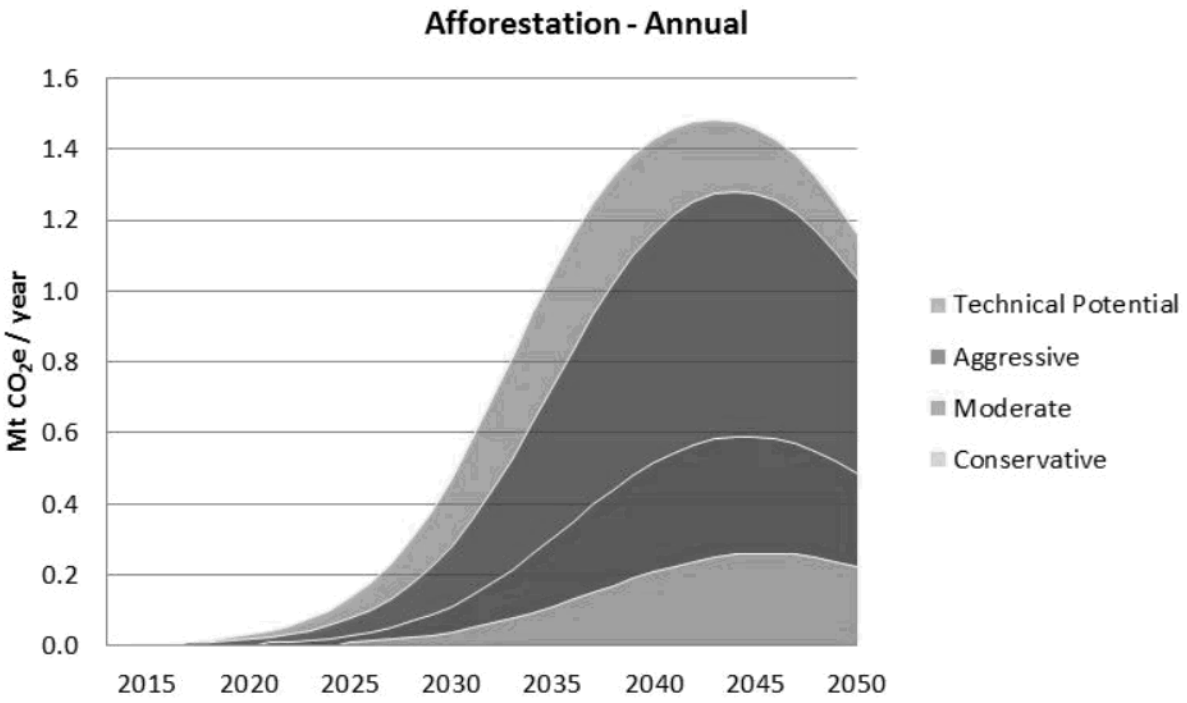
Hybrid poplar is assumed to grow more rapidly than conventional forests (dependent on location); as a result, the annual Technical and Market Potentials peak and begin to decrease within the study period.

High uncertainty in the Technical and Market Potential; heavily dependent on feasible opportunity; growth rate of trees; additionality of reforesting those lands.

Technical and Market Potential increase along a sigmoid curve to mimic tree growth (and therefore ex-post crediting). Technical Potential occurs as if hybrid poplar were planted as soon as land were available.

Recommend allocating time and resources to complete a focused analysis of forest sequestration opportunities with the participation of PCT, CAS, FLNRO, First Nations, industry and other stakeholders.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.01	0.03	0.14	0.47	1.05	1.43	1.46	1.16
Aggressive	0.00	0.02	0.08	0.28	0.73	1.17	1.28	1.03
Moderate	0.00	0.01	0.03	0.11	0.30	0.52	0.59	0.48
Conservative	0.00	0.00	0.01	0.04	0.11	0.21	0.26	0.22



Afforestation

Technical Potential Methodology

- Technical Potential for Afforestation is based on discussion with industry expert
  - Note that some of the opportunity within the Investment Opportunities document categorized as Improved Forest Management may have the potential to be described as Afforestation; however, insufficient information is available for definitive categorization
- Estimates assume that hybrid poplar is planted exclusively within the Afforestation category
- Assume that 100,000 ha of private land available for afforestation with hybrid poplar species
  - Planting of hybrid poplar occurs at a maximum rate of 5,000 ha per year
- Cumulative sequestration of between 75 and 550 tonnes CO_2e/ha
- Assume that all Technical Potential occurs in the Northeast
- Estimate growth in Technical Potential based on sigmoid curve growth from time that land is planted

Market Potential Methodology

- No constraints applied due to crediting period
- Tree growth (and therefore, due to ex-post assumption, offset crediting) is estimated using a sigmoid function from time that land is planted
- Maximum cumulative sequestered carbon reached at 25 years following planting
- Non-price barriers
  - Assume a discount factor of between 10% and 20% to account for permanence reserve
- Time to implement
  - Assume that it takes between 5 and 10 years to reach maximum planting rates
- Price barriers
  - Based on discussion with expert, assume that no barrier exists at \$100 / t CO_2e (0% discount factor) and that at \$25 / t CO_2e some activity occurs as planting of hybrid poplar is currently taking place
  - An increase in the price of timber can be expected to increase harvesting activity and slow (or reverse) increases in total standing volume within project forests, potentially effecting offset generation
  - Financing costs (i.e. the availability of suitable long-term financing) are a critical issue that must be addressed
  - Assume a 75% price discount

Afforestation

Technical Potential Calculation

$TP_A = A * GR$

Where:

TP_A	= Technical Potential for afforestation for hybrid poplar(t CO_2e)
A	= the feasible treatment area (total of 100,000 ha)
GR	= the annual average growth rate for hybrid poplar (~25 t CO_2e / ha / year)

Market Potential Calculation

$MP_A = TP_A * D_{implement} * D_{price} * D_{non\text{-}price}$

Where:

MP_A	= Market Potential (Aggressive, Moderate, Conservative) for afforestation using hybrid poplar (t CO_2e)
$D_{implement}$	= Discount factor related to time required to reach maximum planting rate based on total opportunity area (between 5 and 10 years)
D_{price}	= Discount factor for project cost; between 20% to 100%
$D_{non\text{-}price}$	= Discount factor to account for non-price factors , including permanence reserve(10% to 20%)

IFM – Logged to Protected

Description: Improved Forest Management is designed to facilitate forest management that reduces greenhouse gases. Logged to Protected involves the conversion from conventional logging to reduced impact logging.

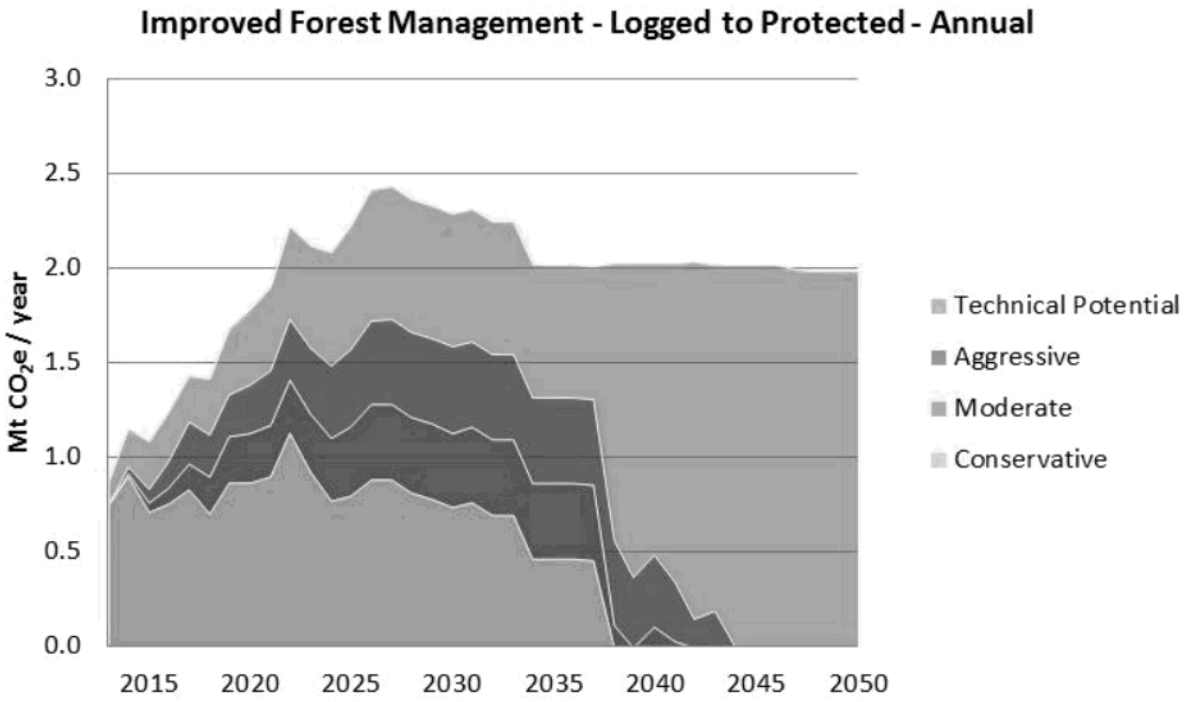
Key Assumptions: Application to private managed forest and area available, offset generation rates.

Sharp increases and decreases year to year occur following the estimates from project documentation for the TimberWest and Darkwoods projects.

High uncertainty in the Technical and Market Potentials, available information and simplifying assumptions.

Recommend allocating time and resources to complete a focused analysis of forest sequestration opportunities with the participation of PCT, CAS, FLNRO, First Nations, industry and other stakeholders.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	1.09	1.78	2.22	2.29	2.02	2.02	2.02	1.99
Aggressive	0.84	1.38	1.57	1.58	1.31	0.48	0.00	0.00
Moderate	0.76	1.13	1.16	1.13	0.86	0.11	0.00	0.00
Conservative	0.71	0.86	0.79	0.73	0.46	0.00	0.00	0.00



IFM – Logged to Protected

Technical Potential Methodology

- Technical Potential for Logged to Protected forest based on project documentation and information from PCT
- Two sections that make up total Logged to Protected potential; existing projects and incremental area available
  - Existing projects: TimberWest and Darkwoods (about 0.7 Mt CO_2e/year; 210,000 ha); assume offsets are generated as expected based on project documentation
  - Assume that similar to TimberWest and Darkwoods projects, only incremental (i.e. other than existing projects)private Managed Forest is available for conversion to Logged to Protected ; approximately 0.7 M ha of incremental private land, assume a maximum conversion rate of 50,000 ha per year, offset generation rate of 2.68 t CO2e / ha / year based on existing project data (net of permanence)

Market Potential Methodology

- Crediting period of 25 years
- Assume that offsets from existing projects (TimberWest and Darkwoods) are generated as expected based on project documentation
- Non-price barriers
  - Assume a discount factor of between 30% and 40% to account for leakage (offset generation rate is net of permanence)
- Time to implement
  - Assume that it takes between 5 and 10 years to reach maximum conversion rate to Logged to Protected forest
- Price barriers
  - An increase in the price of timber can be expected to increase harvesting activity and slow (or reverse) increases in total standing volume within project forests, potentially effecting offset generation
  - Financing costs (i.e. the availability of suitable long-term financing) are a critical issue that must be addressed
  - Assume discount factor for price related issues of between 10% and 70%

IFM – Logged to Protected

Technical Potential Calculation

$TP_{L2P} = TP_{L2P,\ i} + TP_{EP}$

Where:

$TP_{L2P,\ i} = A * GR$

TP_{L2P}	= Technical Potential for Logged to Protected activities (t CO_2e)
$TP_{L2P,\ i}$	= Technical Potential for incremental (other than existing projects) Logged to Protected activities on private land (t CO_2e)
A	= the estimated incremental area (apart from existing projects) of private land available for conversion to Logged to Protected forest; see previous slide (hectares)
GR	= the annual average offsets available for Logged to Protected forests (t CO_2e / hectare / year)
TP_{EP}	= the quantity of offsets projected to be available from existing projects (t CO2e / year)

Market Potential Calculation

$MP_{L2P} = TP_{L2P,\ i} * D_{implement} * D_{price} * D_{non\text{-}price} + TP_{EP}$

MP_{L2P}	= Market Potential (Aggressive, Moderate, Conservative) for Logged to Protected activity (t CO_2e)
$D_{implement}$	= Discount factor related to time required to reach maximum annual implementation of Logged to Protected activity; between 5 and 10 years
D_{price}	= Discount factor related to price of carbon and project costs; between 10% and 70%
$D_{non\text{-}price}$	= Discount factor to account for non-price factors , including leakage (between 30% and 40%)
TP_{EP}	= the quantity of offsets projected to be available from existing projects (t CO2e / year)

IFM – Extended Rotation

Description: This category of IFM - Extended Rotation involves extending the rotation age of evenly aged, managed forests.

Key Assumptions: Area of suitable land, offset generation rate by land area

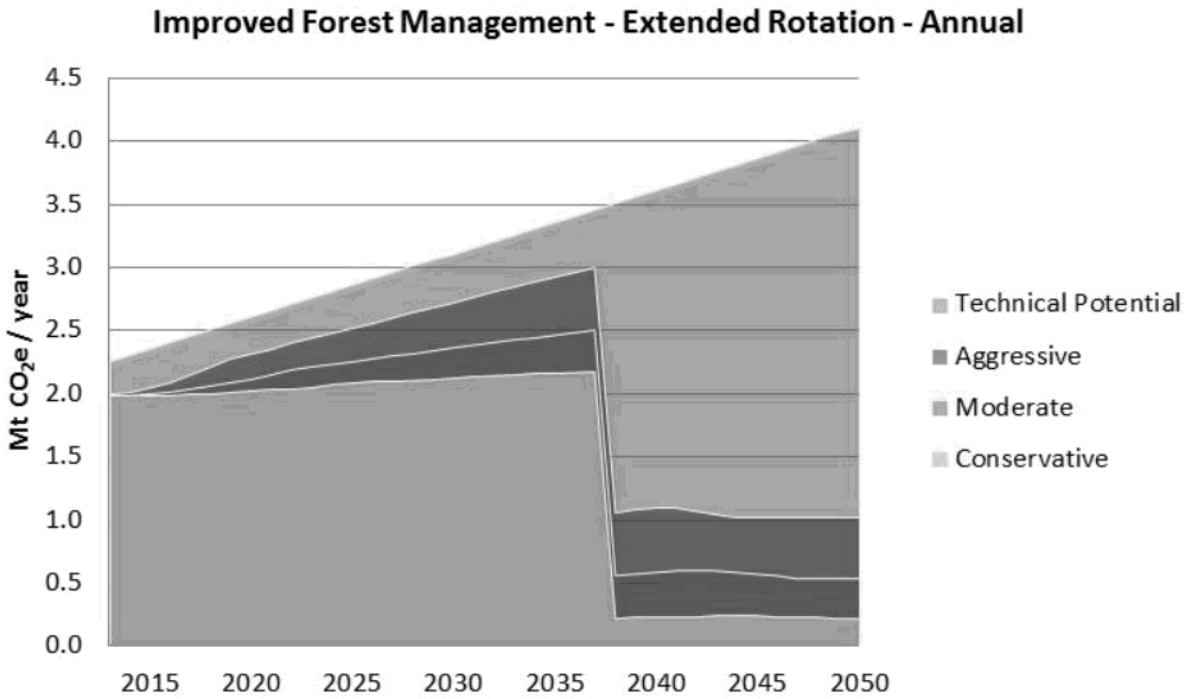
Market Potential decreases significantly around 2038 as the Coastal First Nations projects reach the end of the crediting period.

High uncertainty in the Technical and Market Potentials, due to available information and simplifying assumptions.

Recommend allocating time and resources to complete a focused analysis of forest sequestration opportunities with the participation of PCT, CAS, FLNRO, First Nations, industry and other stakeholders.

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Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	2.4	2.6	2.9	3.1	3.4	3.6	3.9	4.1
Aggressive	2.0	2.3	2.5	2.7	2.9	1.1	1.0	1.0
Moderate	2.0	2.1	2.3	2.4	2.5	0.6	0.6	0.5
Conservative	2.0	2.0	2.1	2.1	2.2	0.2	0.2	0.2



IFM – Extended Rotation

Technical Potential Methodology

- Technical Potential for Extended Rotation forest based on discussion with experts and information from PCT
- Two sections that make up total Extended Rotation Technical Potential; existing projects and incremental area available
  - Existing projects (Coastal First Nations) assume that offsets are generated as anticipated; 2.2 Mt CO_2e / year (net of leakage), total land area of 11 M ha
  - Estimate available area for incremental (i.e. excluding existing projects) opportunities similar to Coastal First Nations; approximately 11 M ha available, assume a maximum conversion to Extended Rotation of 0.25 M ha per year, offset generation rate of 0.2 t CO_2e / ha / year (net of leakage)

Market Potential Methodology

- Crediting period of 25 years for Extended Rotation projects
- Assume that offsets from existing projects (Coastal First Nations) are generated as expected based on project documentation
- Non-price barriers
  - Assume a discount factor of 10% for Coastal First Nations projects and between 10% and 20% to account for permanence (offset generation rate is net of leakage)
- Time to implement
  - Assume that it takes between 7and 15 years to reach maximum implementation
- Price barriers
  - An increase in the price of timber can be expected to increase harvesting activity and slow (or reverse) increases in total standing volume within project forests, potentially effecting offset generation
  - Financing costs (i.e. the availability of suitable long-term financing) are a critical issue that must be addressed
  - Assume discount factor for price related issues of between 10% and 80%

IFM – Extended Rotation

Technical Potential Calculation

$TP_{ER} = TP_{ER,\ i} + TP_{EP}$

Where:

$TP_{ER,\ i} = A * GR$

TP_{ER}	= Technical Potential for Extended Rotation activities (t CO_2e)
$TP_{ER,\ i}$	= Technical Potential for incremental (other than existing projects) Extended Rotation activities (t CO_2e)
A	= the estimated incremental area (apart from existing projects) of land available for conversion to Extended Rotation forest; see previous slide (hectares)
GR	= the annual average offsets available for Extended Rotation forests (t CO_2e / hectare / year)
TP_{EP}	= the quantity of offsets projected to be available from Coastal First Nations projects (t CO_2e / year)

Market Potential Calculation

$MP_{ER} = TP_{ER,\ i} * D_{implement} * D_{price} * D_{non\text{-}price} + TP_{EP,\ A}$

MP_{ER}	= Market Potential (Aggressive, Moderate, Conservative) for Extended Rotation activities (t CO_2e)
$D_{implement}$	= Discount factor related to time required to reach maximum annual implementation of Extended Rotation activity; between 7 and 15 years
D_{price}	= Discount factor related to price of carbon and project costs; between 10% and 80%
$D_{non\text{-}price}$	= Discount factor to account for non-price factors for incremental (i.e. other than Coastal First Nations), including permanence reserve tonnes (offset generation rate is net of leakage (between 10% and 20%)
$TP_{EP,\ A}$	= the quantity of offsets projected to be available from existing projects, adjusted using a discount factor of 10% to account for permanence reserve tonnes (t CO_2e / year)

IFM – Low to High Productivity

Description: IFM – Low to High Productivity includes the ***rehabilitation of a forest or stand of trees (Mountain Pine Beetle, non-commercial brush, problem forest types, non-satisfactorially restocked), as well as the fertilization and spacing of existing stands.***

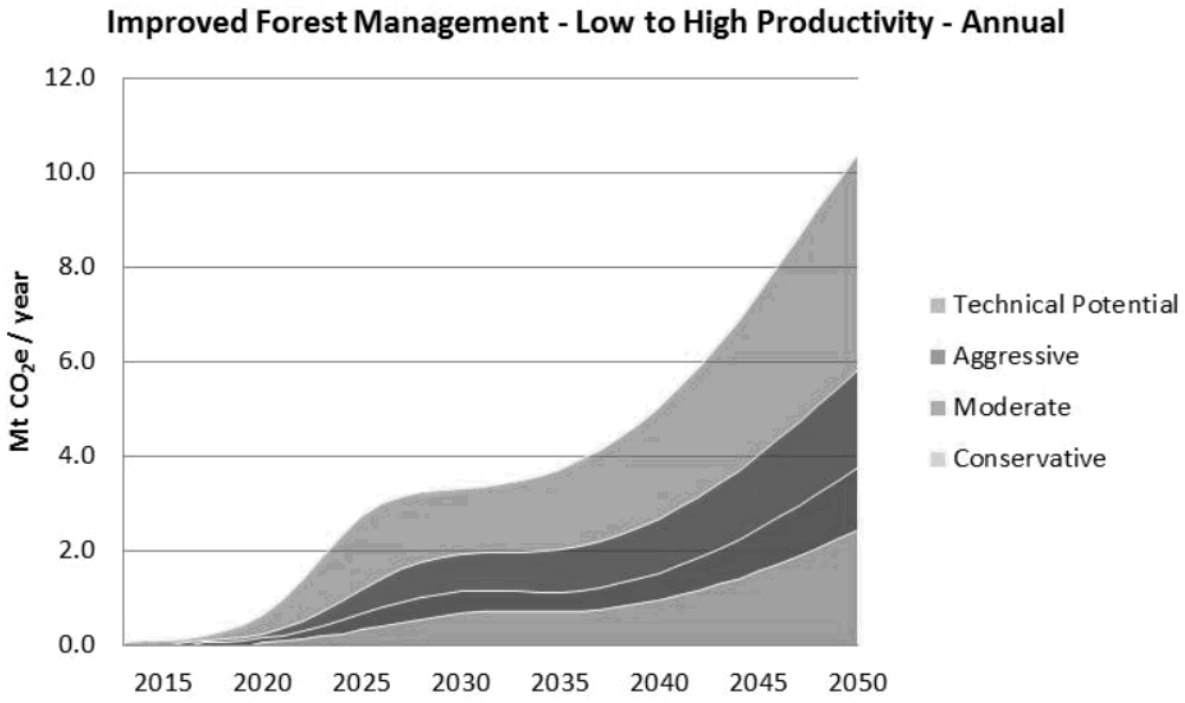
Key Assumptions: Area of suitable public and private land and sequestration rates.

High uncertainty in the Technical and Market Potential; heavily dependent on feasible opportunity and cost of treatment.

Technical and Market Potential for increase along a sigmoid curve to mimic tree growth (and therefore ex-post crediting). Technical Potential occurs as if treatment occurs as soon as land were available; initial offset increase due to more rapid offset generation from fertilization and spacing in comparison to rehabilitation.

Recommend allocating time and resources to complete a focused analysis of forest sequestration opportunities with the participation of PCT, CAS, FLNRO, First Nations, industry and other stakeholders.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.1	0.7	2.8	3.3	3.7	5.5	8.0	10.4
Aggressive	0.0	0.3	1.2	1.9	2.0	2.9	4.4	5.8
Moderate	0.0	0.2	0.7	1.1	1.1	1.7	2.7	3.8
Conservative	0.0	0.1	0.3	0.7	0.7	1.1	1.7	2.4



IFM – Low to High Productivity

Technical Potential Methodology

- Technical Potential for Low to High Productivity is obtained by adding together four activities:
- Rehabilitation: including rehabilitation of problem forest types; backlog non-satisfactory restocked; Mountain Pine Beetle effected stands; and non-commercial brush areas based on *Forest Carbon Offset Investment Opportunities* and FLNRO information:
  - Total feasible treatment area of approximately 1.6 M ha; average annual sequestration rates of 2.66 to 3.88 t CO_2e / ha / year; assumed to be a mixture of spruce, cedar, fir and aspen; maximum rehabilitation rate of about 0.12 M ha / year
- Incremental MPB: based on conversations with the FLNRO and other forestry experts, add Technical Potential to account for further opportunity for MPB effected stands on public land (total of 0.5 M ha) and private land (total of 0.2 M ha)
  - Much of MPB effected area has a very low site index, partial restocking or is undergoing regrowth without intervention; assume similar mixture of trees to *Investment* Opportunities, average sequestration rate of 2.66 t CO_2e / ha / year; rehabilitation occurs at a maximum rate of 75,000 incremental ha per year
- Fertilization & Spacing: add Technical Potential for fertilization of appropriate stands; spacing over dense stands to ready for fertilization and increase rotation times; fertilization of spruce and pine stands activities based on data in *Investment Opportunities*
  - Total feasible treatment of 1.1 M ha; average annual sequestration rates of between 0.50 to 1.83 t CO_2e / ha / year; maximum annual incremental treatment rate of 75,000 ha / year
- Mass Fertilization: add potential for mass fertilization incremental to Investment Opportunities based on information provided by FLNRO
  - Total available treatment area of 4.6 M ha; maximum annual incremental treatment rate of 75,000 ha / year; re-treatment possible for 20% of land 10 years after initial treatment
- There is significant uncertainty associated with estimating the Technical Potential for Improved Forest Management – Low to High Productivity (quantity of land, imprecise data and ownership, treatment of land under the Forests for Tomorrow initiative)
- Estimate growth in Technical Potential based on sigmoid curve growth from time that land is treated, with maximum growth rates occurring between 20 and 50 years for Rehabilitation and Incremental MPB, and within 15 years from treatment for Fertilization & Spacing and Mass Fertilization

IFM – Low to High Productivity

Market Potential Methodology

- Crediting period of 60 years for Rehabilitation and Incremental MPB; for Fertilization & Spacing and Mass Fertilization, Market Potential is limited based on incremental cumulative sequestration possible from treated area over 10 years
- Estimate growth in Market Potential based on sigmoid curve growth from time that land is treated, with maximum growth rates occurring between 20 and 50 years for Rehabilitation and Incremental MPB, and within 15 years from treatment for Fertilization & Spacing and Mass Fertilization
- Non-price barriers
  - For all activities, assume a discount factor of between 10% and 20% to account for permanence reserve
- Time to implement
  - Assume that it takes between 7and 15 years to reach maximum restoration or treatment rate for Incremental MPB; for Rehabilitation, Fertilization & Spacing and Mass Fertilization 5 to 10 years to reach maximum rehabilitation or treatment rate
- Price barriers
  - An increase in the price of timber can be expected to increase harvesting activity and slow (or reverse) increases in total standing volume within project forests, potentially effecting offset generation
  - Financing costs (i.e. the availability of suitable long-term financing) are a critical issue that must be addressed
  - For Incremental MPB, assume a price discount factor of between 25% and 75% based on feedback from FLNRO
  - For Mass Fertilization, assume discount factor for price related issues of 100% (no activity) in Conservative Market Potential; 90% in Moderate Market Potential and 50% in Conservative Market Potential based on information from the FLNRO
  - For Rehabilitation and Fertilization & Spacing, discount factor for price is based on costs in *Investment Opportunities* (about $15 per t CO2e for rehabilitation of problem forest types; backlog non-satisfactory restocked; Mountain Pine Beetle effected stands; and non-commercial brush areas ; between $10 and $20 per t CO_2e for fertilization; and about $40 per t CO_2e for spacing)

IFM – Low to High Productivity

Technical Potential Calculation

$TP_{LHP} = \Sigma_{type} TP_{LHP\ activity}$

$TP_{LHP,\ activity} = A_{type} * GR_{type}$

Where:

TP_{LHP}	= Technical Potential for all types of Improved Forest Management – Low to High Productivity activities (t CO_2e)
$TP_{LHP,\ activity}$	= Technical Potential for Improved Forest Management for particular activity (Rehabilitation, Incremental MPB, Fertilization & Spacing, Mass Fertilization) (t CO_2e)
A_{type}	= the feasible treatment area for each activity (Rehabilitation, Incremental MPB, Fertilization & Spacing, Mass Fertilization (ha)
GR_{type}	= the annual average growth rate for a specific activity (t CO_2e / ha / year)

Market Potential Calculation

$MP_{LHP} = \Sigma_{type} MP_{LHP\ activity}$

$MP_{LHP,\ activity} = TP_{LHP,\ activity} * D_{implement} * D_{price} * D_{non\text{-}price}$

Where:

MP_{LHP}	= Total Market Potential (Aggressive, Moderate, Conservative) for IFM - Low to High Productivity (t CO_2e)
$MP_{LHP,\ activity}$	= Market Potential (Aggressive, Moderate, Conservative) for IFM - Low to High Productivity (t CO_2e)
$D_{implement}$	= Discount factor related to time required to implement forestry activity based on total opportunity area (between 5 and 15 years)
D_{price}	= Discount factor for related to price of activity and carbon; based on costs per t CO_2e in Investment Opportunities or estimated using information from FLNRO
$D_{non\text{-}price}$	= Discount factor to account for non-price factors , including permanence reserve tonnes (10% to 20%)

Acid Gas Injection

Description: Geological sequestration in sedimentary basins of an acid gas mixture which may include hydrogen sulphide and carbon dioxide with traces of other gases.

Key Assumptions: Natural gas production, CO_2 concentration and price tipping point for AGI.

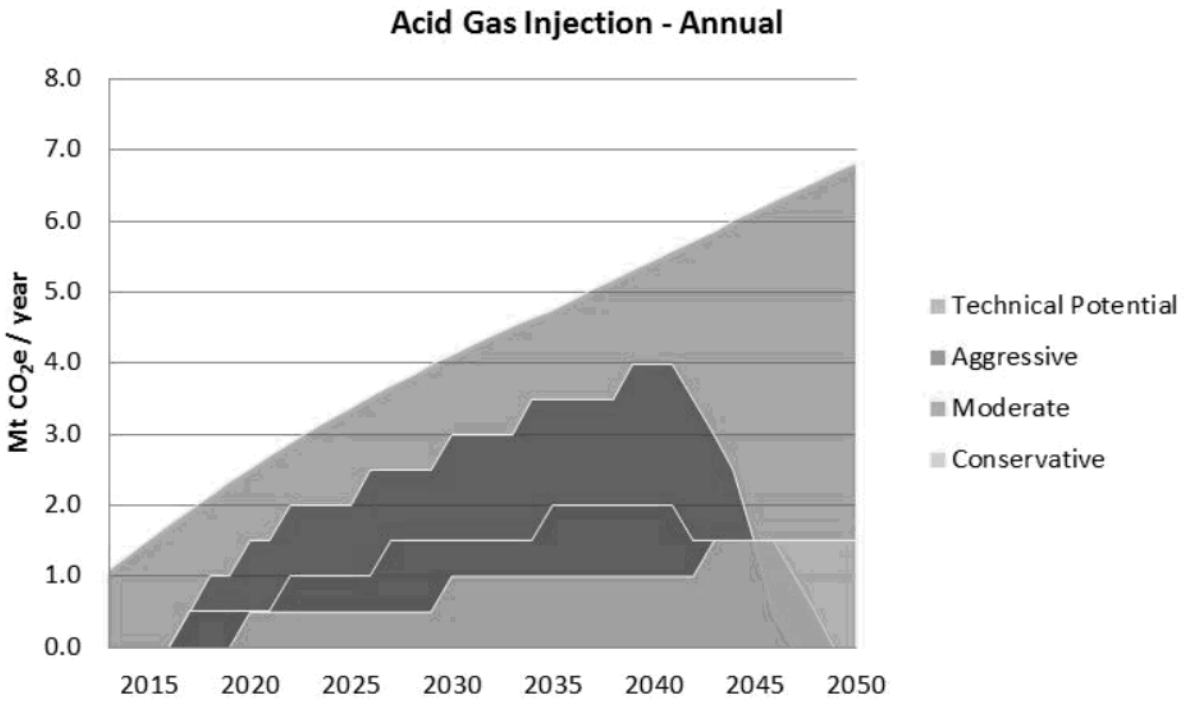
Market Potential increases in 500 kt increments to mimic the commissioning of individual acid gas injection facilities.

Significant uncertainty in Market Potential due to price factors (forward contracts), and non-price factors (e.g. contractual complexity); burden could be reduced by establishing minimum requirements in protocol.

While the Aggressive Market Potential ends prior to the Conservative Market Potential due to a more rapid implementation of fuel switching; cumulatively, Aggressive is always larger than Moderate or Conservative.

Recommend allocating time and resources to complete a focused analysis of the AGI opportunity, with the participation of the natural gas industry (industry survey; interviews with processors), the CAS and other stakeholders.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	1.5	2.5	3.4	4.1	4.8	5.5	6.1	6.8
Aggressive	0.0	1.5	2.0	3.0	3.5	4.0	1.5	0.0
Moderate	0.0	0.5	1.0	1.5	2.0	2.0	1.5	0.0
Conservative	0.0	0.5	0.5	1.0	1.0	1.0	1.5	1.5



Acid Gas Injection

Technical Potential Methodology

- Natural gas production and the concentration of CO_2 in the produced gas are the main drivers for offsets from acid gas injection (AGI) – assume that all Technical Potential occurs in the Northeast
- Assume that Technical Potential is derived from tight and shale gas production alone as conventional gas production is declining and AGI at conventional facilities is typically associated with smaller, strategic sulphur removal and disposal facilities
    - Pro-rate National Energy Board Reference Case in Canada's Energy Future: Energy Supply and Demand Projections to 2035 for shale gas based on expected marketable reserves in Horn River, Cordova and Montney from Shale Gas in British Columbia, Presentation by Alex Ferguson to the CAMPUT Conference, May, 2011 – potential for Doig based on Summary of Shale Gas Activity in Northeast British Columbia 2011, Ministry of Energy and Mines, November 2009 – potential for Laird estimated based on other regions
    - Estimate 12% (1.5% sent downstream) carbon dioxide concentration of raw gas in Liard, Horn River and Cordova and 1% (0.5% sent downstream) in Montney and for tight gas based on National Energy Board Energy Briefing Note: A Primer for Understanding Canada's Shale Gas, 2009 and expert opinion
- Technical Potential is calculated as though all acid gas compression will be electrically driven (note that Market Potential in Horn River is discounted between 2013 and 2025 as electrically driven compression in that region is less likely over that timeframe)
- Assume that specialized systems will be needed at LNG facilities to remove small amounts of CO_2 (it is highly unlikely that NG arriving at LNG facilities will have no CO_2)

Acid Gas Injection

Market Potential Methodology

- 25 year crediting period;
- Assume that no AGI occurs in the Montney region (due to the low concentration of CO_2 in the raw gas in that area)
- Anticipate that at $25, only no / negative cost capacity is built (estimated to be between 20,000 and 75,000 t CO_2e / year) - evidence suggests that $25 / t CO_2e is insufficient to drive AGI implementation
  - It is likely that some smaller and strategic plants will implement AGI economically due to their specialized nature as (effectively) sulphur removal and disposal facilities
- At $50 per tonne, 50% of Technical Potential is implemented a 'tipping point' for AGI exists between $40 and $65 / t CO_2e):
  - Statoil sequesters more than 2 Mt / year in the harsh engineering location of the Norwegian North Sea, comparable to the difficult to engineer areas of Northern BC, and has publically indicated a carbon price of $50 USD/tonne was sufficient to make the project economic. (Statoil Annual Report 2008); Sliepner sequesters ~1 Mt CO_2/year, with CO_2 concentration in raw gas of 9%, similar to parts of NE BC
  - Similarly, Shlumberger estimates $67 USD/tonne (including the Norwegian carbon tax) Leading the Energy Transition: Bringing Carbon Capture and Storage to Market
  - ICO2N: CCS Funding Gap with a wide range of factors estimates required incentive in the range of $50 to >$100 CAD.
- At $100, the price exceeds the high end of the 'tipping point' and almost all of the Technical Potential is implemented
- Assume that the price of sulphur does not have an impact on AGI activity, due to the distance and difficulty getting the sulphur to market and the low sulphur in the raw gas in the Horn River basin
- Complicated mix of price and non-price drivers increases uncertainty
  - Ownership and contractual issues are a significant barrier to implementing AGI, particularly for gas plants that have numerous producers feeding them – reopening contractual agreements is costly and time-consuming; producers will likely want some benefit from re-opening contractual discussions, reducing the incentive to gas plants to renegotiate.
  - Global responses by the natural gas industry to carbon pricing should be treated with some caution particularly when comparing incentive versus tax systems. Carbon taxes in Norway have very high levels of social and political support; industry has a high level of confidence that carbon taxes will continue (or increase). The social and political landscape in BC is different from Norway, and it is expected that the natural gas industry will proceed with greater caution
- Non-price discount applied to Horn River between 2013 and 2025 as electrically driven compression is unlikely
- Discount Market Potential over first 5 years to account for the time required to build/design AGI facilities
- Assume that AGI gas plants are implemented in 400 mcf/d throughput increments; roughly 500 kt CO_2e / year

Acid Gas Injection

Technical Potential Calculation

$TP_{AGI} = \Sigma_{basin} TP_{AGI,\ basin}$

$TP_{AGI,\ basin} = Produced_{shale} * [CO_2]_{basin} * EMR_{basin} / EMR_{total} + Produced_{Tight} * [CO_2]_{tight}$

Where:

TP_{AGI}	= Technical Potential for acid gas injection (t CO_2e)
$Produced_{shale}$	= the annual projected amount of shale gas produced in BC according to the NEB, and adjusted to meet the demand from proposed LNG facilities (Tcf)
$Produced_{Tight}$	= the annual projected amount of tight gas produced in BC according to the NEB, and adjusted to meet the demand from proposed LNG facilities (Tcf)
$[CO_2]_{basin}$	= the concentration of CO_2 in tight gas (vol%)
$[CO_2]_{basin}$	= the concentration of CO_2 in each basin (Horn River, Liard, Cordova and Montney) (vol%)
EMR_{basin}	= the expected marketable resource in each basin (Horn River, Liard, Cordova and Montney) (Tcf)
EMR_{total}	= the sum of the expected marketable resources in Horn River, Liard, Cordova and Montney (Tcf)

Market Potential Calculation

$MP_{AGI} = \Sigma_{basin} MP_{AGI,\ basin}$

$MP_{AGI,\ basin} = TP_{AGI,\ basin} * D_{desigh/build} * D_{price} * D_{non\text{-}price}$

MP_{AGI}	= Market Potential (Aggressive, Moderate , or Conservative) (t CO_2e) (in 500 kt CO_2e increments)
$D_{desigh/build}$	= Discount factor related to time required to design/build and commission an AGI facility (5 years, discount factor decreases from 95% to 0% over 5 years)
D_{price}	= Discount factor related to project costs discussed in previous slide (10% to 70%)
$D_{non\text{-}price}$	= Discount factor related to non-price factors (availability of electrical infrastructure in Horn River) (18% for Horn River, otherwise no discount for non-price factors)

Cement & Lime – Fuel Switch

Description: Increased use of no and low carbon fuels including natural gas and alternative fuels such as construction waste, biosolids and/or rendered fats as a fuel source in the cement and lime production industry.

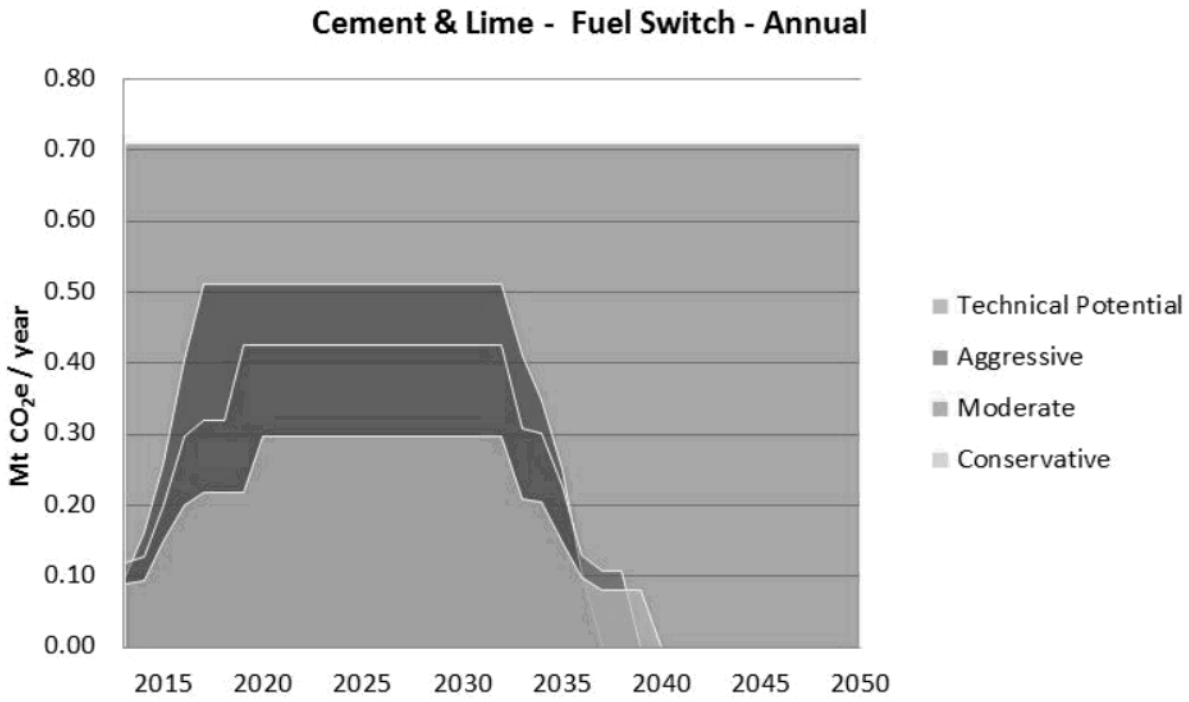
Key Assumptions: Available supply of suitable alternative fuels; technical ability of facilities to implement fuel switch.

More certainty with respect to Technical Potential compared to Market Potential as fuel switch implementation depends significantly on non-price factors (availability of alternative fuels, technical ability of individual facilities to switch fuel).

High carbon prices may increase barriers to fuel switching (e.g. increased demand for alternative fuels impacts economics of implementing fuel switch).

The Aggressive Market Potential ends prior to the Conservative Market Potential due to a more rapid implementation of fuel switching; cumulatively, Aggressive is always larger than Moderate or Conservative Market Potential.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Aggressive	0.26	0.51	0.51	0.51	0.25	0.00	0.00	0.00
Moderate	0.20	0.43	0.43	0.43	0.23	0.00	0.00	0.00
Conservative	0.15	0.30	0.30	0.30	0.15	0.00	0.00	0.00



Cement & Lime – Fuel Switch

Technical Potential Methodology

- 2011 B.C. GHG Reporting Data to identify cement and lime manufacturing facilities (NAICS 327310 and 327410); three cement plants and two lime plants identified (~ 1.4 Mt CO_2e stationary combustion emissions)
  - Assume 40% of Total Combined Industrial Process and Stationary Combustion Emissions are Stationary Combustion
  - Include existing cement fuel switch (waste) offset project (Lafarge ~ 40 kt CO_2e/year) in Technical Potential
  - Assume that 50% of stationary combustion emissions in cement and lime facilities can be displaced by the use of natural gas versus coal; up to ½ of fuel can be displaced by alternative fuels (construction waste, biosolids, rendered fats)
- Assume that existing plants can meet the demand for cement and lime over the study period; no growth
- Technical Potential is allocated to Economic Region based on location of facility (Thompson Okanagan or Mainland / Southwest)

Market Potential Methodology

- 20 year crediting period; assume existing project continues to generate offsets as expected
- Price factors
  - Assume conversion to natural gas from coal at NG prices up to $6/GJ is economic at carbon prices above $25
  - Alternative fuels viable at less than $10 / t CO_2e (existing project); industry expert indicates that >$60 / t CO_2e is required for alternative fuels (construction waste, biosolids, rendered fats) to become financially viable
  - Assume that no price barrier exists at $50 / t CO2e and above; discount factor of 75% at $25 / t CO_2e
- Time to implement
  - Assume that it will take between 3 and 7 years to implement fuel switching to alternative fuels as study and infrastructure investment is likely required; assume that full conversion to natural gas can occur within 4 years (two facilities have already converted to partial natural gas)
  - Implementation occurs in incremental steps of between 25% and 50% of Technical Potential
- Non-price factors, such as facility technical ability to implement fuel switch and decision of facility to implement (perceived risk with alternative fuels)
  - Aggressive: (by 2017) all five facilities are able to switch fully from coal to NG; two cement and one lime facility are able to use incremental alternative fuels to displace ½ of fuel demand (construction waste, biosolids and/or rendered fats)
  - Moderate: (by 2019) all five facilities are able to switch fully from coal to NG; one cement plant is able to use incremental alternative fuels to displace half of the fuel demand (construction waste, biosolids and/or rendered fats)
  - Conservative: (by 2020) four facilities are able to convert at least partially to NG, with one facility using alternative fuels

Cement & Lime – Fuel Switch

Technical Potential Calculation

$TP_{CFS} = \Sigma TP_{CFS,\ plant}$

$TP_{CFS,\ plant} = [CO_2]_{plant} * P_{stationary}$

Where:

TP_{CFS}	= Total Technical Potential for all cement and lime plants that can complete fuel switch including existing projects (t CO_2e)
$TP_{CFS,\ plant}$	= Technical Potential for fuel switch to natural gas or alternative fuels at cement or lime facilities (t CO_2e)
$[CO_2]_{plant}$	= Total Combined Industrial Process and Stationary Combustion Emissions at cement and lime plants (t CO_2e)
$P_{stationary}$	= Percentage of Total Combined Industrial Process and Stationary Combustion Emissions from Stationary Combustion (40%)

Market Potential Calculation

$MP_{CFS} = TP_{,CFS,plant} * D_{price} * D_{design/build} * D_{non\text{-}price}$

MP_{CFS}	= Market Potential (Aggressive, Moderate , or Conservative) (t CO_2e)
D_{price}	= Discount factor representing economic considerations for fuel switch (no discount factor based on price of natural gas and alternative fuels)
$D_{design/build}$	= Discount factor related to time required prior to project commissioning (minimum of 3 years; up to 10 years)
$D_{non\text{-}price}$	= Discount factor that accounts for considerations such as facility decision to implement fuel switch, technical ability of facilities in Technical Potential to displace current fuel and availability of fuel (discount factor of 25% to 75%)

Industrial Forestry – Fuel Switch

Description: Increased use of biomass as a fuel source in the British Columbia industrial forestry industry.

Key Assumptions: Economic activity in the industrial forestry / pulp & paper sector stays constant.

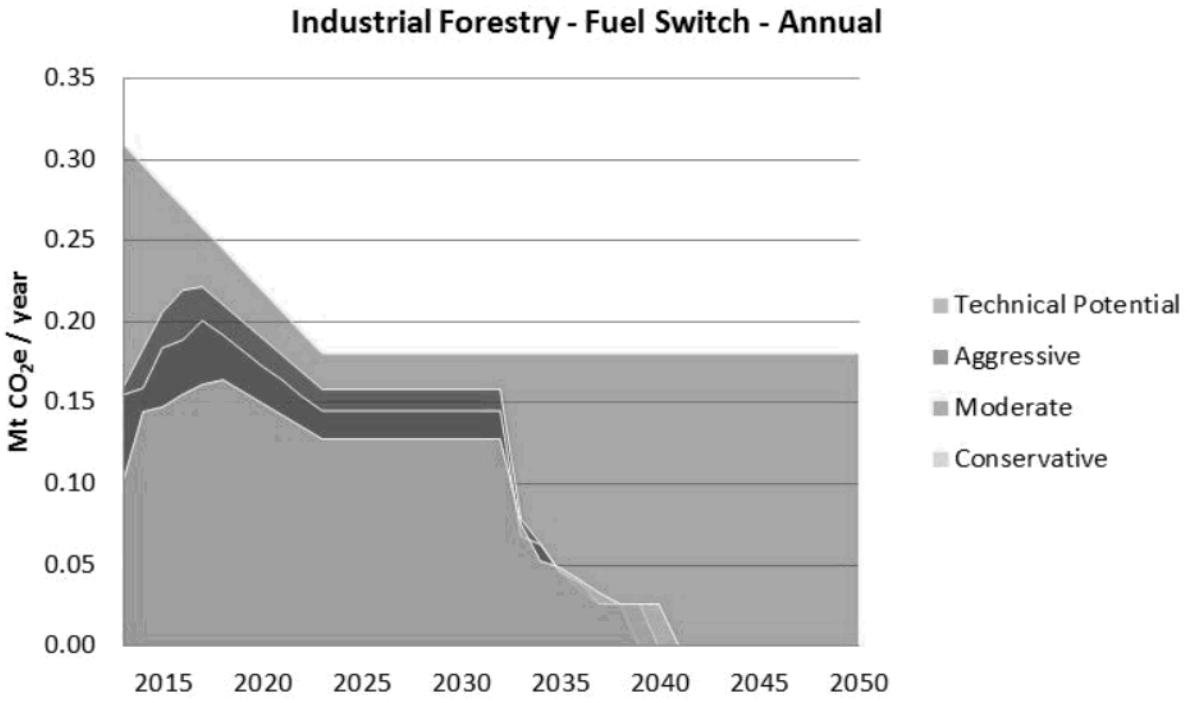
Includes four existing projects representing approximately 50 kt CO_2e in total.

Sharp increases / decreases in Market Potential due to the individual facility approach to the estimates.

Market Potential exhausted prior to 2050 due to impact of crediting period.

Aggressive and Moderate Market Potential ends prior to the Conservative Market Potential due to a more rapid implementation of fuel switching; cumulatively, Aggressive is always larger than Moderate or Conservative.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.28	0.22	0.18	0.18	0.18	0.18	0.18	0.18
Aggressive	0.21	0.19	0.16	0.16	0.05	0.00	0.00	0.00
Moderate	0.18	0.17	0.15	0.15	0.05	0.00	0.00	0.00
Conservative	0.15	0.15	0.13	0.13	0.05	0.03	0.00	0.00



Industrial Forestry – Fuel Switch

Technical Potential Methodology

- Use B.C. GHG Reporting Data to determine fossil fuel combustion emissions from pulp, paper and saw mills emitting more than 25 kt CO_2e / year in combustion emissions, based on 2011 BC GHG Emissions Reporting
  - 18 industrial forestry facilities report emissions from biomass; 16 of those facilities, biomass emissions make up more than 75% of total emissions (12 facilities are greater than 90%). Those facilities assumed to have implemented biomass to the extent possible and excluded from the technical potential.
  - Remaining facilities account for about 0.22 Mt CO_2e total in stationary combustion emissions
  - Included existing offset projects in Technical Potential (4 projects, ~ 12 kt CO_2e / year each)
- Assume Technical Potential decreases by 50% for all facilities except for those with existing projects to account for the impact of the Mountain Pine Beetle on the forest industry
- Assumes that sufficient biomass to supply the demand represented by the Technical Potential is available from the industrial forest industry
- Allocate Technical Potential to Economic Region by facility location

Market Potential Methodology

- Assume a 20 year crediting period; existing offset projects will continue to produce offsets as projected
- Assume no price barrier
  - Four existing offset projects already; biomass use within industrial forestry / pulp & paper is common
  - Assume that at natural gas prices of $5/GJ and carbon prices of $25 / t CO2e and above, there is no price barrier (0% discount factor)
- Non-price barriers
  - Technical ability for facility to implement fuel switch based on ratio of biomass contribution to total stationary combustion emissions (approximately 90% for chemical and mechanical pulp mills, sawmills and newspaper mills; about 50% for softwood veneer and plywood mills)
  - Assume that 6, 8 or 10 additional facilities (i.e. other than existing facilities) implement fuel switch in order from largest to smallest;
- All facility fuel switching occurs within 6 years

Industrial Forestry – Fuel Switch

Technical Potential Calculation

$TP_{IF} = \Sigma TP_{IF,\ plant} + EP$

$TP_{IF,\ plant} = [CO_2]_{plant} * FSR_{biomass}$

TP_{IF}	= Technical Potential for industrial forestry / pulp & paper fuel switch (t CO_2e)
$TP_{IF,\ Plant}$	= Technical Potential for industrial forestry fuel switch / pulp & paper for plants without existing biomass combustion (t CO_2e)
EP	= the annual projected offsets from existing projects (~ 50 kt CO_2e)
$[CO_2]_{plant}$	= the amount of CO_2 from combustion in each plant which do not have existing projects in place (0.25 Mt CO_2e)

Market Potential Calculation

$MP_{IF\ x} = TP_{,IF,Plant} * D_{plant} * D_{non\text{-}price}$

MP_{IF}	= Market Potential (Aggressive, Moderate, Conservative) for industrial forestry / pulp & paper (t CO_2e)
$D_{non\text{-}price}$	= Discount factor for plant decision to implement fuel switch (implementation occurs over 7 year period for each Market Potential (3, 5 or 8 facilities switch fuel); discount factor of between 5% and 25%
D_{price}	= Discount factor to account for price barrier; assume no price barrier exists (no discount)

Large Facilities (>100 kt) – Fuel Switch

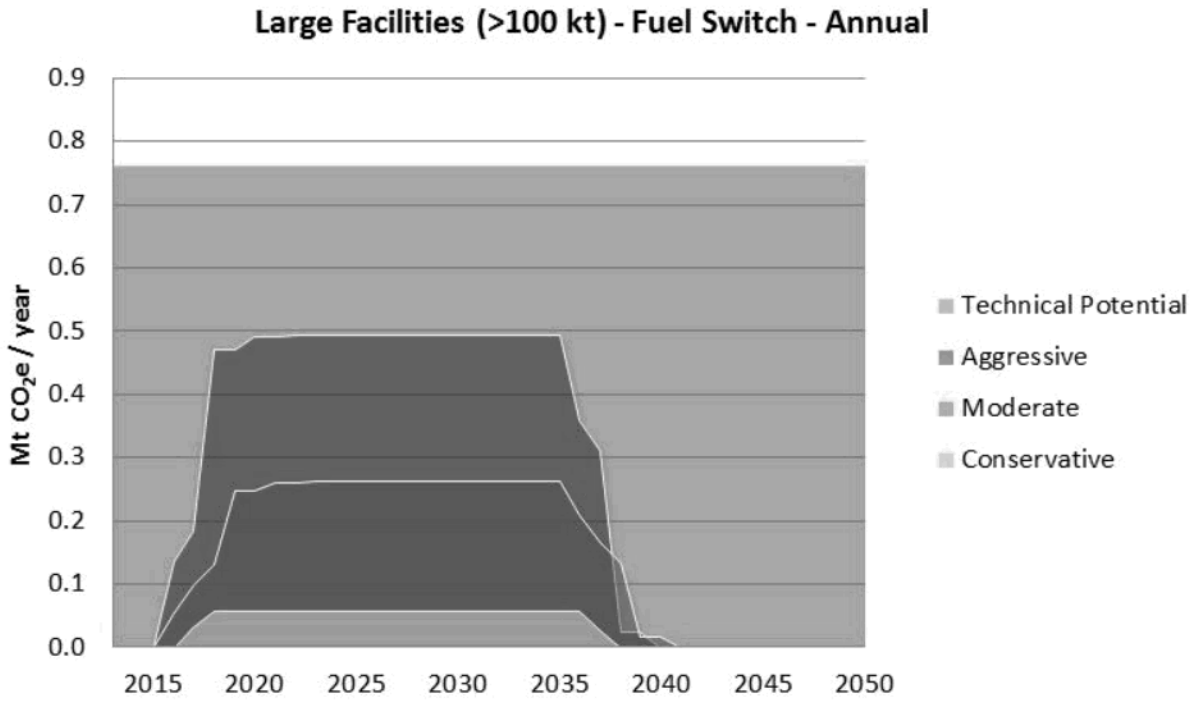
Description: Increased use of biomass and torrefied wood at large final emitter facilities in the mining and smelting industries.

Key Assumptions: Suitability of facilities for fuel switching; availability of biomass at offset prices.

More certainty with respect to Technical Potential compared to Market Potential as fuel switch implementation depends significantly on non-price factors availability of biomass or torrefied wood, technical ability to switch fuel at specialized facilities (e.g. smelting)).

Market Potential exhausted prior to 2050 due to impact of crediting period.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Aggressive	0.00	0.49	0.50	0.50	0.50	0.00	0.00	0.00
Moderate	0.00	0.25	0.26	0.26	0.26	0.02	0.00	0.00
Conservative	0.00	0.06	0.06	0.06	0.06	0.00	0.00	0.00



Large Facilities (>100 kt) – Fuel Switch

Technical Potential Methodology

- Use B.C. GHG Reporting Data; identify about 20 facilities with stationary combustion emissions greater than 100 kt CO_2e
  - Consist mostly of oil and gas facilities (refinery, pipeline, extraction), cement, mining and smelting
- Base Technical Potential on the stationary combustion emissions from mining and smelting (cement, oil and gas facilities are covered in other offset types) – total of nine facilities with stationary combustion emissions of ~0.75 Mt CO_2e/year
- Allocate Technical Potential to Economic Region by facility location (primarily Kootenay, with Thompson Okanagan and Northeast)
- Assume that existing levels of economic activity occur over the study period, no growth

Market Potential Methodology

- Twenty year crediting period
- Assume that sufficient biomass supply is available within lands currently licensed for logging to meet demand represented by the Technical Potential within the Large Facilities category
- Price barriers
  - Assume that at natural gas prices of $5/GJ, no price barrier for fuel switching to biomass or torrefied wood at prices of $50 / t CO_2e or greater; at $25 / t CO_2e, all but two coal mines are prevented from switching fuel based on price
- Time to Implement
  - Assume that fuel switching occurs gradually on a facility-by-facility basis between 2016 and 2023
- Non-price barriers
  - Specialized fuel use in certain industrial applications (e.g. smelting) assumed to prevent fuel switching
  - Between 30% and 70% of fuel is able to be displaced at coal mines; between 0% and 50% of fuel at smelter; no ability to switch in copper mining or alumina production (also sunk costs in recent expansion of Kitimat smelter)

Large Facilities (>100 kt) – Fuel Switch

Technical Potential Calculation

$TP_{LF} = \Sigma [CO_2]_{Facility}$

Where:

TP_{LF}	= technical potential fuel switch for large facilities (t CO_2e)
$[CO_2]_{Facility}$	= stationary combustion emissions from each facility (9 facilities, mining and smelting)

Market Potential Calculation

$MP_{LF} = \Sigma MP_{LF,\ facility}$

$MP_{LF} = TP_{LF,\ facility} * D_{facility}$

MP_{LF}	= Market Potential of Aggressive, Moderate or Conservative scenarios for large facilities (t CO_2e)
$D_{facility}$	= Discount factor for facility decision to implement fuel switch (0% or 100%); between 2 and 5 individual facilities switch fuel within 10 years; assume that Teck Trail and Rio Tinto Alcan Kitimat do not switch fuel over the study period
$D_{non\text{-}price}$	= Discount factor to account for non-price factors (percentage of stationary combustion emissions that can be displaced (discount between 30% to 70%)

Commercial Fleets to Natural Gas

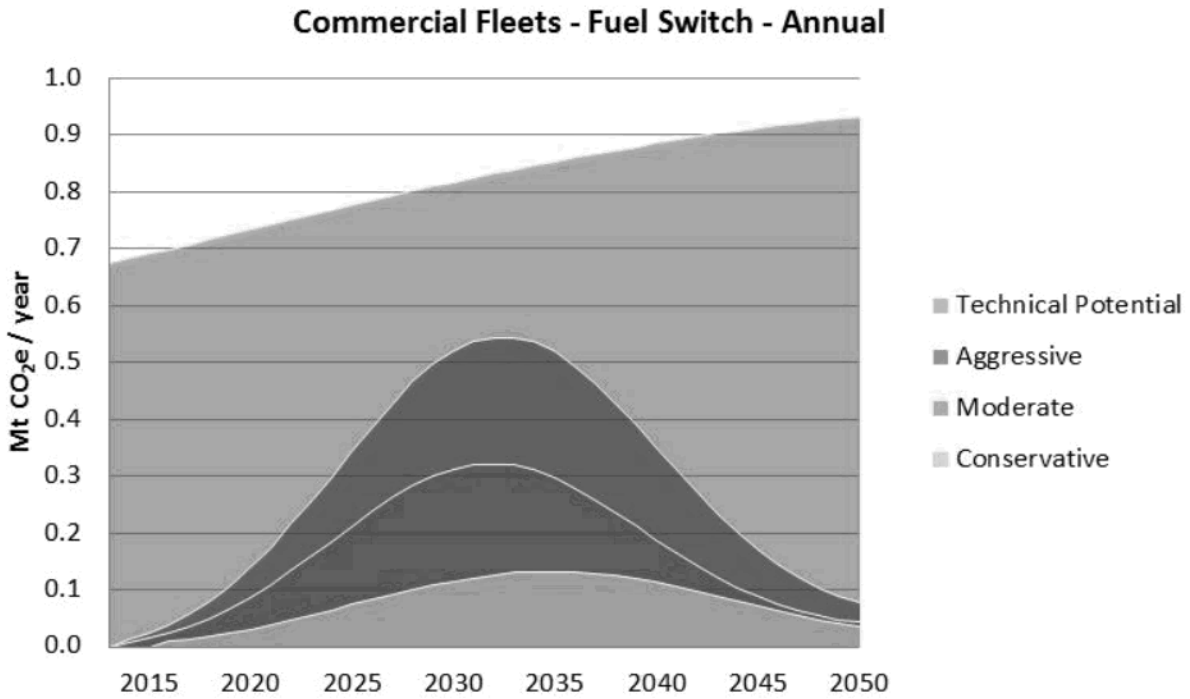
Description: Fuel switch from traditional gasoline and diesel to liquefied natural gas as fuel for commercial fleets operating in British Columbia.

Key Assumptions: Number of eligible commercial vehicles by type of fuel and size; emission reductions available per vehicle.

Technical Potential based on commercial fleet vehicle data from Statistics Canada and interpreted for British Columbia; therefore, high uncertainty in Technical and Market Potentials.

In 2035, the Aggressive Market Potential, about 50,000 vehicles; Moderate Market Potential about 30,000 vehicles, and Conservative Market Potential about 10,000 vehicles. Fortis document aspires to 30,000 by 2030.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.69	0.73	0.78	0.82	0.85	0.89	0.91	0.93
Aggressive	0.02	0.14	0.34	0.52	0.52	0.35	0.17	0.08
Moderate	0.01	0.08	0.21	0.31	0.30	0.19	0.09	0.04
Conservative	0.00	0.03	0.07	0.11	0.13	0.11	0.07	0.03



Commercial Fleets to Natural Gas

Technical Potential Methodology

- Statistics Canada (2009 vintage for Canada and B.C.): transportation data including number of vehicles, vehicle weight category, vehicle kilometres travelled, fuel type and trip purpose
- Estimated fuel volume and type of fuel consumed by commercial vehicles that could be converted from gasoline or diesel to natural gas;
- Assume that a natural gas engine is 95% as efficient as a diesel engine; estimated net emission reductions for each unit of diesel or gasoline displaced by natural gas
- Grow Technical Potential based on population growth
- Distribute Technical Potential between Economic Region based on population

Market Potential Methodology

- Assume a crediting period of 10 years;
- Price factors
  - Fortis *Natural gas fleets are great vehicles for change* indicates that incremental vehicle costs are $6,000 to $45,000 based on the size of vehicle; however, Fortis subsidies reduce maximum price to $9,000 in 2013; growing to $45,000 by 2023 as subsidy expires
  - Assume average fuel prices of for natural gas ($8/GJ), gasoline ($1.36/L), diesel ($1.30/L)
- Time to Implement
  - Assume conversion to natural gas occurs at vehicle retirement (no retrofitting) (5% to 25% of Technical Potential per year by vehicle category; larger vehicles are assumed to have a longer service life)
  - Apply discount factor to account for incremental capital required at purchase, fuel cost savings and revenue from offsets
  - Assume that simple payback period must be less than 3 to 5 years, based on vehicle weight category (discount of 0% to 100% by vehicle size)
- Non-price factors
  - Risk of new technologies; minimal fueling infrastructure in the medium term, capital requests, economies of scale for fleets; apply discount factor of between 60% and 80%

Commercial Fleets to Natural Gas

Technical Potential Calculation

$TP_{CF} = \Sigma_{size} \Sigma_{fuel} TP_{CF, size, fuel}$

Where:

TP_{CF}	= Technical Potential for commercial fleet vehicle conversion to NG from gasoline or diesel (t CO_2e)
$TP_{CF, size, fuel}$	= Technical Potential for commercial fleet vehicle conversion to natural gas (NG), disaggregated by mass and fuel type

$TP_{CF, size, fuel} = KM_{comm, size} * V_{total, size, fuel} * P_{BC} * P_{year}$

Where:

$KM_{comm, size}$	= Percentage of commercial vehicle kilometres to total vehicle kilometers (part of driver's job; or driving to or from service call, carrying goods or equipment, other work purpose)
$V_{total, size, fuel}$	= Estimated amount of fuel consumed by mass and fuel type (< 4.5, 4.5 < x <14.9, and > 14.9 tonnes) gasoline or diesel) (L / year) (*Based on StatsCan data and numerous assumptions; see spreadsheet calculations)*
$P_{BC, size, fuel}$	= Percentage of vehicles by mass and fuel type in British Columbia compared to Canada
P_{year}	= Percentage population growth relative to 2009

Market Potential Calculation

$MP_{CF} = TP_{CF} * D_{turnover} * D_{price} * D_{non\text{-}price}$

MP_{IPM}	= Market Potential for converting commercial fleets from gasoline or diesel to NG (t CO_2e)
$D_{turnover}$	= Discount factor that limits market potential based on the assume turnover (retirement) rate by vehicle size (between 5% and 25% of the Technical Potential annually)
D_{price}	= Discount factor to account for purchase capital, fuel cost savings and offset revenue (0% or 100% by vehicle fuel and mass)
$D_{non\text{-}price}$	= Discount factor to account for non-price factors (risk, fueling infrastructure, fleet size) (60% to 80%)

BC Ferries to Natural Gas

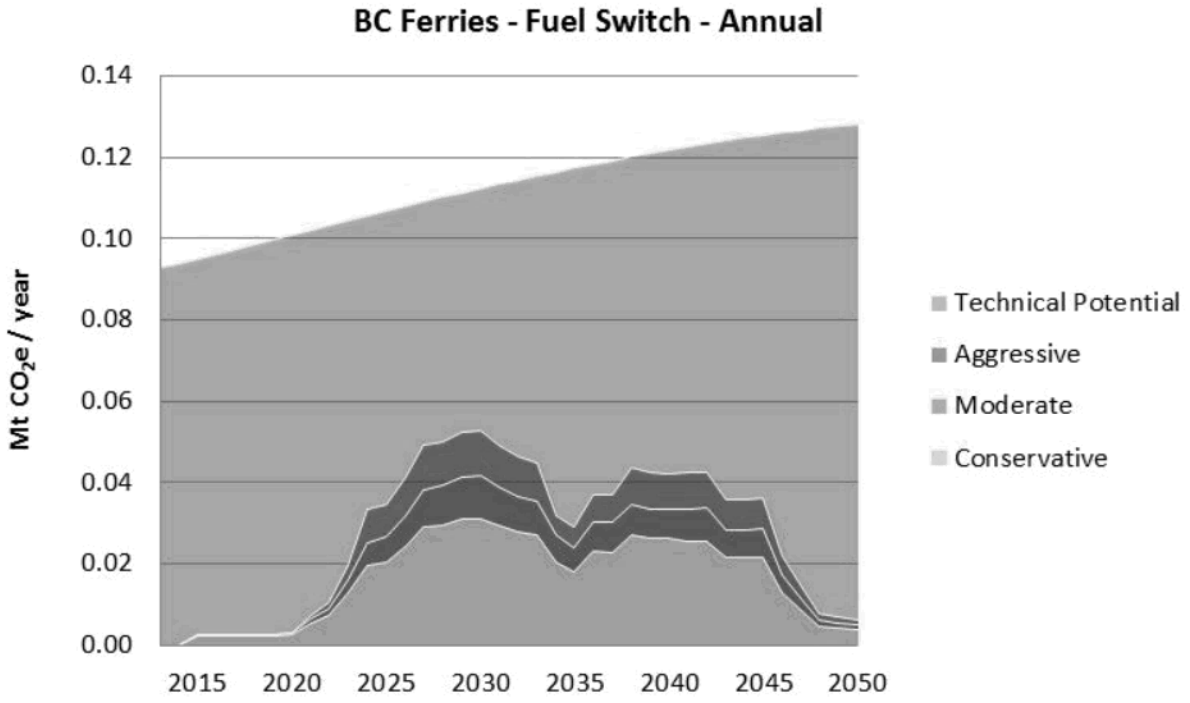
Description: Fuel switch from traditional diesel to liquefied natural gas as fuel in the British Columbia ferry fleet.

Key Assumptions: Decision to implement natural gas switching is based primarily on cost; retirement age of ferries; suitability of retrofit and strategic decisions by BC ferries (e.g. availability of fueling infrastructure).

Fuel switch for Queen of Capilano assumed to be implemented by 2015 in all cases.

Note that the sharp increases and decreases are due to the conversion of numerous ferries over a relatively short period of time, due to groupings of existing ferry vintages.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.13
Aggressive	0.00	0.00	0.03	0.05	0.03	0.04	0.04	0.01
Moderate	0.00	0.00	0.03	0.04	0.02	0.03	0.03	0.00
Conservative	0.00	0.00	0.02	0.03	0.02	0.03	0.02	0.00



BC Ferries to Natural Gas

Technical Potential Methodology

- Pro-rate fuel consumption by ferry based on engine rating and total fuel consumed 2011-2012 (B.C. Ferries website; *BC Ferries Fuel Strategies, March 31, 2013*)
    - Total of ~ 35 vessels in fleet; 10 are more than 40 years old
- Calculate net emissions reductions potential per liter of marine diesel displaced by liquefied or compressed natural gas including impact of engine fuel efficiency (energy efficiency of NG engine estimated to be 95% compared to diesel)
- Estimate volume of fuel by vessel based on engine capacity and total volume of fuel consumed 2011-2012
- Assume all reductions occur in Mainland/Southwest
- Grow potential based on population growth over time

Market Potential Methodology

- Ten year crediting period
- Assume no conversions occur in 2013 or 2014; Queen of Capilano is converted in 2015
- Price factors
    - Average fuel costs estimated at $1.30/L diesel; $12/GJ for NG (including liquefaction)
    - Pro-rate estimated retrofit cost ($10 to $30 million) based on engine rating (information from B.C. Ferries, *Wall Street Journal, Vancouver Sun*)
    - Vessel converts to natural gas if age is greater than 60 years, or if age is greater than 20 years and cost savings over ten years exceed estimated retrofit price (0% or 100%)
- Non-price factors
    - Apply discount to account for non-price factors (feasibility of retrofit, decisions of fleet managers) (10% to 30%)

BC Ferries to Natural Gas

Technical Potential Calculation

$TP_{BCF} = V_{total} * P_{year} * ER_{diesel\ to\ NG}$

Where:

TP_{BCF}	= Technical Potential for entire BC Ferry fleet conversion to natural gas (NG) from diesel (t CO_2e)
V_{total}	= Volume of diesel fuel consumed by BC Ferry fleet in 2011-2012
P_{year}	= Percentage population change relative to 2012
$ER_{diesel\ to\ NG}$	= Emission reduction factor for conversion from diesel to NG based on heating value, engine efficiency and emission factors (~0.78 t CO_2e per m^3 diesel displaced)

Market Potential Calculation

$MP_{BCF} = \Sigma_{vessel}\ MP_{vessel}$

Where:

MP_{BCF}	= Market Potential (Aggressive, Moderate, Conservative) across BC Ferry fleet fuel switch to NG (t CO_2e)
MP_{vessel}	= Market Potential for conversion of a particular BC Ferry to NG (t CO_2e)

$MP_{vessel} = TP_{BCF} * D_{price} * D_{non\text{-}price}$

Where:

MP_{vessel}	= Market Potential for conversion of BC Ferries to NG (t CO_2e)
D_{price}	= Discount factor to account for project economics; if vessel age is greater than 60, then assume replacement NG vessel purchased. If vessel age is less than 55 to 65 years and greater than 25 to 35 years, compare cost of retrofit with cost savings (fuel cost savings, carbon price and tax) (0% or 100%)
$D_{non\text{-}price}$	= Discount to account for non-price factors (10% to 30%)

Compressor Electrification

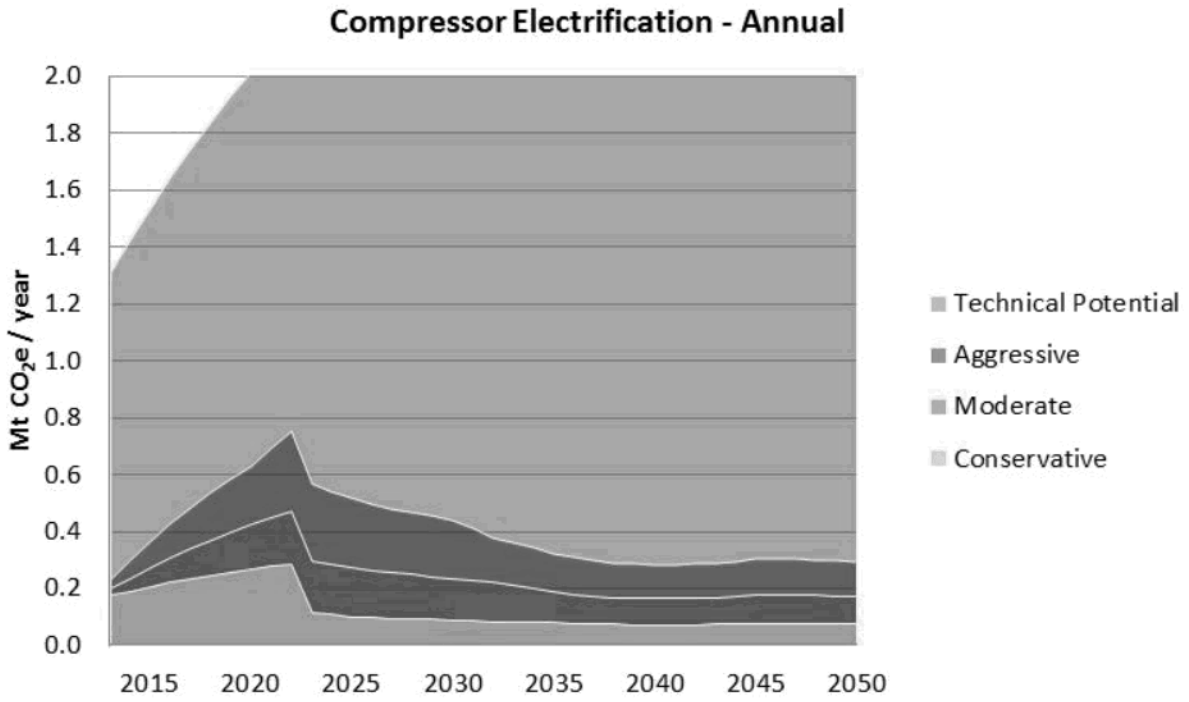
Description: Use of electrified compressors in lieu of natural gas powered compressors at new build (greenfield) gas facilities.

Key Assumptions: Compressors account for the majority of stationary combustion emissions at compressor stations, pipelines, gas plants and gathering systems; 20% of new and existing compression is within reasonable distance of electrical infrastructure.

The Horn River region is assumed to have constraints on electrical infrastructure (and therefore the implementation of electric compression) until between 2020 and 2025.

Strong growth in natural gas production early in the study period increases the opportunity for electrification of compression.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	1.54	2.02	2.36	2.63	2.86	3.06	3.18	3.22
Aggressive	0.37	0.63	0.52	0.44	0.32	0.28	0.31	0.30
Moderate	0.28	0.43	0.27	0.24	0.19	0.17	0.18	0.18
Conservative	0.21	0.27	0.10	0.09	0.08	0.07	0.08	0.08



Compressor Electrification

Technical Potential Methodology

- Estimate Technical Potential based on 2011 BC GHG Reporting Data; include Stationary Combustion emissions from compressors, aggregated compressors, and gas plants (5.8 Mt CO_2e)
    - Conservative compared to results based on emission factors and compressor horsepower
- Because gas compression facilities are often located in remote areas , assume that only 20% of compressors will be located within reasonable distance of necessary grid access
- Assume that existing offset projects continue to generate offsets as expected
- Based on 2011 BC GHG Reporting Data, allocate Technical Potential to Economic Regions
- Technical Potential grows over time with NEB High Case adjusted for proposed LNG production

Market Potential Methodology

- Ten year crediting period; assume existing projects continue to generate offsets as expected
- Price factors
    - Estimate NPV and simple payback period for electric compressor based on incremental capital costs (negligible) and operating costs (Natural Gas Star, PCT and NEB data); decision to implement dependent upon company view of future electricity prices versus natural gas prices
    - At average natural gas price of $3.15/GJ and electricity price of $130 /MWh, NPV negative in all Market Potentials; since there are existing projects, assume price discount factor of 25% to 75%
- Time to Implement
    - Limit Market Potential to conversion of new compressors (greenfield) facilities; base implementation on the annual change in natural gas production (using the NEB High Case adjusted for proposed LNG production); 1 to 13% annual growth
- Non-price considerations
    - Backlog of requests for electricity connections may prevent some implementation
    - Lack of knowledge (actual or perceived risk of equipment failure, risk to operator/decision maker)
    - Assume discount factor of between 10% and 30%
    - Assume that the Horn River region is more limited than the rest of the province in ability to switch to electricity discount the potential 2020 and 2025, discount factor increased by 29% for the Northeast Economic Region based on estimated production from Horn River

Compressor Electrification

Technical Potential Calculation

$TP_{CE} = E_{comp} * R_{elec}$

Where:

TP_{CE}	= Technical Potential for electrification of compressors (t CO_2e)
E	= Estimated stationary combustion emissions for compressors based on 2011 BC GHG Reporting Data (5.8 Mt CO_2e)
R_{elec}	= Ratio of compressors with access to grid supplied electricity (20%)

Market Potential Calculation

$MP_{EC} = TP_{EC} * D_{price} * D_{greenfield} * D_{non\text{-}price}$

MP_{EC}	= Market Potential (Aggressive, Moderate or Conservative) for conversion to electric compression (t CO_2e)
D_{price}	= Discount factor estimated based on NPV and simple payback (no discount for all cases)
$D_{greenfield}$	= Discount factor used to limit opportunity to new (greenfield) compressors, based on annual change in natural gas production in the NEB High Case adjusted for proposed LNG production (1% to 13% of Technical Potential annually)
$D_{non\text{-}price}$	= Discount factor related to non-price factors (10% to 30%; the Northeast is discounted by a further 29% to between 2020 and 2025 due to electrical infrastructure constraints in the Horn River region)

Oil & Gas – Pump Conversion

Description: Replacement of existing pneumatic chemical injection pumps with solar powered pumps and their installation at new build and expanding gas facilities.

Key Assumptions: Emissions reductions per well, and the number of pumps.

Approximately the following number of pumps are replaced (retrofit) or installed new (in addition to the already existing pumps) by 2035 (approximately 17,000 pumps currently):

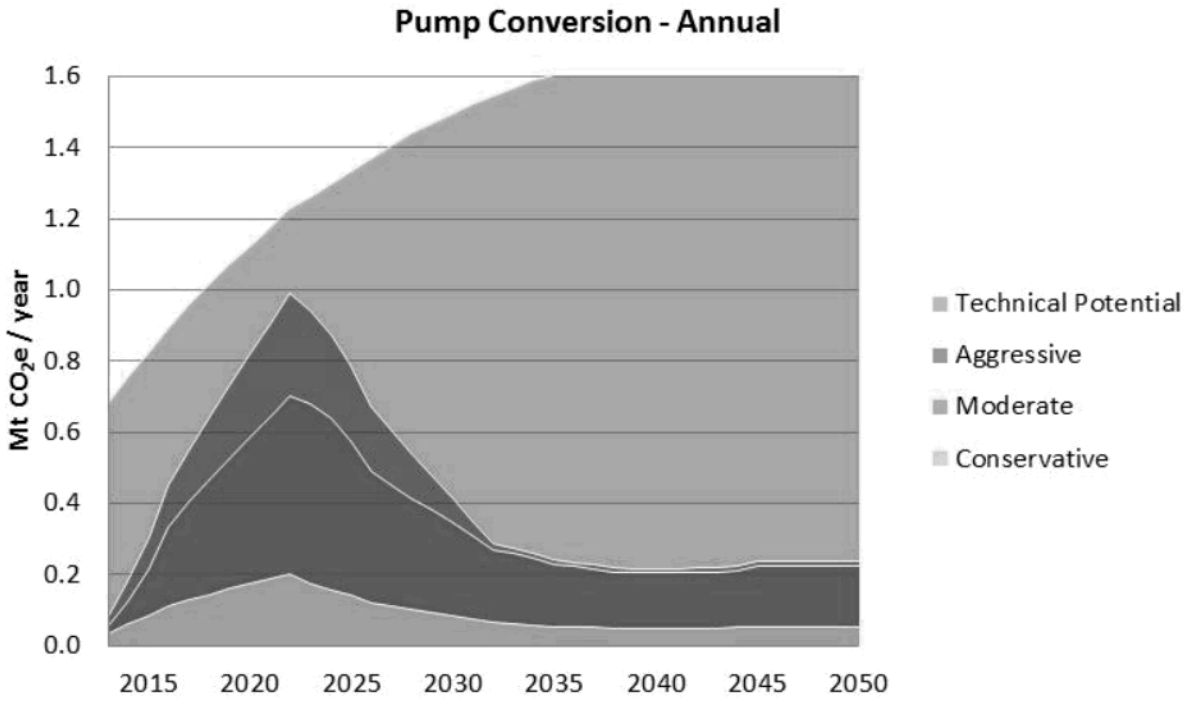
Aggressive: 23,500
Moderate: 16,500
Conservative: 5,000

Estimates include existing projects that generate about 35,000 t CO_2e of offsets annually.

Strong growth in Market Potential early in the study period due to replacement of existing pumps and growth in natural gas production in the province.

Technical Potential reaches 2 Mt CO_2e by 2050.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.83	1.12	1.33	1.49	1.60	1.74	1.87	2.00
Aggressive	0.30	0.82	0.79	0.42	0.24	0.22	0.24	0.24
Moderate	0.22	0.59	0.58	0.34	0.23	0.21	0.22	0.22
Conservative	0.08	0.17	0.14	0.08	0.05	0.05	0.05	0.05



Oil & Gas – Pump Conversion

Technical Potential Methodology

- Assume that pumps can be installed new or retrofit; for existing pumps (retrofit), use B.C. Oil and Gas Commission Data and Blue Source document to determine current number of wells and gas gathering facilities;
    - Assume 1.8 pumps per well and 4 pumps per gas gathering system; subtract already converted pumps (Blue Source)
- New pumps (greenfield) based estimate of existing pumps and percentage change in projected natural gas production
- Use WCI methodology to determine pump emission factor tonnes CO_2e/year per pump (48 t CO_2e/year)
- Based on 2011 BC GHG Reporting Data, assume that Technical Potential exists only in the Northeast
- Technical Potential grows over time with NEB High Case adjusted for proposed LNG production

Market Potential Methodology

- Assume 10 year crediting period and existing projects continue to generate offsets as expected
- Apply discount factor to account for economic choice
    - Estimate of $11,250 for retrofit of pump (PCT) and $7,200 incremental for greenfield pump (Blue Source)
    - At average natural gas price of $3.15/GJ, NPV negative for new and existing pumps at $25 (discount factor 75%); slightly negative for existing pumps at $50 (discount factor 50%); no discount for all other cases.
- Non-price barriers (Blue Source)
    - Lack of knowledge (actual or perceived risk of equipment failure, risk to operator/decision maker, unfamiliar technology)
    - Existing technology (pneumatic pumps) are simple, reliable and common
    - Opportunity may not be large enough small producers with few pumps
    - Bureaucracy, focus on production
    - Sunk cost for existing pumps
    - Apply discount factors to greenfield (10% to 20%) and retrofits (30% to 70%)

Oil & Gas – Pump Conversion

Technical Potential Calculation

$TP_{CSP} = (N_{existing} + N_{new}) * EF_{pump} + EP$

Where:

TP_{CSP}	= Technical Potential for conversion to solar pump (t CO_2e)
$N_{esisting}$	= Number of existing chemical pumps eligible for conversion to solar (number of pumps)
N_{new}	= Number of new chemical pumps eligible for conversion to solar (number of pumps)
EF_{pump}	= Estimated average emission reduction per pump (47 t CO_2e / pump)
EP	= Existing project offsets (t CO_2e)

$N_{existing} = ([GW * P_{GW}] + [GGS * P_{GGS}]) * P_C$

GW	= Number of gas wells in British Columbia
P_{GW}	= Average number of pumps per gas well (estimate 1.8 pumps per well)
GGS	= Number of gas gathering systems in British Columbia
P_{GGS}	= Average number of pumps per gas gathering site (estimate 4 pumps per gas gathering system)
P_C	= Percentage of pumps already converted to solar (11.8%)

$N_{new} = EF_{production} * P_{NG}$

$EF_{production}$	= Estimated Technical Potential per million cubic meters gas production based on data used to calculate $N_{existing}$
P_{NG}	= Percentage increase in natural gas production under High Case adjusted for LNG (year over year)

Market Potential Calculation

$MP_{CSP} = TP_{CSP} * D_{price} * D_{non\text{-}price} * D_{implement}$

MP_{CPS}	= Market Potential (Aggressive, Moderate , or Conservative) (t CO_2e)
$D_{implement}$	= Discount factor related to cost of conversion compared to revenue from carbon price (%)
$D_{non\text{-}price}$	= Discount factor related to non-price factors (e.g. company choice) (10% to 30%)
$D_{non\text{-}price}$	= Discount factor related to economic choice based on estimated simple payback and NPV calculations

High / Low / No Bleed and Instrument Air

Description: Replacement of high or low bleed valves with low or no bleed valves at new build and existing British Columbia gas facilities; or replacement of pressurized natural gas with pressurized air.

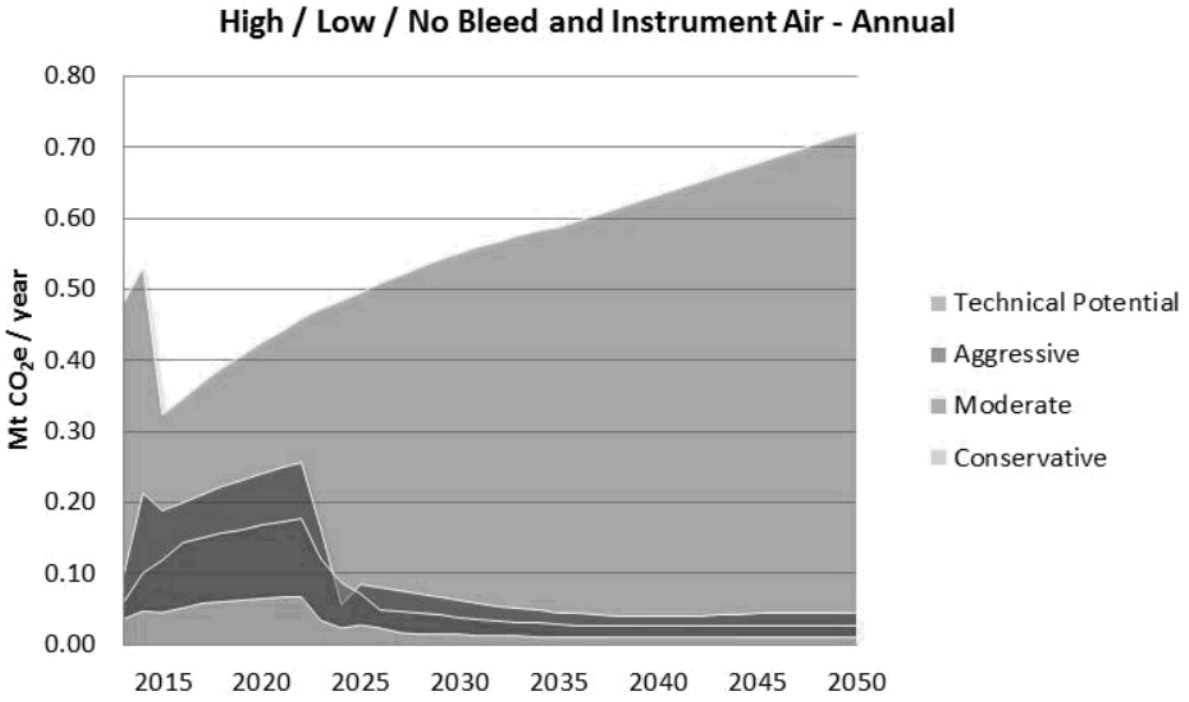
Minimal Technical and Market Potential for high to low bleed conversion due to metering requirements for high bleed valves in 2015 (360-1 of the GHG Reporting Regulation).

The sudden decline in the Technical Potential in 2015 is due to the implementation of 360-1 of the GHG Reporting Regulation, reducing offset generation to low bleed valves.

Includes offsets from existing instrument air project generating between 25 and 50 kt per year.

The Moderate Market Potential exceeds the Aggressive Market Potential in the late 2020's due to a more rapid implementation of low / no bleed and instrument air projects; cumulatively, the Aggressive Market Potential is always larger than the Moderate or Conservative.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.32	0.42	0.50	0.55	0.59	0.63	0.68	0.72
Aggressive	0.19	0.24	0.09	0.06	0.05	0.04	0.04	0.04
Moderate	0.12	0.17	0.07	0.04	0.03	0.02	0.03	0.03
Conservative	0.04	0.07	0.03	0.01	0.01	0.01	0.01	0.01



High / Low / No Bleed and Instrument Air

Technical Potential Methodology

- Determine number of gas gathering systems and gas wells using BC Oil and Gas Commission Data
- Assume that all gas processing plants will have instrument air already; only wells and gas gathering systems are candidates
- Assume market penetration is 64% for high bleed controllers, (US EPA) assume this is the case in British Columbia
- Assume 1.25 valves per well battery and gas gathering facilities; 97% uptime
- Assume 50 t CO_2e/valve/year, 20 t CO_2e/valve/year and negligible emissions from high, low and no bleed valves, respectively
- Technical Potential grows over time with NEB High Case adjusted for proposed LNG production
- Assume that by 2015 companies will have replaced valves or installed measurement equipment per 360-1 of the GHG Reporting Regulation, post-2015, Technical Potential available from low bleed valves only
- Assume that all Technical Potential is in the Northeast, based on 2011 BC GHG Reporting Data

Market Potential Methodology

- Assume a ten year crediting period
- Existing instrument air project continues to generate offsets
    - In Aggressive and Moderate Market Potential, offsets from existing project increase by 100% to 57 kt CO2e by 2016 and 2019, respectively; in Conservative Market Potential, project is not expanded
- Price barrier
    - Retrofit cost ranges from $500 - $2,000 per valve to convert between low and no bleed;
    - At average natural gas price of $3.15/GJ, positive NPV for all valve conversion; simple payback occurs over very short period of time; negative NPV for all instrument air; discount factor driven primarily by offset price (0% for all cases)
- Time to Implement
    - Assume that conversion of eligible valves takes between 5 and 10 years to fully implement
- Non-price barriers (Blue Source)
    - Not common practice to replace controllers prior to their retirement age
    - Opportunity may not be large enough small producers with few controllers
    - Bureaucracy, focus on production, uncertain status of 360-1 of the GHG Reporting Regulation
    - Apply discount to account for non-price factors (50% to 90%)

High / Low / No Bleed and Instrument Air

Technical Potential Calculation

$TP_{HBLB} = [P_{HB} * EF_{HB} + P_{LB} * EF_{LB}] * N_{eligible\ valves} + TP_{EP}$

TP_{HBLB}	= Technical Potential for conversion of high and low bleed valves to no bleed valves or instrument air
P_{HB}	= Percentage of eligible high bleed valves (64%)
EF_{HB}	= Emission factor for low bleed valve (~50 t CO_2e/valve/year)
P_{LB}	= Percentage of eligible high bleed valves (36%)
EF_{LB}	= Emission factor for low bleed valve (~20 t CO_2e/valve/year)
N_{valves}	= Number of valves eligible for conversion in British Columbia gas wells and gas gathering systems
TP_{EP}	= the maximum quantity of offsets projected to be available from existing instrument air project (t CO_2e / yr)

$N_{eligible\ valves} = [GW * V_{GW} + GGS * V_{GGS}] * V_{safety}$

GW	= Number of gas wells in British Columbia (9,240)
GGS	= Number of gas gathering systems in British Columbia (107)
V_{GW}	= Valves per gas well (1.25)
V_{GGS}	= Valves per gas gathering site (1.25)

Market Potential Calculation

$MP_{HBLB} = TP_{HBLB} * D_{implement} * D_{non\text{-}price} * D_{price} + TP_{EP, A}$

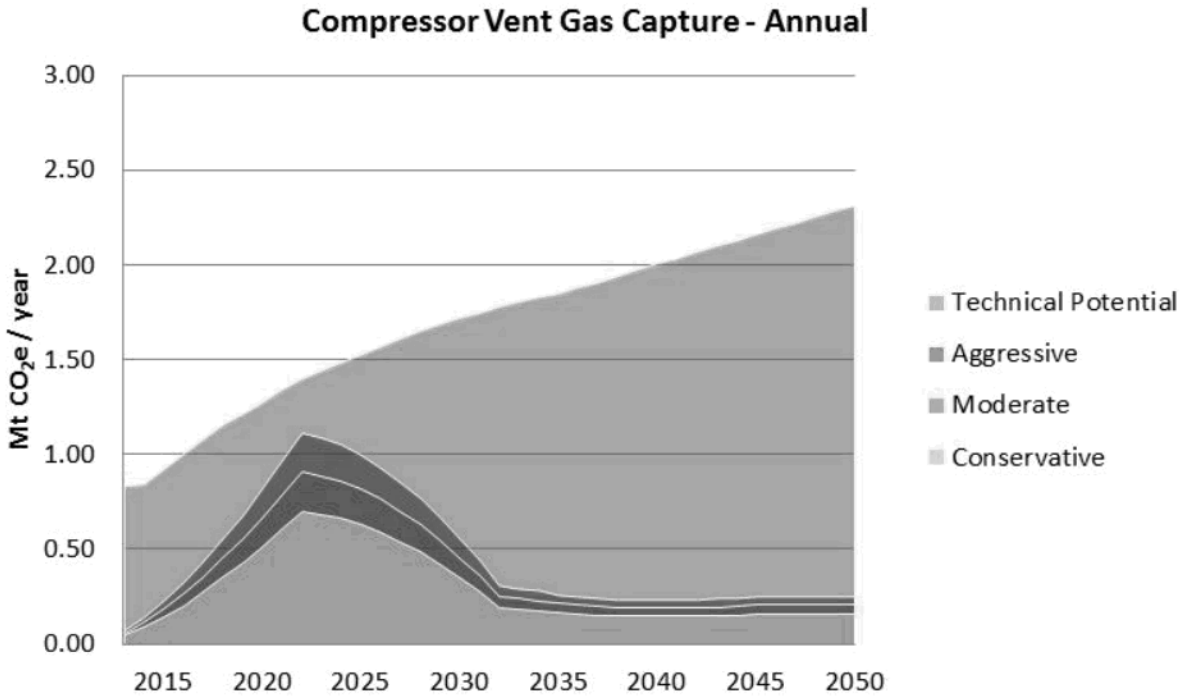
MP_{HBLB}	= Market Potential (Aggressive, Moderate , or Conservative) for conversion from high to low bleed (t CO_2e)
$D_{implement}$	= Discount factor related to time required to implement (between 5 and 10 years)
$D_{non\text{-}price}$	= Discount factor for non-price considerations (between 50% and 90%)
D_{price}	= Discount factor for price factors (0% for all cases)
TP_{EP}	= the adjusted quantity of offsets projected to be available from existing instrument air project; depends on potential for future project expansion (t CO_2e / yr)

Oil & Gas – Compressor Vent Gas Capture

Description: Recovery of natural gas at atmospheric pressure that is normally vented to the atmosphere via engineered vents in new and existing British Columbia compressor facilities. Specifically, this opportunity pertains to Slipstream technology, which must be paired with engines that have system management capability (i.e. fuel to air ratio and heating value compensation).

Key Assumptions: Venting emissions per compressor; number of suitable compressors.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.92	1.28	1.53	1.72	1.85	2.01	2.16	2.32
Aggressive	0.22	0.82	1.00	0.56	0.26	0.23	0.25	0.25
Moderate	0.18	0.66	0.81	0.45	0.21	0.19	0.20	0.20
Conservative	0.14	0.51	0.63	0.35	0.16	0.14	0.16	0.16



Oil & Gas – Compressor Vent Gas Capture

Technical Potential Methodology

- Use Oil and Gas Commission data to determine number of compressors with >100hp (818 compressors)
- Assume that vent capture potential is equivalent to the sum of emissions from dehydrator venting, reciprocating and centrifugal compressor vents and 50% of equipment leaks from valves, connectors, etc. based on 2011 BC GHG Reporting Data (~0.65 Mt CO_2e)
- Assume current market penetration is less than 1% (Blue Source market survey)
- Allocate Technical Potential to Economic Regions based on fugitive emissions in 2011 BC GHG Reporting Data (mostly occurring in the Northeast)
- Technical Potential conservatively adjusted for compressor electrification based on the assumption that Aggressive Market Potential for electrification of compressors occurs; and per compressor, 10% of vented emissions can be reduced via electrification
- Technical Potential grows over time with NEB High Case adjusted for proposed LNG production

Market Potential Methodology

- Assume a ten year crediting period
- Financial barriers
  - Estimate NPV and simple payback based on capital cost of $50,000 (Slipstream) gas savings and offset revenue
  - At average natural gas price of $3.15/GJ, NPV positive and simple payback in less than 1 year in all cases
- Timing barriers
  - Planning and evaluation of technologies; capital requests process, maintenance schedule
  - Apply discount factor to account for time required to implement vent capture technology (occurs over a 10 year period)
- Non-price barriers (Blue Source)
  - Lack of knowledge (actual or perceived risk of equipment failure – relative to no equipment required, risk to operator/decision maker, unfamiliar technology)
  - Unsuitable compressor for unforeseen technical reasons
  - Bureaucracy
  - Apply discount factors between 20% and 50%

Oil & Gas – Compressor Vent Gas Capture

Technical Potential Calculation

$TP_{VG} = N_{EC} * EF_{compressor}$

Where:

TP_{VG}	= Technical Potential for vent gas capture (t CO_2e)
N_{EC}	= Number of compressors eligible for vent gas capture, >100 hp (818 compressors)
$EF_{compressor}$	= Estimated average emission reduction per compressor (~800 t CO_2e / compressor / year)
EL	= Reduction in Technical Potential due to electrification of compressors under the Aggressive Market Potential

Market Potential Calculation

$MP_{VG} = TP_{VG} * D_{implementation} * D_{non\text{-}price} * D_{price}$

MP_{VG}	= Market Potential (Aggressive, Moderate, Conservative) for vent gas capture (t CO_2e)
$D_{implementation}$	= Discount factor estimated based on time required for companies to implement technology
$D_{non\text{-}price}$	= Discount factor related to non-price factors (e.g. perceived reliability, unknown technology) (between 20% and 50%)
D_{price}	= Discount factor related to the price of vent gas capture; positive NPV and short simple payback (0%)

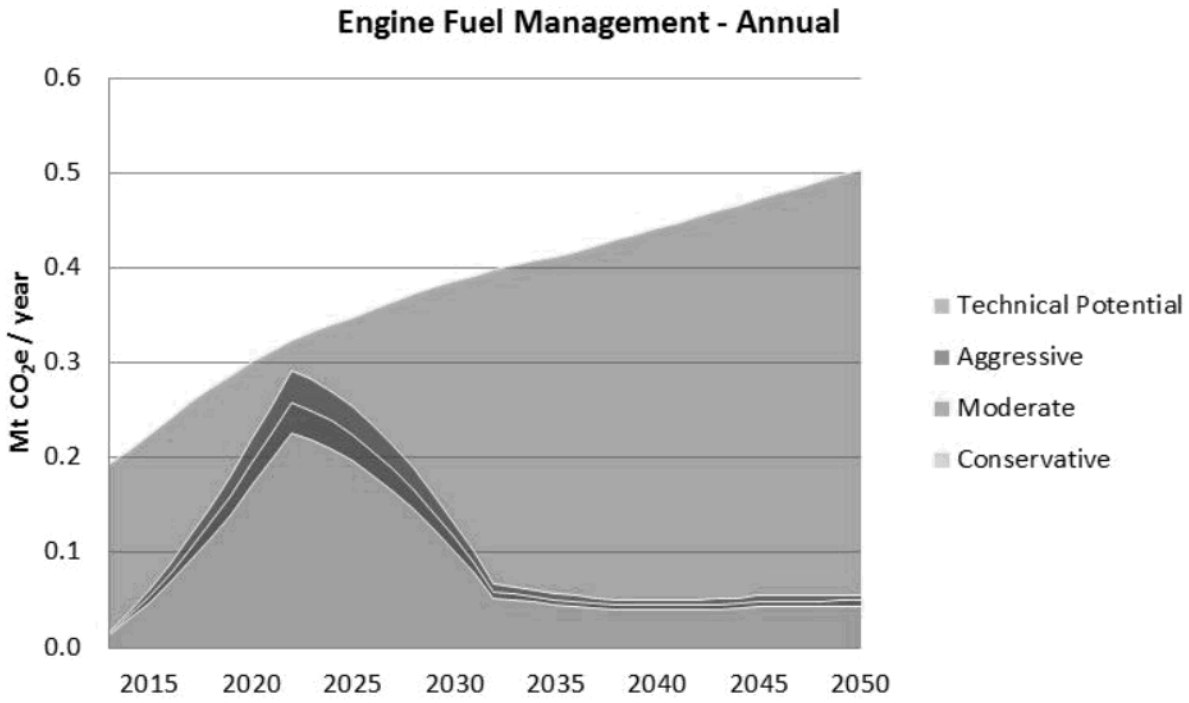
Oil & Gas – Engine Fuel Management

Description: Installation of fuel-air ratio controllers on natural gas powered engines at new build and existing British Columbia gas facilities.

Engine management equipment allows engine operation at lower fuel-to-air ratios, or lean mixtures as opposed to rich mixtures (high fuel to air ratio). Lean mixtures reduce greenhouse gas emissions via increased fuel efficiency and methane emissions by reducing incomplete combustion. Engine management can also facilitate the implementation of other technologies, such as vent gas capture.

Key Assumptions: Number of compressors that are able to implement engine fuel management systems.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.23	0.30	0.35	0.39	0.41	0.44	0.47	0.50
Aggressive	0.06	0.22	0.25	0.13	0.06	0.05	0.06	0.06
Moderate	0.05	0.19	0.22	0.12	0.05	0.04	0.05	0.05
Conservative	0.05	0.17	0.20	0.10	0.04	0.04	0.04	0.04



Oil & Gas – Engine Fuel Management

Technical Potential Methodology

- Use Oil and Gas Commission data to determine number of compressors with >100hp (818 compressors)
  - Assume engine management system is able to reduce emissions at each compressor by 500 t CO_2e on average (approximately 10% of compressor stationary combustion emissions in 2011 BC GHG Reporting Data)
- Adjust for facilities with existing engine management (5%); assume that 50% of BC Natural Gas driven engines would be ideal candidates to be retrofitted with engine fuel management (Petroleum Technology Alliance Canada - PTAC)
- Allocate Technical Potential to Economic Regions based on 2011 BC GHG Reporting Data (mostly in the Northeast)
- Technical Potential conservatively adjusted for compressor electrification based on the assumption that Aggressive Market Potential for electrification of compressors occurs (assume no opportunity for engine fuel management in electric compressors)
- Technical Potential grows over time with NEB High Case adjusted for proposed LNG production

Market Potential Methodology

- Ten year crediting period
- Financial barriers
  - Estimate NPV and simple payback based on capital cost of $138,000 (REMvue)
  - At average natural gas price of $3.15/GJ, NPV positive and simple payback in 1.7 to 3.2 years; assume no price barrier
- Timing barriers
  - Planning and evaluation of technologies; capital requests process, maintenance schedule
  - Apply discount factor to account for time required to implement engine management technology (occurs over 10 years)
- Non-price barriers (Blue Source)
  - Lack of knowledge (actual or perceived risk of equipment failure – relative to no equipment required, risk to operator/decision maker, unfamiliar technology)
  - Bureaucracy
  - Apply discount factors between 10% and 30%

Oil & Gas – Engine Fuel Management

Technical Potential Calculation

$TP_{EFM} = N_{engines} * EF_{EFM} * P_{engines} * P_{installed} - EL$

Where:

TP_{EFM}	= Technical potential for engine fuel management (t CO_2e)
$N_{engines}$	= Estimated number of engines in British Columbia with rating greater than 100 hp (>800; Oil and Gas Commission)
EF_{EFM}	= Estimated emission reductions possible per engine (500 t CO_2e/engine)
$P_{engines}$	= Ratio of compressors that are technically able to implement engine management (50%)
$P_{installed}$	= Percentage of technically available compressors that have already implemented engine management technology (5%)
EL	= Reduction in Technical Potential due to electrification of compressors under the Aggressive Market Potential

Market Potential Calculation

$MP_{EFM} = TP_{EFM} * D_{implementation} * D_{price} * D_{non\text{-}price}$

Where:

MP_{EFM}	= Market Potential (Aggressive, Moderate, Conservative) for engine fuel management (t CO_2e)
$D_{implementation}$	= Discount factor related time required to implement engine management (occurs over 10 years in all scenarios)
D_{price}	= Discount factor related to cost of implementing engine fuel management (no discount for all Market Potentials)
$D_{non\text{-}price}$	= Discount factor to account for non-price factors preventing implementation (between 10% and 30%)

Buildings – NG Energy Efficiency

Description: Reduced use of natural gas within the British Columbia commercial and institutional building sector through the implementation of energy efficiency measures.

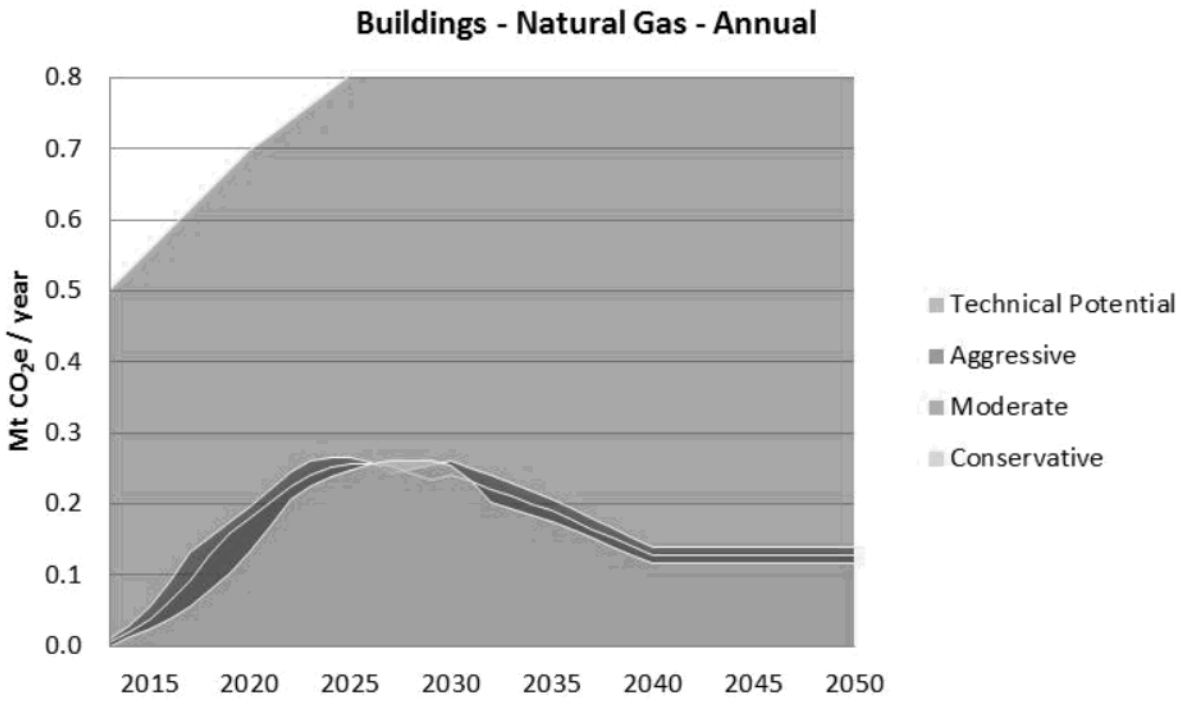
Key Assumptions: Conservation Potential Review ("CPR") "Aggressive" scenario is implemented relative to the CPR "Economic" scenario; impact of offset price on cost of conserved energy.

Technical and Market Potentials based on Commercial savings identified in Fortis CPR from 2010.

Greater certainty in Technical Potential compared to Market Potential as offset generation depends on non-price factors (e.g. protocol quantification requirements).

The Conservative Market Potential exceeds the Moderate and Aggressive Market Potentials in the late 2020's due to the delayed implementation in the Conservative Market Potential; cumulatively, the Aggressive and Moderate Market Potentials are always larger than the Conservative Market Potential.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.56	0.70	0.80	0.89	0.93	0.97	1.02	1.06
Aggressive	0.05	0.19	0.26	0.26	0.21	0.14	0.14	0.14
Moderate	0.04	0.18	0.26	0.24	0.19	0.13	0.13	0.13
Conservative	0.02	0.13	0.25	0.25	0.17	0.12	0.12	0.12



Buildings – NG Energy Efficiency

Technical Potential Methodology

- Use Fortis BC Conservation Potential Review ("CPR"), industrial natural gas energy efficiency potential
- Average potential identified by CPR without price of offsets 2015 to 2030: Economic (535 kt CO_2e/ year), Likely (140 kt CO_2e/year), Aggressive (195 kt CO_2e/year)
- Adjust CPR "Economic" scenario for prices greater than $100 / t CO_2e offsets to obtain Technical Potential (increase energy efficiency gains by 35% over the Reference case)
- Estimate allocation of Technical Potential to Economic Regions based on geographic categories identified in CPR (Lower Mainland, Northern Interior, Southern Interior, Vancouver Island); Technical Potential outside of Fortis service area (Pacific Northern Gas) estimated based on population and CPR data
- Extrapolate growth in Technical Potential over time past CPR outlook of 2030 using 2025-2030 average

Market Potential Methodology

- Assume a 10 year crediting period
- Carbon price effectively increases the price of natural gas between approximately $1.30 and $5 per GJ
- Base Market Potential (price and non-price factors included) on "Aggressive" CPR scenarios (increased between 15% and 36% based on review of cost of conserved energy discussion with experts)
- Assume that "Economic " and "Aggressive' cases maintain a consistent relationship based on expert discussion and review of
- CPR "Aggressive" scenario accounts for price and non-price factors

Buildings – NG Energy Efficiency

Technical Potential Calculation

$TP_{MEE} = CPR_{economic} * P_{economic}$

Where:

TP_{MEE}	= Technical Potential for energy efficiency in the manufacturing sector (all activities) (t CO_2e)
$CRP_{economic}$	= Fortis Conservation Potential Review (CPR) "Economic" case for the Commercial sector (GJ of NG savings relative to Reference Case)
$P_{economic}$	= Estimated increase in natural gas savings with "Economic" case at high price of carbon (> $100 / t CO_2e) (increase of 36%)

Market Potential Calculation

$MP_{MEE} = CPR_{aggressive} * P_{economic} * D_{implement}$

Where:

MP_{MEE}	= Market Potential (Aggressive, Moderate, Conservative) for building energy efficiency (t CO_2e)
$CRP_{aggressive}$	= Fortis Conservation Potential Review (CPR) "Aggressive" case for the Commercial sector (GJ of NG savings relative to Reference Case)
$P_{economic}$	= Estimated increase in natural gas savings with "Aggressive" at the Aggressive, Moderate and Conservative carbon prices (between 15% and 36%)
$D_{implement}$	= Discount factor for implementation of offset projects (5 to 10 years)

Manufacturing – NG Energy Efficiency

Description: Reduced use of natural gas within the British Columbia industrial sector through the implementation of energy efficiency measures.

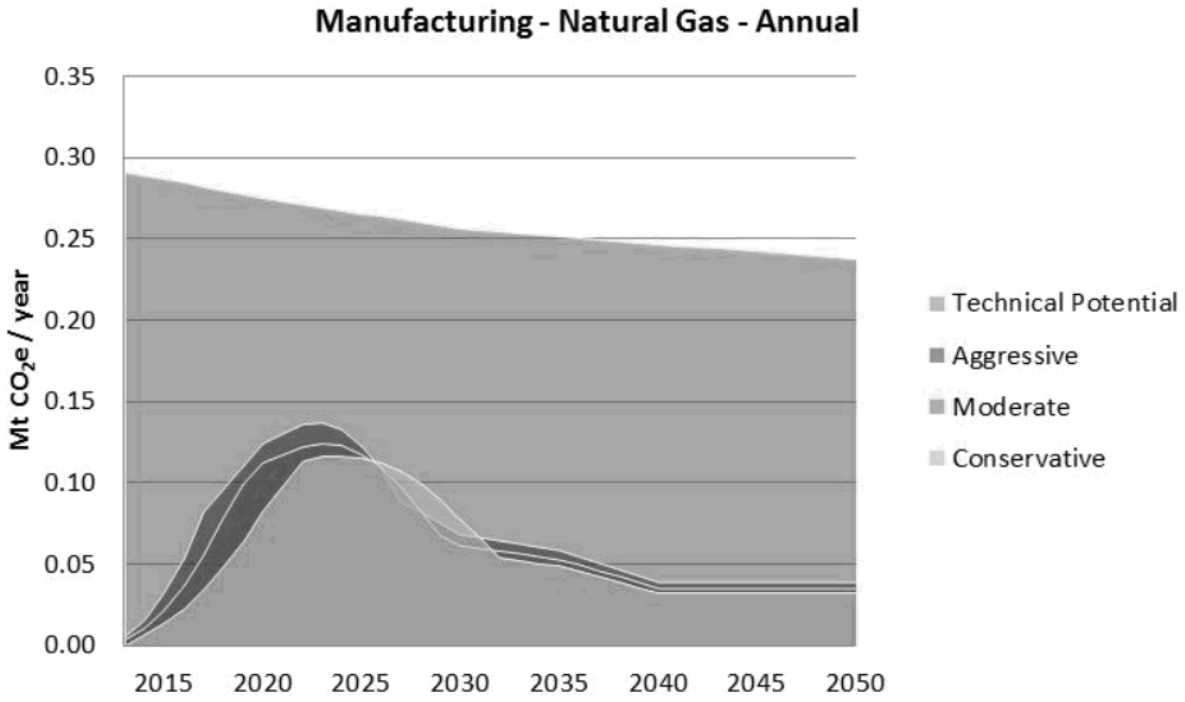
Key Assumptions: Conservation Potential Review ("CPR") "Aggressive" scenario is implemented relative to the CPR "Economic" scenario; impact of offset price on cost of conserved energy.

Technical and Market Potentials based on Industrial savings identified in Fortis CPR from 2010.

More certainty with respect to Technical Potential compared to Market Potential as offset generation depends on non-price factors (e.g. quantification required by protocol).

The Conservative Market Potential exceeds the Moderate and Aggressive Market Potentials in the late 2020's due to the delayed implementation in the Conservative Market Potential; cumulatively, the Aggressive and Moderate Market Potentials are always larger than the Conservative Market Potential.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.24
Aggressive	0.03	0.12	0.12	0.07	0.06	0.04	0.04	0.04
Moderate	0.02	0.11	0.12	0.06	0.05	0.04	0.04	0.04
Conservative	0.01	0.08	0.11	0.08	0.05	0.03	0.03	0.03



Manufacturing – NG Energy Efficiency

Technical Potential Methodology

- Use Fortis BC Conservation Potential Review ("CPR"), industrial natural gas energy efficiency potential
- Average potential identified by CPR without price of offsets 2015 to 2030: Economic (175 kt CO_2e/ year), Likely (60 kt CO_2e/year), Aggressive (90 kt CO_2e/year)
- Adjust CPR "Economic" scenario for prices greater than $100 / t CO_2e offsets to obtain Technical Potential (increase energy efficiency gains by 39% over the Reference case)
- Estimate allocation of Technical Potential to Economic Regions based on geographic categories identified in CPR (Lower Mainland, Northern Interior, Southern Interior, Vancouver Island); Technical Potential outside of Fortis service area (Pacific Northern Gas) estimated based on population and CPR data
- Extrapolate growth in Technical Potential over time past CPR outlook of 2030 using 2025-2030 average

Market Potential Methodology

- Assume a 10 year crediting period
- Carbon price effectively increases the price of natural gas between approximately $1.30 and $5 per GJ
- Base Market Potential (price and non-price factors included) on "Aggressive" CPR scenarios (increased between 15% and 36% based on discussion with experts)
- Assume that "Economic " and "Aggressive' cases maintain a consistent relationship based on expert discussion
- CPR "Aggressive" scenario accounts for price and non-price factors

Manufacturing – NG Energy Efficiency

Technical Potential Calculation

$TP_{MEE} = CPR_{economic} * P_{economic}$

Where:

TP_{MEE}	= Technical Potential for energy efficiency in the manufacturing sector (all activities) (t CO_2e)
$CRP_{economic}$	= Fortis Conservation Potential Review (CPR) "Economic" case for the Industrial sector (GJ of NG savings relative to Reference Case)
$P_{economic}$	= Estimated increase in natural gas savings with "Economic" case at high price of carbon (> $100 / t CO_2e) (increase of 39%)

Market Potential Calculation

$MP_{MEE} = CPR_{aggressive} * P_{economic} * D_{implement}$

Where:

MP_{MEE}	= Market Potential (Aggressive, Moderate, Conservative) manufacturing energy efficiency (t CO_2e)
$CRP_{aggressive}$	= Fortis Conservation Potential Review (CPR) "Aggressive" case for the Industrial sector (GJ of NG savings relative to Reference Case)
$P_{economic}$	= Estimated increase in natural gas savings with "Aggressive" at the Aggressive, Moderate and Conservative carbon prices (between 15% and 39%)
$D_{implement}$	= Discount factor for implementation of offset projects (5 to 10 years)

Waste Diversion

Description: Diversion of organic waste from British Columbia landfill results in reduced methane emissions via anaerobic decomposition of the waste.

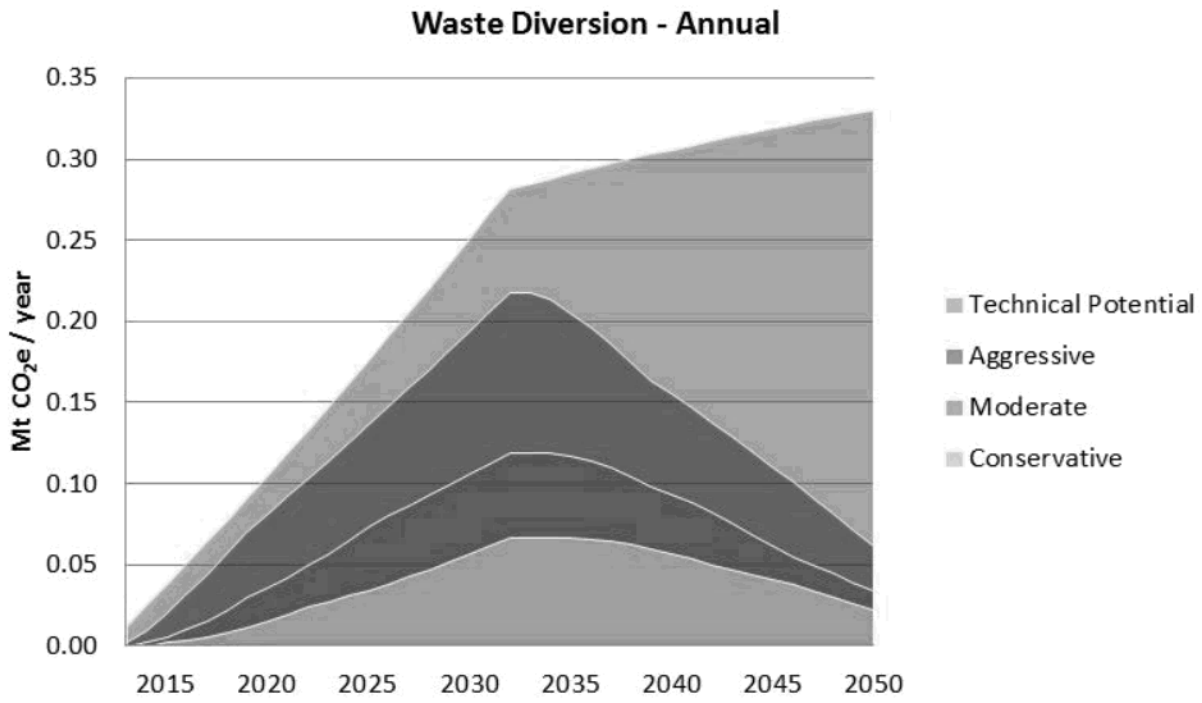
Key Assumptions: Mass of waste available for diversion, offsets generated per unit of waste diverted.

BC regulation will require landfill gas capture at most landfills in the province.

Quantity of offsets estimated based on assumption that all waste is disposed of in a landfill with landfill gas capture (reduces Technical and Market Potential).

Crediting occurs with waste decomposition (i.e. crediting for waste disposed of in a given year occurs over 20 years).

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.04	0.11	0.18	0.25	0.29	0.31	0.32	0.33
Aggressive	0.02	0.08	0.14	0.19	0.20	0.15	0.11	0.06
Moderate	0.01	0.04	0.07	0.11	0.12	0.09	0.06	0.03
Conservative	0.00	0.01	0.03	0.06	0.07	0.06	0.04	0.02



Waste Diversion

Technical Potential Methodology

- The Technical Potential is driven by the organic content in residential and non-residential (ICI, CR&D) waste that is able to be diverted from landfill (i.e. the waste is currently being disposed of in landfill)
- Estimate fraction of residential and industrial/commercial disposal waste in total waste disposed using StatsCan data (correlated with BC Stats *British Columbia's Solid Waste Flow 2006 Summary Report*)
- Use *Golder Associates Report on Inventory of Greenhouse Gas Generation from landfills in British Columbia* estimate Technical Potential at landfills with greater than 10,000 tonnes waste/year; combine with StatsCan data to estimate disposal for landfills receiving less than 10,000 tonnes waste disposal/year.
- Determine composition of organics in residential and non-residential waste disposed in landfill through BC Stats *British Columbia's Solid Waste Flow 2006 Summary Report*
- Emission factor based on Canada's National Inventory Report (~0.48 t CO_2e / t organic waste diverted); assume that 75% of all landfill gas is captured
- Crediting occurs over 20 year period
- The forecast of Technical Potential to 2035 is directly population projections in B.C. (correlated with BC Stats *Solid Waste Generation in British Columbia 2010 – 2025 Forecast*)

Market Potential Methodology

- Twenty year crediting period
- Market Potential based on amount of organic waste disposed of in individual landfills (estimated using *Golder* report, StatsCan)
- Anticipate that higher carbon price signal encourages greater diversion at smaller landfills (where less organic waste is available) compared to lower carbon prices.
    - Percentage of Technical Potential delivered based on thresholds for organic waste available at landfill
    - Different maximums applied to residential versus non-residential
- Assume time for design/build of organics collection programs and composting facilities takes between 3 and 10 years

Waste Diversion

Technical Potential Calculation

$TP_{waste} = TP_{residential} + TP_{non\text{-}residential}$

Where:

$TP_{residential}$ = technical potential for diverted residential organic waste (t CO_2e)
$TP_{non\text{-}residential}$ = technical potential for diverted non-residential organic waste (t CO_2e)

Note that $TP_{residential}$ and $TP_{non\text{-}residential}$ are calculated in the same manner; therefore, only the equations for $TP_{residential}$ are shown.

$TP_{residential} = D_{residential\ organics} * P_{year}$

Where:

$D_{organics}$ = mass of CH_4 avoided due to diversion of organic waste (t CH_4)
P_{year} = percentage change in population from 2007 (%)

$D_{residential\ organics} = M_{residential} * P_{residential\ organics} * ER_{waste}$

Where:

ER_{waste} = emission reduction per tonne of waste diverted (0.48 t CO_2e / t organic waste)
$M_{residentiall}$ = total mass of disposed residential waste (tonnes waste)
$P_{residential\ organics}$ = percentage of organics (food, yard and garden waste) in landfilled residential waste (~40%)

Waste Diversion

Market Potential Calculation

$MP_{waste} = MP_{residential} + MP_{non\text{-}residential}$

Where:

$MP_{residential}$ = market potential for diverted residential organic waste (t CO_2e / year)
$MP_{non\text{-}residential}$ = market potential for diverted non-residential organic waste (t CO_2e / year)

Note that $MP_{residential}$ and $MP_{non\text{-}residential}$ are calculated in the same manner; therefore, only the equations for $MP_{residential}$ are shown.

$MP_{residential} = TP_{residential} * D_{desigh/build} * D_{price}$

MP_{Waste} = Market Potential (Aggressive, Moderate , or Conservative) (t CO_2e)
$D_{implement}$ = Discount factor related to time required to implement (between 7 and 20 years for residential, and between 3 and 10 years for non-residential)
D_{price} = Discount factor related to project cost, based on estimated amount of organics disposed of in individual landfills (between 15% and 52% for residential and between 9% and 43% for non-residential)

Blue Carbon

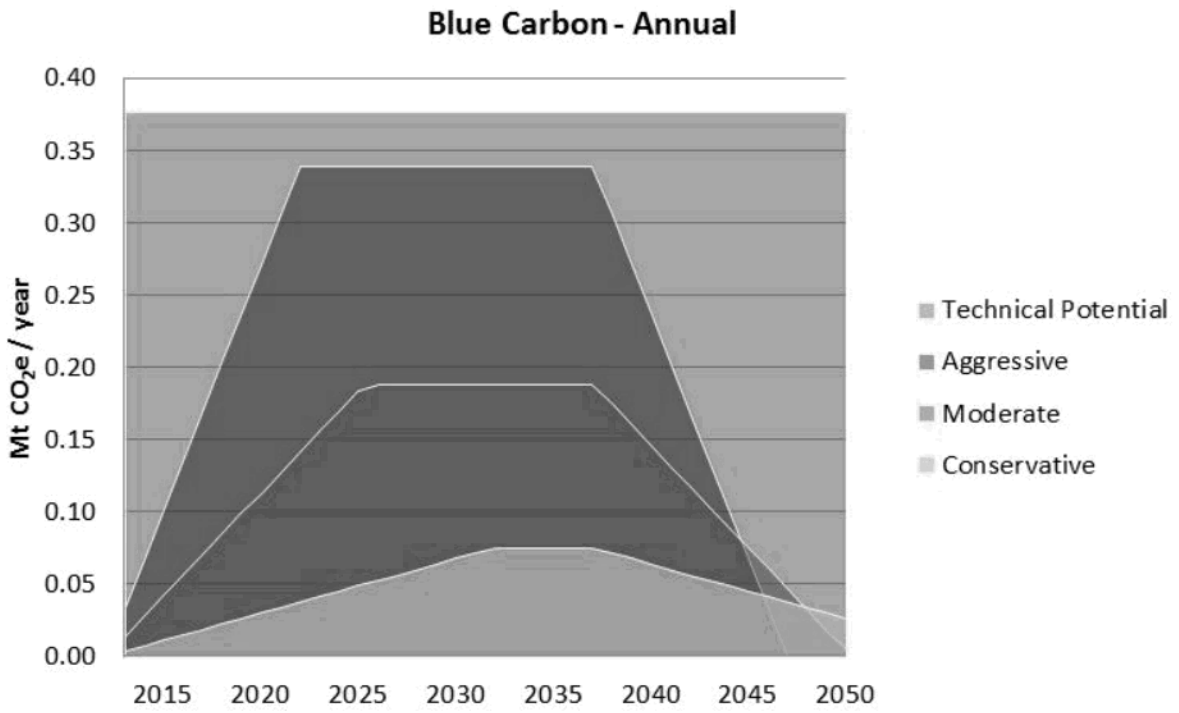
Description: Sequestration of carbon dioxide in seagrass rich estuaries, through rehabilitation of estuaries along the coast of British Columbia.

Key Assumptions: Area eligible for blue carbon sequestration projects, amount of sequestration that can occur per unit area.

Significant uncertainty in Technical and Market Potentials as limited data and information is available.

The Moderate and Conservative Market Potential exceeds the Aggressive Market Potentials in the late 2040's due to the delayed implementation in the Moderate and Conservative Market Potential; cumulatively, the Aggressive Market Potential is always larger than the Moderate and Conservative Market Potentials.

Mt CO_2e / year	2015	2020	2025	2030	2035	2040	2045	2050
Technical	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Aggressive	0.10	0.27	0.34	0.34	0.34	0.24	0.07	0.00
Moderate	0.04	0.11	0.18	0.19	0.19	0.15	0.08	0.00
Conservative	0.01	0.03	0.05	0.07	0.08	0.06	0.05	0.03



Blue Carbon

Technical Potential Methodology

- Use information from a report by the Sierra Club BC entitled *Blue Carbon – British Columbia: The Case for the Conservation and Enhancement of Estuarine Processes and Sediments in B.C.* and from the PCT
- Technical Potential is driven by the available area for restoration of damaged estuary habitats, which increases the ability of the estuary to sequester carbon; B.C. estuaries have a combined area of 745 km^2
- Calculate minimum carbon sequestration from eelgrass and salt marsh habitats
    - Eelgrass and salt marsh habitats are the most critical habitats (sequester up to 350 g C/m^2/year and 210 g C/m^2/year, respectively
    - Assume that all other habitats are able to implement eelgrass and sequester 350 g C/m^2/year
- Estimate the sequestration potential for the Fraser River habitat and other estuaries
- Assume no growth of potential over time

Market Potential Methodology

- Twenty-five year crediting period
- Assume it takes 10 years for all available opportunity to be implemented (e.g. resolving land and credit ownership, consultations)
- Discount for non-price factors; assume that not all of the area identified in the Sierra Club estimates is suitable for Blue Carbon project (discount factor between 10% and 80%)
- Based on information provided in PCT memo (US National Academy of Science); assume that price of restoring estuaries is not significant relative to the price of offsets (no discount factor)

Blue Carbon

Technical Potential Calculation

$TP_{BC} = C_1 + C_2 + C_3$

Where:

TP_{BC}	= Technical Potential for carbon sequestration in all estuaries in B.C. (t CO_2e)
C_1	= minimum amount of carbon sequestered from damaged eelgrass habitats (t CO_2e)
C_2	= mass of carbon sequestered from damaged salt marsh habitats (t CO_2e)
C_3	= mass of carbon that can be sequestered from the (re)introduction of eelgrass in other estuary habitats in B.C. (t CO_2e)

$C_1 = A_{eelgrass} * f_{eelgrass} * MM_{CO2} / MM_C * F_{available}$

Where:

$A_{eelgrass}$	= total area of eelgrass habitats in B.C (km^2)
$f_{eelgrass}$	= mass of carbon sequestered per area of eelgrass habitat per year (350 g C/ m^2 / year)
MM_{CO2}	= molar mass of carbon dioxide (g CO_2/ mol)
MM_C	= molar mass of carbon (g C/ mol)
$F_{available}$	= fraction of eelgrass area suitable for blue carbon projects (25%)

$C_2 = A_{salt\ marsh} * f_{salt\ marsh} * MM_{CO2} / MM_C * F_{available}$

Where:

$A_{salt\ marsh}$	= area salt marsh habitat (km^2)
$f_{salt\ marsh}$	= mass of carbon sequestered per area of salt marsh habitat per year (210 g C/m^2/year)
MM_{CO2}	= molar mass of carbon dioxide (g CO_2/ mol)
MM_C	= molar mass of carbon (g C/ mol)
$F_{available}$	= fraction of salt marsh area suitable for blue carbon projects (99%)

Blue Carbon

Technical Potential Calculation (continued)

$C_3 = (A_{total} - A_{salt\ marsh} - A_{eelgrass}) * f_{eelgrass} * F_{available}$

$f_{eelgrass}$	= mass of carbon sequestered per area of eelgrass habitat per year (350 g C/ m^2 / year)
A_{total}	= total area of all estuary habitats in B.C (km^2)
$A_{eelgrass}$	= total area of eelgrass habitats in B.C (km^2)
$A_{salt\ marsh}$	= area salt marsh habitat (km^2)
$F_{available}$	= fraction of area suitable for blue carbon projects (50%)

Market Potential Calculation

$MP_{BC} = TP_{BC} * D_{price} * D_{implementation} * D_{non\text{-}price}$

MP_{BC}	= Market Potential for Blue Carbon (Aggressive, Moderate or Conservative) (t CO_2e)
D_{price}	= Discount factor related to economic considerations (100% for all cases)
$D_{implementation}$	= Discount factor related to length of time required to restore all estuaries (10 years)
$D_{non\text{-}price}$	= Discount factor related to non-price factors (suitability of identified area for Blue Carbon (between 25% and 90%)

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BC Deputy Ministers – CAPP Meeting

Hotel Grand Pacific
North Pender Island Ballroom
Victoria, BC

Thursday, June 11, 2015
1:00pm-5:00pm

Agenda

1. Welcome & Introductions

2. Fiscal, Royalties and Infrastructure

2.1. Producer Cost of Service (PCOS)

2.1.1. Carbon Tax deduction
2.1.2. Water handling costs

2.2. Royalties

2.2.1. Long Term Royalty Agreements
2.2.2. Multi-year Infrastructure Royalty Credit Program
2.2.3. Oil royalty programs / diversification strategy

2.3. Petrinex (Petroleum Registry of Alberta) – BC's plans

3. Environmental

3.1. GHG

3.1.1. Climate 2.0
3.1.2. GHG reporting burden – linear facility definition and verification
3.1.3. Carbon offsets – electrification in the upstream

3.2. Water

3.2.1. Saline water definition

3.2.2. Incentives for greater water reuse/recycling (i.e. Clean Infrastructure Program)

3.2.3. Water monitoring, mapping, etc – duplication across ministries/agencies

3.2.4. Alternative water disposal methods (vaporization)

3.3. Air

3.3.1. NE BC Air Monitoring Program

3.4. Cumulative Effects

3.4.1. Policy proliferation (includes Caribou)

3.5. Environmental Assessment

3.5.1. Trigger of >75 litres/second production

3.5.2. Sweet gas plant exemption

4. Permitting

4.1. Alternative permitting initiatives (well-pad / life cycle / area based)

5. First Nations & Communities / Public Confidence & Social License

5.1. Status of Consultation Agreements, environmental assessment agreements and LNG ESI

5.2. Fair Share agreement update

5.3. HHRA – Next steps

6. Oil

6.1. Update on 5 conditions

6.2. Status of Spill preparedness

7. Closing & Next Steps

BC Deputy Ministers – CAPP Meeting

Victoria, BC - June 11, 2015

Agenda

Topic	Concern	Leading Agency
Welcome and Introductions		MNGD / CAPP
PCOS – Carbon Tax deduction	Producer Cost of Service (PCOS) does NOT include the portion of Carbon Tax that producers pay for moving BC's share of gas (i.e. royalty share) – This has been a concern since 2009 – Province never moved on it due to the considerable fiscal impact, although it's been recognized that the request has merits	MNGD / FIN
PCOS – Water handling costs	PCOS does not include water handling costs and industry has been increasingly concerned about the escalating costs of disposing of water. Concern is, this could have a big fiscal impact, still unknown as request is not fully articulated. Water management costs are included in PCOS as part of the Coalbed Gas Royalty Program, which has zero use as no activity is going on in CG. If industry pushes, our position should be to do a FULL review of PCOS, particularly in light of recent reductions in costs due to the decline in oil prices, plus the opportunity moving to Petrinex brings.	MNGD / FIN
Long Term Royalty Agreements	CAPP has been briefed high level about the contents of Bill 23, and there was a commitment by the DM and the ADM to get back with more details as regulations are discussed. Concerns will likely focus on fairness, ability to access the new tool, etc.	MNGD
Multi-year Infrastructure Royalty Credit Program	A multi-year approval of the IRCP has been discussed for many years, but never accomplished for a variety of reasons. We're supportive and will try again with TBS.	MNGD

Topic	Concern	Leading Agency
Oil royalty program / diversification	There's a considerable potential for shale oil development in the Montney, and four companies in particular have been very vocal about needing royalty programs to be able to "open up" the resource. Some internal analysis has been done and we're still exchanging information with industry. CAPP has been "warm and cold" on this depending on the moment and which companies are requesting what, so CAPP's support has been lukewarm.	MNGD
Petrinex	s.12,s.13	MNGD / FIN / OGC
Climate 2.0	How does the upstream industry participate in this process? How do we maintain competitiveness in the upstream industry? Interested in discussing how the new advisory group will have a scope (TOR) and what that will mean for the upstream.	MOE
GHG reporting burden – linear facility definition and verification	Current GHG reporting requires verification, and this, in CAPP's view is an unnecessary burden. Regulation should require auditable reporting. The linear faculty definition is too broad and causes the capture of minor facilities, therefore creating unnecessary costs to industry. The goal would be to discuss ways to achieve the same environmental improvement with a lower cost to industry.	MOE
Carbon offsets – electrification in the upstream	CAPP has been supportive to some of their members' request to evaluate potential incentives for electrification in the upstream. Analysis has been done by MNGD with Hydro/CAS/EAED and FIN and demonstrates that the merits of the proposal are very dependent on the price assumptions. New assumptions are being analyzed and CAPP has been challenged to provide additional evidence. There's still no clarity about the merits of the proposal. s.13 s.13	MOE / MNGD / FIN

Topic	Concern	Leading Agency
Saline water definition	10,000 pp/m vs 4,000 pp/m – this definition is critically important to the trigger of a water license application and for the depth of surface casing. We are looking for a scientific approach to the definition and would encourage harmonization with other jurisdictions.	MOE
Incentives for greater water recycling (i.e. Clean Infrastructure Program)	MNGD has fully designed a Clean Infrastructure Royalty Credit Program that would tackle GHG and water use, among other potential technical advances that could reduce environmental impacts of development.[s.12,s.13] s.12,s.13	MOE / MNGD / OGC
Water monitoring / mapping – duplication across agencies	What is the status of the NEBC water strategy and Water Sustainability Act. What are the various roles and responsibilities of MoE, FLNRO and OGC? Is government contemplating new regulations?	MOE / OGC
Alternative water disposal methods (vaporization)	Are there ways to incent new disposal methods? Vaporization could be an interesting one to look at, but there could be others.	OGC
NE BC Air Monitoring program	Discussion to ensure the monitoring is complementary and compatible with CAAQS and BLIERS etc	MOE / OGC
Cumulative Effects – Policy proliferation (including Caribou)		FLNRO / MOE /MNGD
EAO >75 litres/second production threshold	Saline vs fresh: the 75 litres/second is a trigger (CAPP to confirm they have this accurately) for an EA. CAPP would like to discuss if saline water could exempted from this trigger, as an incentive to use non-fresh water. So, for example, if the reg trigger was for 'fresh or potable' water this could be a solution.	EAO
Sweet natural gas processing plants exemption	Status of exemption	EAO
Alternative permitting initiatives (pad? Area based?)	General discussion	MNGD / OGC

Topic	Concern	Leading Agency
Status of Oil and Gas Consultation Agreements / LNG ESI	Update	OGC / MNGD
Fair Share agreement update	CAPP looking for assurance that government has a plan to bring 'peace' to the peace country and that industry is not going to get dragged into the middle of this and/or exposed to new local tax initiatives.	MNGD
Human Health assessment – Next steps	Update	MNGD / OGC
Update on 5 conditions	Update	MNGD
Status of Spill preparedness	Update	MOE / MNGD

MINISTRY OF ENVIRONMENT
MEETING INFORMATION NOTE

2015-05-27
File:
CLIFF/tracking #: 284340

PREPARED FOR: Wes Shoemaker, Deputy Minister of Environment

DATE AND TIME OF MEETING: June 11, 2015 at 1:00 PM to 5:00 PM

ISSUE(S): 4-hour meeting with Canadian Association of Petroleum Producers to discuss numerous issues with representatives from the BC government, including fiscal (Carbon tax and water handling fees), royalties and infrastructure, permitting, First Nations & communities, social licence, oil and the environment. Specific environment topics include: GHGs, water, air cumulative effectives, and environmental assessment.

BACKGROUND:

In preparation for this meeting CAPP provided two documents: one standard agenda that provides the topic/time allotment for each discussion area, and a second that lists each topic CAPP wants to raise and then its primary *concern* related to that topic.

CAPP listed more than 20 *concerns* for this meeting, 11 of which are for MoE or EAO to address, either individually or in partnership with another Ministry:

1. Climate 2.0 (MoE);
2. GHG reporting burden – linear facility definition and verification (MoE);
3. Carbon offsets – electrification in the upstream (MoE/MNGD/FIN);
4. Saline water definition (MoE);
5. Incentives for greater water recycling (i.e. Clean Infrastructure Program) (MoE/MNGD/OGC);
6. Water monitoring / mapping – duplication across agencies (MoE/OGC);
7. NE BC Air Monitoring program (MoE/OGC);
8. Cumulative Effects – Policy proliferation (including Caribou) (FLNRO/MoE/MNGD);
9. EAO >75 litres/second production threshold (EAO)
10. Sweet natural gas processing plants exemption (EAO) - no MoE/EAO content provided
11. Status of Spill preparedness (MoE/MNGD)

Ministry staff have contributed bullets for relevant topics, these bullets have been added directly into the CAPP document that lists its concerns. That ammended document with MoE comment is attached directly into this note as the *'discussion.'* MoE comments appear in blue text under each topic, and each MoE topic is highlighted in red for easy reference during the meeting.

DISCUSSION:

BC Deputy Ministers – CAPP Meeting

Victoria, BC - June 11, 2015

Agenda

Topic	Concern	Leading Agency
Welcome and Introductions		MNGD / CAPP
PCOS – Carbon Tax deduction	Producer Cost of Service (PCOS) does NOT include the portion of Carbon Tax that producers pay for moving BC's share of gas (i.e. royalty share) – This has been a concern since 2009 – Province never moved on it due to the considerable fiscal impact, although it's been recognized that the request has merits	MNGD / FIN
PCOS – Water handling costs	PCOS does not include water handling costs and industry has been increasingly concerned about the escalating costs of disposing of water. Concern is, this could have a big fiscal impact, still unknown as request is not fully articulated. Water management costs are included in PCOS as part of the Coalbed Gas Royalty Program, which has zero use as no activity is going on in CG. If industry pushes, our position should be to do a FULL review of PCOS, particularly in light of recent reductions in costs due to the decline in oil prices, plus the opportunity moving to Petrinex brings.	MNGD / FIN
Long Term Royalty Agreements	CAPP has been briefed high level about the contents of Bill 23, and there was a commitment by the DM and the ADM to get back with more details as regulations are discussed. Concerns will likely focus on fairness, ability to access	MNGD

Topic	Concern	Leading Agency
	the new tool, etc.	
Multi-year Infrastructure Royalty Credit Program	A multi-year approval of the IRCP has been discussed for many years, but never accomplished for a variety of reasons. We're supportive and will try again with TBS.	MNGD
Oil royalty program / diversification	There's a considerable potential for shale oil development in the Montney, and four companies in particular have been very vocal about needing royalty programs to be able to "open up" the resource. Some internal analysis has been done and we're still exchanging information with industry. CAPP has been "warm and cold" on this depending on the moment and which companies are requesting what, so CAPP's support has been lukewarm.	MNGD
Petrinex	BC is completing its business case to decide if it will join Petrinex (i.e. Petroleum Registry of Alberta). This was tried a few times but government lacked the funding and some of the key agencies' commitment to make the change. Now, the three organizations (OGC/MNGD/FIN) are supportive, so depending on the results of the business case, it is likely we will. CAPP and industry in general are very supportive of the change, as it will reduce reporting costs and make all of Western Canada have similar reporting structures and portal.	MNGD / FIN / OGC
Climate 2.0	How does the upstream industry participate in this process? How do we maintain competitiveness in the upstream industry? Interested in discussing how the new advisory group will have a scope (TOR) and what that will mean for the upstream. **MOE'S RESPONSE:** The upstream industry participation in the climate leadership	MOE

Topic	Concern	Leading Agency
	process can occur throughout the process, including in response to the public discussion paper (July) and Climate Leadership Plan (December). The Climate Leadership Team has not yet made decisions regarding the advisory groups. The Ministry and CAS are prepared to meet with the sector as and wherever necessary.	
GHG reporting burden – linear facility definition and verification	Current GHG reporting requires verification, and this, in CAPP's view is an unnecessary burden. Regulation should require auditable reporting. The linear faculty definition is too broad and causes the capture of minor facilities, therefore creating unnecessary costs to industry. The goal would be to discuss ways to achieve the same environmental improvement with a lower cost to industry. **MOE'S RESPONSE**: ***Third party verification*** of facility emissions over 25,000 tonnes annually has been part of the Reporting Regulation since 2009. Third party verification ensures integrity in quantifying and reporting GHG emissions and results in increased accuracy of data. Similar verification requirements are used by other jurisdictions including, Ontario, Quebec, and California. When the regulations were introduced in 2009 the government decided to allow trained, accredited third party verification services that companies had the freedom to choose, as opposed to hiring and training additional government staff to verify and audit greenhouse gas emissions. With reports from Alberta of multi-million dollar auditing costs, staff constraints and ongoing reporting compliance issues, we believe we have chosen the correct approach. BC industry broadly concurred with the third party verification approach over government	MOE

Topic	Concern	Leading Agency
	verification and audit at the time the regulations were being developed. With the advent of federal regulations for greenhouse gas emissions from the natural gas sector expected in the coming months, we believe the reporting requirements appropriately balance burden and rigour. ***Facilities that are linearly connected*** (e.g. natural gas transmission and storage) and managed or controlled by the same entity are subject to reporting requirements if the facilities together emit more than 10,000 tonnes or more carbon dioxide equivalent emissions a year. This approach is similar to the geological basin approach used by the EPA and California. The LFO definition is critical to achieving fairness between companies and preventing the fragmentation of operations to avoid crossing the reporting threshold and to establish comprehensive coverage of emissions despite large variability in the companies' organizational, operational, and structural profiles. The Alberta and federal approach of a 50,000 tonne single facility reporting requirement would exclude a large proportion of facilities and emissions in the BC natural gas sector. CAPP submitted comments on the Greenhouse Gas Industrial Reporting and Control Act Reporting Regulation Intentions Paper posted publically between March-April 2015. These comments are currently under consideration. The concern regarding the definition of LFOs was not addressed in the submitted comments.	

Topic	Concern	Leading Agency
Carbon offsets – electrification in the upstream	CAPP has been supportive to some of their members' request to evaluate potential incentives for electrification in the upstream. Analysis has been done by MNGD with Hydro/CAS/EAED and FIN and demonstrates that the merits of the proposal are very dependent on the price assumptions. New assumptions are being analyzed and CAPP has been challenged to provide additional evidence. There's still no clarity about the merits of the proposal. Climate 2.0 might be the best way of tackling this proposal and looking at potential incentives to electrification, if needed. **MOE'S RESPONSE:** s.12,s.13 s.12,s.13	MOE / MNGD / FIN

Topic	Concern	Leading Agency
Saline water definition	10,000 pp/m vs 4,000 pp/m – this definition is critically important to the trigger of a water license application and for the depth of surface casing. We are looking for a scientific approach to the definition and would encourage harmonization with other jurisdictions. **MOE'S RESPONSE:** s.13	MOE
Incentives for greater water	MNGD has fully designed a Clean Infrastructure Royalty Credit Program that would tackle GHG and water use, among other potential technical advances that	MOE / MNGD / OGC

Topic	Concern	Leading Agency
recycling (i.e. Clean Infrastructure Program)	could reduce environmental impacts of development. s.12,s.13 s.12,s.13 **MOE'S RESPONSE:** s.13	
Water monitoring / mapping – duplication across agencies	What is the status of the NEBC water strategy and Water Sustainability Act. What are the various roles and responsibilities of MoE, FLNRO and OGC? Is government contemplating new regulations? **MOE'S RESPONSE:** • The Northeast Water Strategy (NEWS) was released publically on March 20, 2015, and was collaboratively developed and supported by: the major industry associations operating in the Northeast, including CAPP; Treaty 8 First Nations represented by the Treaty 8 Tribal Association;	MOE / OGC

Topic	Concern	Leading Agency
[redacted]	local governments; and provincial natural resource and health agencies. • An inter-agency NEWS provincial steering committee, that will include FLNRO, ENV and the OGC and other agencies, is being established to promote enhanced agency coordination of water management in Northeast BC through the delivery of NEWS (which incorporates specific WSA actions), and consistent communication of provincial priorities and actions under the NEWS and other provincial initiatives, including the implementation of the WSA and its associated regulations and policies. • A multi-partner Northeast Water Working Group is also being established, co-chaired by the Province and Treaty 8 First Nations, to guide implementation of the NEWS. Membership will include provincial, federal and local governments, Treaty 8 First Nations, industry associations, and non-government organizations. • The NE Water Working Group will help guide the implementation of the NEWS through various projects. A key priority for phase one of the NEWS implementation is the development of an enhanced surface and groundwater monitoring system for Northeast BC Monitoring and assessment of surface and groundwater resources in NE BC will be coordinated through this working group and the inter-agency steering committee. Other NEWS priorities are still in the process of being identified.	
Alternative water	Are there ways to incent new disposal methods? Vaporization could be an	OGC

Topic	Concern	Leading Agency
disposal methods (vaporization)	interesting one to look at, but there could be others.	
NE BC Air Monitoring program	Discussion to ensure the monitoring is complementary and compatible with CAAQS and BLIERS etc **MOE'S RESPONSE:** • The Air Quality Management System (AQMS) is a new, comprehensive air management system that is being implemented across the country. • Air zones are the basis for monitoring, reporting and managing air quality under AQMS. • The Canadian Ambient Air Quality Standards (CAAQS) are the drivers for improvements to protect human health and the environment. • The Northeast Air Zone is one of seven broad air zones that the province has identified. • The Ministry began operating a new fully equipped AQHI monitoring station in Fort St. John in January 2015. • Data from this site will be used to report out on CAAQS achievement in future years. • CAAQS reporting is one factor that will be given consideration in developing a sustainable monitoring network for the Northeast. • Recognizing that Fort St. John is only one community in a large, diverse region, the NE Monitoring Project is instrumental in understanding air	MOE / OGC

Topic	Concern	Leading Agency
	quality levels in communities beyond Fort St. John. • Three portable monitoring stations measuring sulphur dioxide (SO2) and total reduced sulphur (TRS) will soon be moved to new long-term locations in the Peace River Regional District. • The ministry is currently involved in discussions to identify new CAAQS for SO2. • In response to a request by CAPP members, ministry staff will be taking part in discussions with CAPP staff regarding potential implementation issues for new SO2 CAAQS that will likely include monitoring, modelling and other issues. • The first meeting is scheduled for Thursday, June 4. • The province has committed to reviewing its own interim air quality objectives for SO2 and nitrogen dioxide (NO2) once the CAAQS are established. • This review process will involve more fulsome consultation with a broad range of stakeholders. • The CAAQs are the driver for measuring the environmental outcomes from the implementation of the national Air Quality Management System. The CAAQs measure the cumulative effects of air emissions from all sources in a region. • BLIERS are emission standards for large point source facilities. Compliance with BLIERS will be through a facility reporting process	

Topic	Concern	Leading Agency
	rather than by ambient air quality levels in a region in relation to the CAAQS.	
Cumulative Effects – Policy proliferation (including Caribou)		FLNRO / MOE /MNGD
EAO >75 litres/second production threshold	Saline vs fresh: the 75 litres/second is a trigger (CAPP to confirm they have this accurately) for an EA. CAPP would like to discuss if saline water could exempted from this trigger, as an incentive to use non-fresh water. So, for example, if the reg trigger was for 'fresh or potable' water this could be a solution. **MOE'S RESPONSE:** • The current threshold for an environmental assessment of groundwater diversions is for diversions greater than 75 litres per second (about 1000 gallons per minute) • It is expected that industry will seek an exemption from the EA requirement for wells using deep saline groundwater under the proposed regulation (>600m depth and >4000 pp/m total dissolved solids) • Projects accessing deep saline groundwater have been waived out of the EA process in the past subject to specified information requirements. • Further discussions among the EAO and ENV are recommended prior to providing any direction on the request for amending the EA threshold.	EAO

Topic	Concern	Leading Agency
	• EAO has prepared separate background material and Kevin Jardine will be on hand to assist on or lead these topics.	
Sweet natural gas processing plants exemption	Status of exemption • EAO has prepared separate background material and Kevin Jardine will be on hand to assist on or lead these topics.	EAO
Alternative permitting initiatives (pad? Area based?)	General discussion	MNGD / OGC
Status of Oil and Gas Consultation Agreements / LNG ESI	Update	OGC / MNGD
Fair Share agreement update	CAPP looking for assurance that government has a plan to bring 'peace' to the peace country and that industry is not going to get dragged into the middle of this and/or exposed to new local tax initiatives.	MNGD

Topic	Concern	Leading Agency
Human Health assessment – Next steps	Update	MNGD / OGC
Update on 5 conditions	Update	MNGD
Status of Spill preparedness	Update **MOE'S RESPONSE:** • Government is committed to the design principles that received broad support during the engagement by government with industry, First Nations, local governments and other stakeholders during the Two Intentions Papers namely: 1. Polluter pays – this principle is already in effect in B.C. and will not change. Companies that spill or pose the risk of having a spill should be responsible for the costs associated with preparing for and responding to a spill. 2. Risk-based requirements – all spillers will be required to meet new response requirements. The requirements for planning and preparedness will be based on a defined risk threshold which will consider toxicity, persistence and volume. 3. Avoids duplication – recognizing there are some effective and	MOE / MNGD

Topic	Concern	Leading Agency
[redacted]	collaborative spill response procedures in place in certain sectors, supplementation is still required to ensure environmental protection and also ensure British Columbia's system can be considered world-leading. 4. Fair and transparent process – government has committed to continued dialogue through consultation on the development of new legislation and regulations. 5. Opportunities for First Nations and communities in preparedness, response and recovery – active engagement by First Nations and communities on all aspects of a world-leading system are considered key to the successful design, implementation and operations. 6. Strong government oversight – new requirements will provide both clarity and certainty for spillers, meet public and First Nations expectations and maximize the protection of the environment. 7. Continuous improvement – government is committed to continuous improvement ensuring a sustainable world-leading system by applying lessons learned from exercises, incidents and other jurisdictions. Additionally, any technological innovations will continue to be considered.	

Topic	Concern	Leading Agency
[redacted]	• New legislative and regulatory requirements for preparedness, response and recovery will be developed. • The Provincial Government is focussed on building a regime that fills the gaps that currently exist – be that on the land or in the marine environment. The currently identified gaps are the focus of the second intentions paper. • To ensure we meet these design principles, government will work with Industry to build a new land based spill regime together. Your active participation in the design will ensure that our robust regime not only meets our environmental objectives, but that we do so efficiently and effectively, leveraging resources already in place, ensuring coordination and reducing duplication of effort.	

Reviewed by	Initials	Date
DM	WS	6/10/15
DMO	--	--
ADM	MZ	6/8/15
Dir./Mgr.		
Author		

MINISTRY OF ENVIRONMENT
INFORMATION NOTE

2015-05-27
File:
CLIFF/tracking #: 284500

PREPARED FOR: Wes Shoemaker, Deputy Minister of Environment

ISSUE: DM/Canadian Association of Petroleum Producers (CAPP) June 11 Meeting – Climate Action Secretariat Response

BACKGROUND:
The June 11, DM/CAPP meeting will raise three areas of concern regarding government's response to climate change, these include:

1. **Climate 2.0:**
   - How does the upstream industry participate in this process? How do we maintain competitiveness in the upstream industry? Interested in discussing the scope (ToR) of the new advisory group and what that will mean for the upstream.
2. **GHG reporting burden – linear facility definition and verification**
   a. Current GHG reporting requires verification, and this, in CAPP's view, is an unnecessary burden. Regulation should require auditable reporting.
   b. The linear faculty definition is too broad and causes the capture of minor facilities, therefore creating unnecessary costs to industry. The goal would be to discuss ways to achieve the same environmental improvement with a lower cost to industry.
3. **Carbon offsets – electrification in the upstream**
   - CAPP has been supportive to some of their members' request to evaluate potential incentives for electrification in the upstream. Analysis has been done by MNGD with Hydro/CAS/EAED and FIN and demonstrates that the merits of the proposal are very dependent on the price assumptions. New assumptions are being analyzed and CAPP has been challenged to provide additional evidence. There's still no clarity about the merits of the proposal. Climate 2.0 might be the best way of tackling this proposal and looking at potential incentives to electrification, if needed.

DISCUSSION:
Issue 1: Climate 2.0

The upstream industry participation in the climate leadership process can occur throughout the process, including in response to the public discussion paper (July) and Climate Leadership Plan (December). The Climate Leadership Team has not yet made decisions regarding the advisory groups.The Ministry and CAS are prepared to meet with the sector as and wherever necessary.

Issue 2: GHG reporting burden –verification and linear facility definition

1. Third-party verification:

Third party verification of facility emissions over 25,000 tonnes annually has been part of the Reporting Regulation since 2009. Third party verification ensures integrity in quantifying and reporting GHG emissions and results in increased accuracy of data. Similar verification requirements are used by other jurisdictions including, Ontario, Quebec, and California.

When the regulations were introduced in 2009 the government decided to allow trained, accredited third party verification services that companies had the freedom to choose, as opposed to hiring and training additional government staff to verify and audit greenhouse gas emissions. With reports from Alberta of multi-million dollar auditing costs, staff constraints and ongoing reporting compliance issues, we believe we have chosen the correct approach. BC industry broadly concurred with the third party verification approach over government verification and audit at the time the regulations were being developed. With the advent of federal regulations for greenhouse gas emissions from the natural gas sector expected in the coming months, we believe the reporting requirements appropriately balance burden and rigour.

2. Linear Facility Definition (LFO):
Facilities that are linearly connected (e.g. natural gas transmission and storage) and managed or controlled by the same entity are subject to reporting requirements if the facilities together emit more than 10,000 tonnes or more carbon dioxide equivalent emissions a year. This approach is similar to the geological basin approach used by the EPA and California.

The LFO definition is critical to achieving fairness between companies and preventing the fragmentation of operations to avoid crossing the reporting threshold and to establish comprehensive coverage of emissions despite large variability in the companies' organizational, operational, and structural profiles. The Alberta and federal approach of a 50,000 tonne single facility reporting requirement would exclude a large proportion of facilities and emissions in the BC natural gas sector.

CAPP submitted comments on the *Greenhouse Gas Industrial Reporting and Control Act* Reporting Regulation Intentions Paper posted publically between March-April 2015. These comments are currently under consideration. The concern regarding the definition of LFOs was not addressed in the submitted comments.

<u>Issue 3: Carbon Offsets Electrification in the upstream</u>

s.12,s.13

Contact:
Susanna Laaksonen-Craig
CAS
250 387-9456/508-4132c

Alternate Contact:
Tim Lesiuk / Adria Fradley
CAS
250 356-7557 / 250 387-1359

Prepared by:
Konstantin Zahariev
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250 953-4884

Reviewed by	Initials	Date
DM		
DMO		
ADM	SLC	2015/06/05
ED/Mgr.	TL/AF	2015/06/05
Author	KZ	2015/05/27

Ireland, Shannon L ENV:EX

From: David Hostetter <dave@bhecanada.com>
Sent: Saturday, May 30, 2015 3:49 PM
To: Ireland, Shannon L ENV:EX
Subject: Technology - greenhouse gas reduction

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: HEAD

Hello Shannon Ireland,

I'm looking for the correct contact in your department to further discuss an opportunity to offer significant GHG reductions through our new technology that improves diesel fuel (among others) and actually extends the fuel volume.

With certain fuels, such as certain shipping fuels, we can nearly double the source fuel and in doing so, create a finished fuel product that is better in both calorific-value and lower is its emission profile.

Because so much energy and GHG emissions are used in creating diesel (as well as 8 liters of water for every litre of diesel fuel), our low-energy process reduces the amount of GHG normally created when diesel is produced by a very large margin. We produce or extend the diesel fuel (or shipping fuel) using either 1L and up to 2L for every litre of new fuel or extension.

We would like to discuss what kind of verification of our carbon reduction initiative is through the best agencies and discuss where there may be opportunities for the Climate Action Secretariat and Carbon Fund, to assist us with the implementation of a facility in British Columbia (likely focused initially on shipping fuels).

We have just about completed a pilot project facility in Calgary and we have independent observation and sampling reports done by Intertek Canada that verify the technology actually 'works' as advertised. The AITF in Alberta is currently doing some final studies before they can claim the same belief in our technology (a mass-balance analysis) - this is currently under way.

Our next step is to get verification and quantification of how much GHG our process is reducing from the status quo in producing diesel or shipping fuels.

We have capacity, that can be increased over time, to create or extend millions and tens of millions of liters of fuel on an ongoing basis.

We have been approved for fuel-tax collecting and processing in Alberta through the Alberta Government and also through the Federal Government for excise tax on fuels - with the procedures clearly documented. We would eventually work with the BC government fuel taxation authorities to get those fuel tax reporting and remittances accordingly perfected.

I look forward to hearing back on who the appropriate people would be to start the discussion.

Very Best Regards,

Dave Hostetter, COO
BHE Canada
T. 403-476-3616 x 113
M. 778-240-3029 (no voice-mail - please text)

MINISTRY OF ENVIRONMENT

TELEPHONE RESPONSE RECORD

CLIFF Reference #: 284645

Date of Telephone Call: emailed June 4 & June 11, call June 11, 2015

Time of Call: 1:20pm

Recipient of Telephone Call: David Hostetter

T. 403-476-3616 x 113
M. 778-240-3029 (no voice-mail - please text)

BHE Canada

CALL DETAILS:

Susanna Laaksonen-Craig advised to include Michael Rensing on a call. s.22 s.22 (hence first email to Mr. Hostetter advising that we'd get back to him) but gave me some advice via email. Since I wouldn't be able to offer much over the phone instead I researched Mr. Hostetter's enquiries and sent him the email below.
Mr. Hostetter called me back to say thanks for the information, and that he'd be back in touch once he's got his life cycle assessment complete. He seemed pleased & looking forward to presenting to us in the future.

Hi David,

As a follow up to your email to Shannon Ireland of June 2, and my subsequent email back – I've done a bit of research into possible assistance that is (and is likely not) available to you through the Province of BC.

Carbon Offsets

While there is a fuel switching protocol that governs the purchase of offsets from GHG reductions realised through switching from a higher carbon to a lower carbon fuel, the GHG reductions would be realized through the end user of the fuel, not the fuel producer (although in some instances an agreement can be made between end user and producer to transfer rights to the reductions). Furthermore, the reductions need to be realized in BC – so for example GHG reductions realized through switching shipping fuel that is used for international transportation would not be eligible. If you'd like to find out more about the BC

Government's carbon offset business, please have a look at the Climate Investment Branch's web page, and in particular, the BC Emissions Offset Regulation.

Renewable & Low Carbon Fuel Requirements Regulation

This regulation applies to fuel producers in BC, and does recognize carbon intensity reductions through an offset program. However currently the regulation cannot recognize any reductions related to petroleum based fuel products. Ministry of Energy & Mines will be consulting on necessary amendments to enable recognition of processes like this, and it will be important for anyone with a business interest to participate in the discussions. Please contact Michael.Rensing@gov.bc.ca if you would like to participate in this. Michael has expressed interest in hearing more about your business plan and the viability of your production of low carbon fuel , but encourages you to obtain a life cycle assessment of your product first.

Lifecycle Assessment

There are a number of accredited GHG Validators and Verifiers located in BC – the accreditation program web sites both provide lists:

ANSI Accreditation Program for Greenhouse Gas Validation/Verification Bodies, Accreditation Directory

Standards Council of Canada, Directory of Accredited Bodies

I'm not familiar with their areas of speciality, but you should be able to find this information out through the programs or the consultants themselves.

Finally I'd like to direct you to the Business page of our web site – this should guide you through the resources we offer to folks wanting to start a business in BC.

I hope this information is of help to you, please don't hesitate to contact me if you have further questions. Best of luck with the growth of your business!

Sol

soledad (sol) reeve • climate innovation and business development • climate action secretariat • b.c. ministry of environment • 250.387.3230

COMMENTS:

[INSERT TEXT]

CONTACT NAME: Soledad Reeve

CONTACT NUMBER: 250-387-3230

DIVISION: Climate Innovation – Climate Action Secretariat

Follow-Up Letter Required? [NO]

CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS

Canada's Oil and Natural Gas Producers

September 14, 2015

Susanna Laaksonen-Craig
Head, Climate Action Secretariat
Ministry of Environment
Government of British Columbia
396 Waterfront Crescent
Victoria, BC V8T 0A7

(Submitted via e-mail to climateleadershipplan@gov.bc.ca and susanna.laaksonen-craig@gov.bc.ca)

Dear Ms. Laaksonen-Craig:

Re: Climate Leadership Plan Discussion Paper

The Canadian Association of Petroleum Producers (CAPP) appreciates the opportunity to submit comments to the Climate Action Secretariat with respect to the Climate Leadership Plan Discussion Paper. CAPP recognizes that the Government of British Columbia has worked hard to update its greenhouse gas regulatory and policy framework to better reflect the changing industrial landscape of British Columbia.

CAPP represents companies, large and small, that explore for, develop and produce natural gas and crude oil throughout Canada. CAPP's member companies produce about 90 per cent of Canada's natural gas and crude oil. CAPP's associate members provide a wide range of services that support the upstream crude oil and natural gas industry. Together CAPP's members and associate members are an important part of a national industry that is the largest private sector investor in Canada ($45 billion in 2015).

The government of British Columbia has demonstrated leadership in setting climate policy priorities with the development and implementation of provincial greenhouse gas reduction policy regimes. Minister Mary Polak's recent announcement to renew this commitment with a Climate Action Plan 2.0 represents a milestone in British Columbia's continued commitment to climate change priorities.

CAPP supports a climate policy framework in British Columbia that creates a vibrant and competitive oil and gas sector while efficiently and effectively managing greenhouse gas emissions. To this end, CAPP has developed the following principles to guide climate policy development:

- Balanced "3E" policy should deliver economic growth, environmental protection, and a secure and reliable energy supply.
- Policy should be designed to drive efficient actions required to achieve emission objectives.
- Policy should stimulate and support investment in the technologies necessary for significant reductions in GHG emissions in Canada.
- Predictable policy built on stable principles should support long term capital investments in the upstream oil and gas sector and create jobs for Canadians.

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- Policy should maintain competitiveness of Canadian industry, ensure compatibility with major trading and economic partners (particularly with the U.S., our largest trading partner), and compliance should be achievable within the context of growing production.
- Policy should distribute cost burden equitably among sectors and jurisdictions across the economy.
- Policy should be harmonized across jurisdictions within Canada, to an extent that is both reasonable and practical.
- Policy should be simple and minimize the administrative burden on industry to the greatest extent possible.

We have reviewed the discussion paper circulated by the government and are pleased to offer the following comments, informed by these principles.

1. Economic Competitiveness

Economic competitiveness is a key consideration in the development of British Columbia's climate policy framework. This is especially important for the upstream oil and gas sector, which has experienced a decrease in investment by approximately 40 per cent nationwide relative to 2014. The current challenging price environment, in combination with recent government initiatives that have imposed additional significant costs on the industry (such as the introduction of the LNG tax, the carbon tax, and the industry tax impacts arising from reversion back to the PST) have eroded the economic competitiveness of BC's upstream industry over time. As such, CAPP does not support any further increases to the carbon tax at this time. CAPP believes that through collaboration there are other avenues to support further emission reduction which could improve BC's upstream competiveness, maintain a strong economy and foster economic growth.

While CAPP generally supports the Principle 2 in the discussion paper, namely, to "balance outcomes across economic, environmental, and social objectives", emphasis needs to be placed not only on balancing, but strengthening economic outcomes.

As an overarching objective, CAPP recommends that any climate policy initiatives undertaken by the province seek to not only preserve, but enhance the economic competitiveness of British Columbia's upstream oil and gas sector to attract investment and create jobs. This includes ensuring full cost accounting of policy options is taken into account when evaluating cumulative burden across policies and regulations.

Potential mechanisms for achieving this objective may include reviewing royalty programs to offset cost burdens associated with carbon taxes and examining royalty deductibility of emissions reducing infrastructure and technologies incurred by companies.

Climate policy alignment with the government's vision to be a "global leader in natural gas", as identified in its natural gas strategy is a key opportunity in this regard. The strategy seeks to develop new markets while maintaining competitiveness through strategic infrastructure investments and competitive royalties, while balancing environmental considerations. Today, the upstream oil and gas industry directly employs 12,000 people in British Columbia and invests, on average, $5 billion dollars annually in the province to maintain current production and to service existing markets in British Columbia, Canada and the United States. To maximize the benefits to British Columbians of natural gas development in the future, significant new additional investment will be needed; and government has a significant role in establishing an attractive investment climate. This is an objective and approach that could be incorporated into the development of a new natural gas strategy for the province, as identified in the 2015 mandate for the Minister of Natural Gas Development.

2. Carbon Price and Inter-Jurisdictional Alignment

The Government of British Columbia designed its original carbon tax to lower greenhouse gas emissions while managing the economic and distributional impacts. At the time of the introduction of the tax, the government outlined several key principles that CAPP continues to support. These include ensuring the tax is applied broadly to all combustion fuel sources; the tax is gradually phased in so as to ensure businesses have time to adjust and are not positioned uncompetitively, and the tax is fully integrated with other greenhouse gas reduction measures, including those under consideration by the federal government and other provinces. These principles continue to be relevant today.

In 2013, the Government of British Columbia continued to recognize the importance of business competitiveness by maintaining the provincial carbon price at its current rate for five years, so as to provide an opportunity for other jurisdictions, especially within North America, to introduce similar carbon pricing. This policy recognized the importance of managing inter-jurisdictional competitiveness issues in carbon price design, and any proposed climate policy changes needed to continue to consider the impacts on BC's trade exposed sectors. An increased carbon policy burden relative to other jurisdictions would impair the competitiveness of BC's oil and gas sector, especially in this low price environment when operating margins are already reduced. Access to new markets is critically important to the long term economic viability of the upstream oil and gas industry and CAPP recommends that the province continue to protect trade exposed sectors, by aligning and/or creating an equivalent carbon burden approach to those of key trading partners.

3. Emissions Reductions and Long-Term Performance

Greenhouse gas policy is best designed by creating an operational environment that enables industry and the province to make further emissions reductions to meet provincial emission reduction commitments, while balancing economic competitiveness, viability of emission reduction options and growth. As outlined in Principle 1 of the Climate Leadership Plan Discussion Paper, government action is required to meet both short- and long-term emission reduction commitments. CAPP considers two pieces of policy architecture as fundamentally critical to the continued success of the province as a climate policy leader: technology and offsets.

Technology

Long-term reductions in greenhouse gas emissions require step changes in technological innovation. Accelerating technological progress through increased investment is critically important as industry and government work together to achieve strong climate-driven outcomes. This approach enables technological progress to simultaneously drive economic growth and greenhouse gas emission reductions.

GHG emission reduction technologies that have proven successful in the past and/or have the potential to achieve future reductions include low-or-no-venting equipment, electrification, cogeneration, waste heat recovery, natural gas vehicles and carbon capture and storage.

To reach desired emission reduction objectives through technological advancements while maintaining industry competitiveness, carbon costs need to be offset in some way by investment incentives for technology. For this reason, CAPP recommends the creation of an innovation and technology fund that, consistent with the intent to recycle revenues into areas that offer solutions, would utilize greenhouse gas policy compliance funds to invest in short- and long-term emission reduction technology opportunities. For example, a similar framework has been established under Alberta's Specified Gas Emitters Regulation (SGER) and supporting programs, which were recently strengthened by the Alberta government in June 2015.

Offsets

Offsets are critical to compliance and to enabling voluntary emissions reduction opportunities. Therefore, starting within BC, the Government must take steps to ensure a robust and credible system is available that can support the opportunities in oil and gas; for example, allowing offsets generated from upstream electrification for LNG.

A robust and credible offsets system is key to gaining access to other carbon markets. This approach ensures that offsets are real, additional, permanent, verifiable, quantifiable, and enforceable. The system also needs to be designed so as to minimize transaction costs, ensure minimal buyer liability, and allow for streamlined but thorough verification.

4. Emissions reduction opportunities

A number of significant opportunities have been identified to help achieve substantial emissions reductions in the upstream oil and gas sector.

Upstream Electrification

One of the most important mechanisms that the government could implement to achieve a substantial reduction in upstream greenhouse gas emissions, while allowing for economic growth, is to expand the electric transmission grid in northeastern British Columbia. Preliminary estimates suggest that upstream electrification could reduce industry emissions by up to 25 per cent from the wellhead to the LNG tanker or 3 – 4 MT/year of CO2 by electrifying 6 Bcf/d of production. CAPP supports the economically viable expansion and reinforcement of electricity transmission to support load growth for new facilities, positioning electrification on a competitive economic footing relative to gas drive technologies, before controlling for carbon. The continued ability to generate GHG offset credits for the electrification of facilities will assist in bolstering competitiveness while reducing emissions at the same time. Electrification is a leading opportunity to reduce emissions in BC upstream industry, however in today's low gas price environment the decision to invest in electrification is challenged economically. Retrofitting or switching a facility between gas drive and electric drive is not economically feasible due to the magnitude of the capital investment. Thus technology choices become locked-in and can have a structural effect on future emission for decades. It is evident that government and industry will need to explore mechanisms to support and encourage the choice of facility electrification in today's market conditions. Timing and certainty of transmission reinforcements will help to mitigate business risk for operators seeking to electrify.

Carbon Capture and Storage

Carbon Capture and Storage (CCS) is a promising option to substantially reduce GHG emissions in the near future, and help the province achieve its GHG reduction targets. CAPP member companies already capture CO2 and store (sequester) it underground or transport it to conventional oil and gas wells to help recover more resources from those wells. While CCS has significant potential for emissions reductions, it requires a large amount of investment to reach fruition. CAPP supports the development of CCS but cautions that market mechanisms alone will likely not be sufficient to incent commercial viability.

Clean Infrastructure Royalty Program

The province currently offers an infrastructure royalty credit program that awards royalty credits to oil and gas companies who invest in new oil and gas roads and pipeline projects in BC. The program was designed to

encourage investment in oil and gas infrastructure and improve year round access to oil and gas resources in northeast BC.

The program has facilitated new capital investment and job growth in northern communities, as well as new incremental revenue to the Crown. Since 2004, the program has leveraged over $1.4 billion in industry capital investments in oil and gas infrastructure, and over $5 billion in well drilling and completion investment, resulting in over 200 new or upgraded all-season roads and pipeline projects.

Building on the success of the existing infrastructure royalty credit program, CAPP recommends that the province create a broad clean infrastructure program with incremental funding. Such an incremental program would incent the development in infrastructure or technology that helps reduce fugitive and combustion emissions in the upstream, assist in the possible adaptation to changing environmental operating conditions or could be used for other environmental mitigation opportunities.

Natural Gas

Natural gas is the cleanest burning fossil fuel. As an energy source, it provides a cost-effective pathway for countries to reduce the carbon intensity of their economies. CAPP recognizes the potential that natural gas has to not only reduce emissions from electricity infrastructure in the near -term, but also to provide further grid stability for the benefit of producers and consumers alike. As a transition fuel, the development, use, and export of natural gas resources from British Columbia can support clean energy strategies that depend on mid to long-term shifts in the economics of renewable energy technologies. British Columbia's climate leadership plan should recognize the critical role that the province can play in contributing to not only provincial and national but global emission reductions. World demand for energy is forecasted to grow by 37% by 2040. Natural gas is recognized a desirable choice around the world to meet this growing demand while helping to curb GHG emission growth and also achieving local air quality improvements in rapidly developing nations.

5. Regulatory Efficiencies

British Columbia has a longstanding regulatory regime of outcome-based requirements that have resulted in efficient emission reductions. The benefit of compliance models with inherent flexibility is that they foster innovative solutions that achieve real operational efficiencies and emission reductions. CAPP would like to underscore the importance of maintaining the single window regulatory model. The OGC as a world class regulator, serving both the public's interest and maintaining regulatory efficiencies and predictability which are import for attracting new investment to support existing upstream actives and those incremental new investments needed to service LNG.

In its 2015 Speech from the Throne, the government committed to reducing red tape and easing unnecessary burdens in order to save time and make things more efficient. In the spirit of these objectives, CAPP recommends that the province could continue to look for opportunities to reduce red tape and GHG emissions at the same time. Government and industry combined efforts to successfully eliminate routine flaring and venting is one example of a successful approach in this regard, and future opportunities could include reforms in areas such as well testing.

Conclusion

We believe that continued collaboration among provincial, territorial, and federal governments, industry and other stakeholders is needed to not only maintain but enhance the competitiveness of Canada's oil and natural gas sector and to achieve ambitious emission reduction objectives. As outlined in Principle 6 of the Climate Leadership Plan, this collaboration is critical to long-term success. To that end, CAPP anticipates further and

deeper consultations with the government of British Columbia on the development of policies and regulation for the management of provincial greenhouse gas emissions and looks forward to further supporting the Climate Action Secretariat in this regard.

Sincerely,



Alex Ferguson
Vice President, Policy and Performance

From:	Morrison, Geoff
To:	Scott, Heidi ENV:EX
Subject:	RE: Meeting with Minister Polak [WARNING: SPF validation unavailable]
Date:	Friday, September 18, 2015 3:38:09 PM
Attachments:	CAPP_EDMS-#269627-v1-CAPP_Feedback_on_BC_Climate_Leadership_Plan_Discuss....pdf

Thanks Heidi
The purpose of the meeting is to talk about the new Climate Action Plan.
Attached is our letter to the CLT which covers the topics of interest.
On a secondary level, it could be anticipate that the topics of the BC Spill response regime and Water Sustainability Act could come up as part of the conversation as they are topical.
On spills, the Ministry has just started consultation on the New spill response regime, so the issue is on the forefront.
With respect to the WSA, CAPP is supportive of the new Act and the regulation of ground water etc. and but there is an outstanding technical issue with the definition of Saline water. I don't expect this to come up, but it might be useful if the Minster had a briefing on the topic.
The purpose of the meeting is climate and carbon policy.
Thanks
Geoff
Geoff Morrison | Manager of British Columbia Operations
Victoria: 778.410.5040 | Cell: 250.634.4010| Calgary: 403.776.1409

From: Scott, Heidi ENV:EX [mailto:Heidi.Scott@gov.bc.ca]
Sent: Friday, September 18, 2015 3:11 PM
To: Morrison, Geoff
Subject: Meeting with Minister Polak [WARNING: SPF validation unavailable]

Hi Geoff,

I am emailing to confirm your meeting with Minister Polak on September 29th, 2:30-3:00pm, room 112 in the parliament buildings. Please send over materials you would like the Minister to review in advance of your meeting.

Thank you,
Heidi

Heidi Scott
Administrative Coordinator
Office of the Minister of Environment of BC
Room 112, Parliament Buildings
Ph: 250-387-1187
Heidi.Scott@gov.bc.ca

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MINISTRY OF ENVIRONMENT
MEETING INFORMATION NOTE

September 23, 2015
File: 280-30
CLIFF/tracking #: 290772

PREPARED FOR: Honourable Mary Polak, Minister of Environment

DATE AND TIME OF MEETING: Tuesday September 29 at 2:30 pm.

ATTENDEES:
From CAPP: Tim McMillian,CAPP President and CEO; Brad Herald, VP Western Operations; Geoff Morrison, Manager of BC Operations.
From MOE: Wes Shoemaker and Susanna Laaksonen-Craig

ISSUE(S): Climate Leadership Plan and CAPP's submission to the CLP Discussion Paper. New spills response regime and the *Water Sustainability Act* may be raised as secondary issues.

BACKGROUND:

The Canadian Association of Petroleum Producers (CAPP) represents companies that explore for, develop and produce natural gas and crude oil in Canada. The upstream oil and gas industry employs 12,000 British Columbians and invests an average of $5 billion annually in the BC economy.

CAPP has been a key stakeholder in British Columbia's climate action process dating back to the development of the 2008 Climate Action Plan. The organization is broadly supportive of policies to reduce greenhouse gas emissions in the province, with the caveat that the measures must protect the competitive position of the oil and gas sector and, wherever possible, be aligned with policies in other North American jurisdictions.

With respect to the revenue-neutral carbon tax, CAPP supported the 2008-2012 approach of gradual and predictable rate increases, broad-based coverage, and integration with broader climate policies. CAPP also favoured government's decision to adopt a five-year freeze on carbon tax rates from 2013 to 2018, to allow other jurisdictions time to adopt more robust carbon pricing regimes and avoid carbon leakage from BC to other jurisdictions with less stringent policies.

DISCUSSION:

In its submission to the Climate Leadership Plan Discussion Paper, CAPP outlines a number of considerations and recommendations for the final Climate Leadership Plan.

CAPP is not supportive of further increases to the carbon tax rate at this time. The organization believes such increases would further erode the economic competitiveness of BC's oil and gas sector, in the context of a significant drop in oil and gas prices in recent months. CAPP believes protection for trade-exposed sectors such as oil and gas

from disproportionate carbon pricing is critical, ideally through ensuring BC's carbon price is equivalent to the price charged in other competing jurisdictions.

CAPP wants to ensure that any new climate policies in BC are aligned with other government policies that impact their industry, such as the updated Natural Gas Strategy identified in the 2015 mandate letter for the Minister of Natural Gas Development.

The two key overarching strategies CAPP is recommending for the Climate Leadership Plan are technology innovation and carbon offsets. CAPP recommends the creation of an innovation and technology fund to support emission reduction innovations in the oil-and-gas sector, funded by recycled carbon tax revenue from the sector itself. This proposal is similar to the current Alberta Specified Gas Emitters Regulation and supporting incentive programs.

CAPP also proposes another mechanism to fuel innovation in the oil and gas sector: a clean infrastructure royalty program to support new technologies to reduce upstream fugitive and combustion emissions, and to promote climate-resilient infrastructure.

The association believes carbon offsets are a practical and low-cost approach to reducing emissions. CAPP views the upstream electrification of LNG as a potential source of offsets for the sector as a whole.

Specific emissions reduction opportunities proposed in the submission include the electrification of the upstream oil and gas operations, and increased deployment of carbon capture and storage. However, the association cautions that both of these policies have significant implementation costs, and are not economically viable under current market conditions.

CAPP also supports the promotion of natural gas as a global transition fuel towards renewable energy options, and wants the province to maintain the Oil and Gas Commission as a single-window regulator.

Climate Action Secretariat (CAS) recognizes the issues emission intensive, trade-exposed sectors have. CAS is in close contact with Ministry of Natural Gas Development and Ministry of Energy and Mines regarding all aspects CAPP's submission and the ministries are working collaborative to ground-truth the economics and the competitiveness challenges CAPP has identified, and to find policies and mechanisms that enable BC's continued global climate leadership and facilitate a competitive natural gas sector in BC.

SUGGESTED RESPONSE:

The province values the ongoing partnership with CAPP, and individual companies in the oil and gas sector, on climate change policy development. The Climate Leadership Plan will be aligned with current government priorities such as the BC Jobs Plan, LNG Strategy and Natural Gas Strategy. Ministry of Environment works collaborative with other ministries to ensure alignment between the government priorities.

We will continue to engage with CAPP as we finalize the Climate Leadership Plan over the coming months.

Attachment: CAPP Feedback BC Climate Leadership Plan Discuss

Contact:	**Alternate Contact:**	**Prepared by:**
Susanna Laaksonen-Craig, Head	*Tim Lesiuk, ED*	*Erik Kaye, Sr Advisor*
Climate Action Secretariat	*CAS*	*CAS*
250-508-4132	*250-356-7557*	*250-387-1160*

Reviewed by	Initials	Date
DM		
DMO		
ADM	SLC	Sept 24/15
ED	TL	Sept 24/15
Author	EK	Sept 23

Ireland, Shannon L ENV:EX

From: Scott, Heidi ENV:EX
Sent: Wednesday, September 23, 2015 11:49 AM
To: Rollheiser, Kate ENV:EX
Subject: FW: Request to Meet Minister Polak

Can you cliff this one please.

From: Plant, Marnie [mailto:Marnie.Plant@bcbioenergy.ca]
Sent: Tuesday, September 22, 2015 4:40 PM
To: Scott, Heidi ENV:EX
Cc: Weedon, Michael
Subject: RE: Request to Meet Minister Polak

Thank you Heidi,

Both Michael Weedon and I will be available October 20th to meet with Ministers Polak and Bennett in Victoria, 11:15 to 11:45 am.

Many thanks,
Marnie Plant
Strategic Advisor to BC Bioenergy Network
W: (604) 891-1228
C: (604) 813-7198

From: Scott, Heidi ENV:EX [mailto:Heidi.Scott@gov.bc.ca]
Sent: September-22-15 4:20 PM
To: Plant, Marnie
Subject: Request to Meet Minister Polak

Hello Marnie,

I am following up with your email to Andrew Ives requesting to meet with Minister Polak regarding how Bioenergy fits in to Climate Action 2.0. Will you be available for a joint meeting with Minister Polak and Minister Bennett on October 20th 11:15-11:45am in Victoria?

Thank you,
Heidi

Heidi Scott
Administrative Coordinator
Office of the Minister of Environment of BC
Room 112, Parliament Buildings
Ph: 250-387-1187
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MINISTRY OF ENVIRONMENT
MEETING INFORMATION NOTE

October 6, 2015
File: 280-20
CLIFF/tracking #:290875

PREPARED FOR: Honourable Mary Polak, Minister of Environment
Honourable Bill Bennett, Ministry of Energy and Mines

DATE AND TIME OF MEETING: October 20, 2015, 11:15 am - 11:45 am

ATTENDEES: Marnie Plant, Strategic Advisor, BC Bioenergy Network
Michael Weedon, Executive Director, BC Bioenergy Network
Susanna Laaksonen-Craig, Head, Climate Action Secretariat

ISSUE(S): Bioenergy's role in the Climate Leadership Plan

BACKGROUND:

Established in April 2008 with a $25 million grant from the Provincial government, BC Bioenergy Network (BCBN) is an industry-led initiative that helps deploy near-term bioenergy technologies and supports research towards building a world-class bioenergy capability in BC.

BCBN is currently working with four advanced technology development projects to provide low carbon fuels. These fuels can be blended with fossil fuels, or to replace them in certain instances, and used in transportation, communities and industry.

The four projects are:

1. BioCube – biodiesel based on waste vegetable oils.
2. Highbury Energy Inc./Korea Institute of Energy Research – renewable diesel or jet fuel from woody biomass.
3. Proton Power Inc. – hydrogen rich synthetic gas for renewable diesel.
4. An emerging project – electricity and diesel fuel from biogas.

DISCUSSION:

BCBN sent in two submissions in response to the Climate Leadership Plan Discussion Paper. The August 14th submission is a 10-page submission with responses to the Discussion Paper survey and proposals for how biofuels can be part of the solution path. The September 17th submission is a supplement to the first submission with a 20-page Executive summary highlighting bioenergy projects and over 300 pages of appendices, including studies and reports from conferences and trade forums.

In response to the Discussion Paper survey, BCBN suggests that the immediate short-term goal should be "The Way We Travel" with biofuels used in the transportation sector to reduce GHG emissions. In the long-term, BCBN states that "The Way We Work" and "What We Value" should be the priorities. They believe that government can do more to

educate industry and citizens about the urgent need for carbon neutralizing and how bioenergy is part of the solution pathway.

Biofuels are just one form of bioenergy which can reduce GHG emissions. Other bioenergy technologies which BCBN has been exploring are district energy systems and energy centres at industrial sites utilizing wood waste and landfill gas. BCBN feels there is a need for technology demonstrations to make market progress with these bioenergy technologies.

To support BC's clean tech economy, BCBN recommends that Government:

- Recapitalize the BC Bioenegy Network with $25 million to continue its demonstrations of advanced technologies in bioenergy.
- Strengthen BC's Innovate Clean Energy (ICE) fund.
- Fund expansion of the Clean Energy Research Centre and Biomass and Bioenergy Research Group at UBC.

Other BCBN recommendations for actions which would support the bioenergy sector are:

- Review the Renewable and Low Carbon Fuel requirements and set targets for 2050.
- Promote district energy systems, where possible.
- Reinstate annual increases to the carbon tax.
- Expand the carbon tax to covner the remainder of BC's economy.

SUGGESTED RESPONSE:

The ministry recognizes the bioenergy sector can play a key role in reducing greenhouse gas emissions, and appreciates the detailed submissions from the network to the Discussion Paper public engagement process.

All of the submissions will be given careful consideration in the development of the final Climate Leadership Plan. We encourage BCBN to respond to the draft Climate Leadership Plan during the second public consultation process in December.

Contact:	**Alternate Contact:**	**Prepared by:**
Susanna Laaksonen-Craig	*Erik Kaye*	*Selma Low*
Climate Action Secretariat	*Climate Action Secretariat*	*Climate Action Secretariat*
250-356-9443	*250-356-7544*	*250-387-9819*

Reviewed by	Initials	Date
DM	-	-
DMO	BC	Oct 13/15
ADM	SLC	Oct 13/15
ED	TL	Oct 9/15
A/Mgr	EK	Oct 6/15
Author	SL	Oct 5/15

MINISTRY OF ENVIRONMENT
MEETING INFORMATION NOTE

November 9, 2015
File: 280-30
CLIFF/tracking #: 292940

PREPARED FOR: Honourable Mary Polak, Minister of Environment

DATE AND TIME OF MEETING: November 18 at 8:30 am

ATTENDEES: Canadian Propane Association (CPA):

- Andrea Labelle, Executive Director
- Allan Murphy, Senior Director of Public Affairs & Policy
- Scott McFadyen, Western Regional Manager

ISSUE: CPA to discuss how propane can play a role in lowering emissions, provide jobs and help grow the economy.

BACKGROUND:

The Canadian Propane Association is the national association for the Canadian propane industry, representing over 400 members.

The CPA has expressed disappointment (Attachment 2) that propane was excluded from Natural Resource Canada's Natural Gas Transportation Roadmap, and has also been enquiring with BC Ministry of Environment staff as to why propane was not included in BC's Clean Energy Vehicle Program.

Per Minister Bennett's speaking notes June 2015:

- The Ministry supports the adoption of propane powered vehicles in BC Propane conversion kits for vehicles are PST exempt in BC; however, the market does not indicate that government incentives are necessary.
- Propane for transportation is PST exempt but is subject to the motor fuel tax in BC.
- Availability of dedicated propane vehicles is extremely limited and focused primarily on Cutaways, vehicles sold with just a chassis and cab allowing the customer to install the type of work box/cube they wish.
- The infrastructure for propane used in transportation is outmoded and currently shows no indication of expanding in BC

The CPA is also meeting with Minister Bennett on November 18, 2015 (Attachment 1). Purpose of the meeting is a "friendly courtesy call".

DISCUSSION:

Ministry of Energy and Mines' (MEM) response to including propane in the CEV program:

- "The focus of the CEV Program Phase 2 is on zero emission vehicles. One of the objectives of the CEV Program is to achieve significant GHG emissions reductions in the light duty passenger vehicle sector. Propane vehicle emissions savings are significantly less than plug-in electric or hydrogen fuel cell vehicles. Additionally, propane vehicles have reached a state of market maturity where they no longer require government incentives to stimulate demand due to a low price barrier. As well, propane vehicles as an Original Equipment Manufacturer offering are a very limited segment of the market and primarily supplied by one manufacturer."
- MEM Electricity and Alternative Energy Division (MEM EAED) are developing a new program aimed at both public and private fleets; the focus will be on encouraging fleets to purchase zero emission vehicles (ZEV); however, there will be an outreach and education component that will include the benefits and costs of purchasing lower-carbon medium-duty vehicles.
- Climate Action Secretariat partnered with MEM EAED to explore development of a centralized procurement program that may align with the proposed ZEV fleet program. One component may be strategic coordination between procurement of vehicles and upgrades to lower carbon fuels (natural gas and propane) and fuel distribution and infrastructure. A Request for Information (RFI) will be issued soon to seek market advice on how the program might work best. The RFI will consider all lower-carbon alternatives for light and medium duty fleet vehicles, including propane.

CONCLUSION:

Propane is a lower-carbon and cost-effective fuel when used for transportation and the Ministry supports its use. Staff will alert the CPA when the RFI is issued; the CPA and its members are encouraged to respond to the RFI.

Attachments: 1. MEM Briefing Note – November 2015
2. ENV Briefing Note – February 2012

Contact:	**Alternate Contact:**	**Prepared by:**
Susanna Laaksonen-Craig, Head *Climate Action Secretariat* *250 356-9443*	*David Coney, Manager* *Climate Innovation & Solutions, CAS* *250 356-6243*	*Sol Reeve, Senior Analyst* *Climate Innovation & Solutions, CAS* *250-387-3230*

Reviewed by	Initials	Date
DM	WSB for WS	Nov 17/18
DMO	BC	Nov 16/15
ADM	SLC	Nov 13/15
ED	TL	Nov 13/15
Author	SR	Nov 12/15

Date: November 9, 2015
Cliff No.: 92221

MINISTRY OF ENERGY AND MINES
BRIEFING NOTE FOR INFORMATION

I PREPARED FOR: Honourable Bill Bennett, Minister of Energy and Mines

II ISSUE: Meeting with the Canadian Propane Association represented by Andrea Labelle, Executive Director, Allan Murphy, Senior Director of Public Affairs & Policy and Scott McFadyen, Western Regional Manager.

III BACKGROUND:

The Canadian Propane Association (CPA) is the national association for the multi-billion dollar Canadian propane industry, representing over 400 members. The CPA has a strong relationship with the Ministry of Energy and Mines, and the purpose of this meeting is a friendly courtesy call.

Propane is used in a variety of applications in British Columbia. As a transportation fuel, it is used primarily in retrofitted light- and medium-duty vehicles that are part of the existing fleet. The Province continues to exempt vehicle propane retrofits from the Provincial Sales Tax.

Propane is a low carbon transportation fuel under the Renewable and Low Carbon Fuel Requirement Regulation (Regulation). The Regulation sets a default carbon intensity of 75.35 grams of carbon dioxide equivalent per megajoule of energy (gCO_2e/MJ), to reflect the carbon intensity of propane produced at the refineries. However, the Ministry of Energy and Mines recognizes that propane supplied in British Columbia is a blend of two sources: refineries; and gas plants which process natural gas before it enters the pipeline system, resulting in a carbon intensity of 67.65 gCO_2e/MJ. This is 22.5 percent lower than petroleum gasoline, which has a carbon intensity of 87.29 gCO_2e/MJ, and similar to the carbon intensity of compressed natural gas.

In 2012, members of the CPA supplied 126 million litres of propane for transportation fuel in British Columbia. In California, credits under the Low Carbon Fuel Standard have been trading at values between $17 and $79 per credit; setting a prospective value for credit in British Columbia. At a price of $50 per credit, those who supply transportation propane in British Columbia could recover 2.4 cents per litre from the sale of credits generated in 2014.

The number of credits will reduce to roughly one half for the same quantity of fuel by 2020 due to the decrease of the carbon intensity required by the Regulation. At $50 per credit, this could be a cost recovery of 1.4 cents per litre of propane sold.

IV DISCUSSION:

Some propane suppliers have not reported for the compliance period ending December 31, 2014. They should be encouraged to report their compliance to avoid penalties and to take advantage of the cost recovery possible through the sale of the credits.

It would be beneficial for both the Regulation and the British Columbia propane industry if the CPA members that supply propane as a transportation fuel were encouraged to engage in marketing the credit generated from the sale of the fuel they supply.

Currently, the Regulation credit market does not have any credit trading recorded. s.13,s.21
s.13,s.21
s.13,s.21 The credit market is critical for allowing fuel suppliers to achieve compliance with the Regulation in the long term. Therefore, it would benefit the Regulation if the CPA members who supply propane for transportation were to report and sell the credit they generate.

V CONCLUSION:

Propane is a lower-carbon fuel when used for transportation, and Ministry staff will continue to work with the CPA and its members who supply propane for transportation in British Columbia.

Credits are starting to be purchased, and the CPA members who sell credits stand to benefit financially under the Regulation.

DRAFTED BY:
Michael Rensing, Director

APPROVED BY:
Dan Green, Exec. Director ✓
Les MacLaren, ADM, EAED ✓
Elaine McKnight, DM, MEM

Ireland, Shannon L ENV:EX

From: Cynthia Waldmeier <cynthia@impactcanada.com>
Sent: Thursday, October 15, 2015 12:57 PM
To: Polak.MLA, Mary LASS:EX; Minister, ENV ENV:EX
Subject: 291818 Request to meet-Canadian Propane Association

Categories: Meeting/Invite Request

Dear Minister Polak,

I'm reaching out to you on behalf of the Canadian Propane Association (CPA), which has over 400 member companies located from coast-to-coast, many in British Columbia. Our industry employs over 23,000 Canadians and generates over $16 billion for the economy each year. Propane is a highly portable, clean burning and safe fuel that is sourced primarily from natural gas, and therefore shares its low-emission, clean burning properties. In British Columbia, supply is abundant and an expansive infrastructure exists to make it readily available and competitively priced.

The propane industry understands the importance of sustainable energy for British Columbia. In this period of intense environmental concern, propane stands above most fuels and rivals the cleanest, while also offering great value. For almost 100 years, propane has played a key role in communities across the country and hundreds of thousands of Canadians rely on it as an energy solution for their homes, businesses, farms and fleets. Every year our sector invests in local economies through employment, purchases and taxes, and our companies have been working hard for decades to understand and exceed our customers' needs.

The CPA's Executive Director, Senior Director of Public Affairs & Policy and Western Regional Manager will be Victoria meeting with policy officials on November 18th and would very much appreciate some of your time to speak further on how propane can play a key role in lowering emissions, continue to provide jobs and help grow the economy.

I look forward to hearing from you.

Best,

Cynthia

Cynthia Waldmeier
Cynthia@impactcanada.com
613-233-8906

MINISTRY OF ENVIRONMENT
INFORMATION NOTE

November 9, 2015
File: 280-30
CLIFF/tracking #: 292936

PREPARED FOR: W.H. (Wes) Shoemaker, Deputy Minister, Ministry of Environment

DATE AND TIME OF MEETING: November 12, 2:30 pm

ATTENDEES: Darren Flynn, General Manager and Natalie Poole-Moffatt, Head of Corporate Affairs, Woodside Canada

ISSUE: Woodside's entry into Canada

BACKGROUND:

Woodside Energy is Australia's largest independent dedicated oil and gas company. In 2014, Woodside was the tenth largest producer of LNG in the world, controlling nearly three percent of the global market and earning over 70 percent of its revenues through its natural gas operations.

Woodside is looking to maintain if not grow its market share through a number of proposed domestic and international LNG projects. During a recent speech, Minister Coleman provided strong views on the role that natural gas can play globally. He stated that suppliers should not be afraid as new supply (and potentially surplus) enters the global market place as this spurs innovation. This additional supply carries the potential for new applications for natural gas, and will in turn spur demand.

Woodside's Interests in British Columbia

Woodside recently completed its acquisition of Apache's interest in the Kitimat LNG project. This transaction included approximately 320,000 net acres in the Horn River and Liard Basins, adding a growth option to Woodside's development portfolio.

Woodside also has a proposed project on Grassy Point, north of Prince Rupert, called Grassy Point LNG. This project is in the early stages of its environmental assessment and recently (January 2015) was granted an export license from the National Energy Board for twenty million tons per annum.

Woodside's Participation in the 2015 LNG in BC Conference

Peter Coleman played a large role during the second day of the 2015 LNG in BC conference when he joined Minister Coleman for a discussion on what British Columbia can learn from Australia's experience in the LNG industry.

Woodside, through Kitimat LNG, was a Platinum sponsor for the 2015 conference and took part on the exhibition floor. As well, Kitimat LNG helped to support the 2015 GameChanger Youth Expo and hosted a reception at the Vancouver Convention Centre on October 15.

DISCUSSION:

Current Economic Climate for Oil and Gas and Outlook on LNG in Canada

With the global economy slowing, and oil and gas supplies currently exceeding demand, many sectors of the oil and gas industry have felt impacts to their bottom lines. However, with 5 export projects proposed for the east coast of Canada (such as Bear Head, Goldboro and H-Energy) and 20 export projects proposed here in British Columbia the Canadian LNG industry continues to develop quickly. British Columbia has taken steps to ensure that its tax and royalty framework is globally competitive, and provides proponents the certainty they need to make investment decisions.

Kitimat LNG

- Woodside has reinvigorated this project. Through discussions with Chevron and Woodside regarding Kitimat LNG, the Ministry of Natural Gas Development has learned that the proponents are now considering some design changes that could have the potential of increasing the proposed project capacity. Such a change could require changes to both the project's export license and – at a minimum – an amendment to their Environmental Assessment certificate.
- Through the use of hydroelectricity (either for just ancillary or to power the entire facility), some proposed projects have been able to come in below the established threshold for GHG emissions. If Kitimat LNG were to consider the use of hydroelectricity, this could lower the environmental impact of the facility and would have the potential to be below the benchmark. Peter Coleman is also meeting with the CEO of BC Hydro and might raise this possibility. If pursued, this could result in lower transmission upgrade costs for both LNG Canada and Kitimat LNG.
- Discussions continue between Kitimat LNG and the Province with respect to the negotiation of a Project Development agreement.

Grassy Point LNG

- The Grassy Point LNG project is in the early stages of its environmental assessment and its final Application Information Requirements are targeted for March 2016 to meet the amended terms of Woodside's sole proponent agreement with the Province.
- The Environmental Assessment Office is identifying ways to consider concerns raised by Lax Kw'alaams in the environmental assessments underway in the region. The Environmental Assessment Office continues to work closely with other ministries regarding this issue.

CONCLUSION

The Province appreciates the strong working relationship it has built with Woodside and continues to work with them on both of the projects they are involved with.

Given its experience operating and managing multiple projects in Australia, Woodside has indicated that it intends to continue developing both Kitimat LNG and Grassy Point LNG in so far as market conditions would support both.

British Columbia believes the Grassy Point site is world class.

The Province is grateful for Woodside's participation in the 2015 LNG in BC conference, and for the Platinum level sponsorship provided by Kitimat LNG.

Attachments: 1. Kitimat LNG Project Overview
2. Grassy Point LNG Project Overview

Contact:
Susanna Laaksonen-Craig, Head
Climate Action Secretariat
Cell: 250-508-4132

Prepared by and Alternate Contact:
Tim Lesiuk, ED
Climate Action Secretariat
Cell: 250-216-5893

Reviewed by	Initials	Date
DM		
DMO	BC	11/09/15
ADM	SLC	11/9/2015
Author/ED	TL	11/9/2015

Attachment 1: Kitimat LNG Project Overview

- Kitimat LNG is proposing to build an LNG facility and marine terminal at Bish Cove near Kitimat. At full build-out this facility would export upwards of 10 million tonnes per annum (MTA) of LNG.
- On April 10, 2015, Woodside successfully completed the acquisition of Apache's portion of the Kitimat LNG project for a purchase price of US$854 million.
- Kitimat LNG received a National Energy Board export license in 2011 for 10 million tonnes per annum over 20 years. It received major environmental approvals in 2006.
- 16 First Nations affected by the Pacific Trail Pipeline (Kitimat LNG's proposed pipeline) have joined together through the First Nations Limited Partnership (FNLP) to support the development of that natural gas pipeline project. Moricetown was the final First Nation or Band to join the FNLP in January, 2015.

Proponent	Chevron (50%), Woodside (50%)
Location	Bish Cove (Kitimat)
Proposed Size	10 MTA
Export License	Approved–20 years, with annual volume of 10 million tonnes of LNG
Environmental Assessment	Federal and Provincial approvals completed
Pipeline	Pacific Trail Pipeline
Estimated Investment	$5 billion (estimate for train 1)
Jobs	Construction: 3,000 at peak activity
Latest Development	On September 3, 2015, the BC EAO determined that the Kitimat LNG Terminal Project has been substantially started. With that, the EA Certificate remains in effect for the life of the Project.

Attachment 2: Grassy Point LNG Project Overview

- Woodside proposes to construct, commission and operate a liquefied natural gas export facility – referred to as Grassy Point LNG – on provincially administered Crown Land at Grassy Point, near Prince Rupert. At full build-out this facility would export upwards of 20 million tonnes of LNG per annum.
- On January 16, 2014, the Government of British Columbia announced a sole proponent agreement had been reached with Woodside for exclusive rights to pursue long-term Crown land tenure in the Grassy Point area.
- Grassy Point LNG entered into the Environmental Assessment process in August 2014 and is currently in the Pre-Application phase.
- The environmental assessment and engineering work is expected to be finished by 2017 followed by 4 years of construction activities. Operations are expected to commence in 2021.
- In January 2015, the project was issued an export license from the National Energy Board for 20 million tonnes per annum for 25 years.

Proponent	Woodside
Location	Grassy Point (near Prince Rupert)
Proposed Size	20 MTPA
Export License	Approved – 25 years, with annual volume of 20 million tonnes of LNG
Environmental Assessment	In Progress (Pre-Application)
Pipeline	TBD
Estimated Investment	$10 - $15 billion (Phase 1)
Jobs	Construction: 1,000for near shore option, 6,000 for onshore option
Latest Development	An export license was issued by the National Energy Board to export 20 MTPA for a period of 25 years on January 29, 2015.

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MINISTRY OF ENVIRONMENT
MEETING INFORMATION NOTE

January 26, 2016
File: 280-20
CLIFF/tracking #: 294034

PREPARED FOR: Honourable Mary Polak, Minister of Environment

DATE AND TIME OF MEETING: February 9, 2016 from 9:30-10:00 a.m., Room 112, Parliament Buildings.

ATTENDEES: Scott Wenger, Manager, Government Relations, Suncor Energy Inc.
Ginny Flood, Vice President, Government Relations, Suncor Energy Inc

ISSUE(S): Discuss emission reductions, marine spill response and clean technology.

BACKGROUND:

Suncor Energy Inc. is an integrated energy company. Suncor's global operations include oil sands development and upgrading, conventional and offshore oil and gas production, petroleum refining and product marketing under the Petro-Canada brand. Most recently, Suncor turned their attention to oil sands, bidding to acquire Canadian Oil Sands.

Suncor's British Columbia (BC) presence was more substantial (yet still only about five percent of BC oil/gas sector emissions) until 2013 when they sold their BC conventional natural gas plays. This is reflected in their annual GHG emissions (below). Suncor still maintains ownership of Montney assets (shale gas), evaluated at about 7 trillion cubic feet of "contingent Montney resource". However, in 2014 it suspended plans to develop them.

Suncor's operations in BC are split between Suncor Energy Inc. and its wholly-owned subsidiary, Suncor Energy Products Partnership.

Suncor Energy Inc.'s annual GHG emissions reported to BC (tonnes CO2-equivalent):

2010:	2011:	2012:	2013:	2014:
224,046	198,487	164,022	31,197	24,543

BC Facilities (as of 2014) - all in Fort Nelson/Fort St. John area, and all classified as upstream, conventional oil/gas extraction facilities:

- One battery[1] with emissions E > 10,000 tCO2e
- One battery with emissions 1,000 < E < 10,000 tCO2e
- One well with emissions 1,000 < E < 10,000 tCO2e

Current or potential LNG involvement:

[1] **"battery"** means a facility at which the liquids obtained from one or more wells are stored before those liquids are processed for market or delivered to market or are otherwise disposed of, and may include equipment or other devices for separating the liquids into oil, natural gas and water (EMA, Oil and Gas Waste Regulation)

- No involvement in either current public LNG facility proposals or natural gas transmission lines.
- However, Suncor still own Montney assets (see above);
- If there were to be significant LNG development in BC, it is conceivable that, with its Montney assets, Suncor could provide some feedstock natural gas to an LNG facility that does not have an upstream partner to supply them.

Suncor Energy Products Partnership's annual GHG emissions reported to BC (tonnes CO2-equivalent):

2010:	2011:	2012:	2013:	2014:
14,446	12,167	12,071	11,200	11,737

BC Facilities (as of 2014):

- Burrard Products Terminal[2] (Port Moody/Burnaby) - reporting
- 3 other terminals in BC: Nanaimo, Kamloops, Terrace – do not report (apparently below 10,000 tCO2)

The Province has met with and consulted Suncor regularly over the past several years, including with respect to the development of BC's Renewable and Low Carbon Fuel Requirements Regulation (RLCFRR) in spring 2015, and the development of the Climate Leadership Plan in late 2015/early 2016.

Topics of interest for Suncor include BC's efforts to manage carbon emissions (emissions targets, biofuels and carbon pricing), BC's marine spill response system, and support for the clean technology sector in BC.

1) Managing Carbon Emissions

(a) Emissions targets:

- BC has legislated emission reduction targets of 33% under 2007 levels by 2020 and 80% under 2007 levels by 2050.

(b) Biofuels:

- The RLCFRR establishes annual carbon intensity limits for the supply of transportation fuels in BC, and a market-based mechanism to promote fuel supplier compliance with these limits.
- In spring 2015, Cabinet confirmed BC's commitment to carbon intensity limits that achieve a 10% reduction by 2020 (relative to 2010).
- Petroleum fuel suppliers (e.g. Suncor) have options for achieving compliance with the RLCFRR, such as increasing the supply of higher renewable content fuel blends at the pump, or purchasing compliance credits from low carbon fuel suppliers.

(c) Carbon Pricing:

[2] "A distribution terminal's primary function is to receive large amounts of transportation fuel (such as gasoline, jet fuel, and diesel) from oil refineries; process the fuel to meet customer specifications, then distribute the fuel to various customers (retail gas stations, airports, etc.) by truck, rail, marine or pipeline."

- BC's revenue neutral carbon tax covers 70 percent of provincial emissions. The tax is set at $30 per tonne of CO2 equivalent emissions, and all revenues are returned to British Columbians in the form of personal or business tax cuts.
- The Province has stated that the carbon tax will not increase before 2018.

2) Marine Spill Response

- In 2012, the Province released five conditions outlining requirements for BC to support for heavy oil pipelines. The second and third conditions relate to world-leading marine and land-based oil spill response, prevention and recovery systems to manage and mitigate the risks and costs associated with pipelines and shipments.

3) Clean Tech Sector

- BC has a growing clean technology sector, and the Province has been clear that it is open for business in the global low-carbon economy.
- The new BC Tech Strategy, released January 18, 2016, reinforces this message with a strong focus on improving access to venture capital, talent and markets for BC companies, including clean technology companies.
- On December 8, 2015, Premier Clark announced a new $100 million venture capital fund-of-funds as part of the BC Tech Strategy. The Ministry of International Trade is seeking a private sector investment manager to manage this new fund-of-funds, manage the $90M of capital currently committed through the BC Renaissance Capital Fund, and build a more robust provincial venture capital system by increasing the supply of local venture capital and drawing other investors into BC.
- The BC Innovation Council is implementing a new program, the Innovation Exchange, that will build on BC's history of natural resource development. The Innovation Exchange identifies key industrial problems and "feeds" them, in a curated environment, to researchers and technology developers to solve, fostering integration of innovative solutions that span multiple domains.

DISCUSSION:

1) Managing Carbon Emissions

s.13

- The CLT recommends establishing a new 2030 target of 40 percent below 2007 levels. Sectoral targets are also recommended for transportation, industry and buildings.

(b) Biofuels:

- In spring 2015, Cabinet committed to review the RLCFRR in 2017. Suncor and other fuel suppliers would be participants in this regulatory review.
- The Climate Leadership Team recently recommended that BC's carbon intensity limits for transportation fuels achieve a 20 percent reduction by 2030 (relative to 2010).

2) Marine Spill Response

- After two years of research and engagement with federal partners, industry, First Nations and local government, BC is proceeding with legislative amendments to the *Environmental Management Act* to introduce new spill preparedness, response and recovery requirements in the spring of 2016.
- Elements of the new regime will include geographically-based planning and response that will see participation by First Nations, first responders and local communities.
- Consultation on a third policy intentions paper is targeted for early 2016 with further consultation planned for spring 2016. Regulatory development is anticipated to continue into 2017.
- BC continues to consult with and provide regular updates to industry associations through a project Advisory Committee on the Spill Response Regime.

3) Clean Tech Sector

- In January 2016, Suncor Energy Inc. and Cenovus Energy Inc. announced the launch of a $100 million Evok Innovations fund. Evok aims to tap early-stage innovations focused on the oil and gas industry and reduce the time it takes to commercialize technologies. The investments must meet the "double-bottom line" criteria of reducing costs and carbon emissions. Evok will look at technologies that can reduce tailings ponds, improve the upgrading process, reduce diluent, improve steam-oil ratio and particularly through the use of smart centres, big data and analytics.

SUGGESTED RESPONSE:

s.12,s.13

Contact:	**Alternate Contact:**	**Prepared by:**
Susanna Laaksonen-Craig, Head	*Tim Lesiuk, Exec. Director*	*David Coney, Manager*
Climate Action Secretariat	*Climate Action Secretariat*	*Climate Action Secretariat*
250 356-9443	*250 356-7557*	*250 356-6243*

Reviewed by	Initials	Date
DM	WSB	February 2, 2016
DMO	BC	January 27, 2016
ADM	SLC	January 26, 2016
Exec. Director.	TL	January 26, 2016
Author	DC	January 20, 2016

MINISTRY OF ENVIRONMENT
MEETING INFORMATION NOTE

April 22, 2016
File:
CLIFF/tracking #: 298188

PREPARED FOR: Honourable Mary Polak, Minister of Environment

DATE AND TIME OF MEETING: May 16th at 9:00am

ATTENDEES: Tim McMillian, Canadian Association of Petroleum Producers (CAPP) President, Michael Gatens, CAPP Chairman & CEO, Unconventional Gas Resources Canada, Brad Herald, Vice President of Western Operations, Geoff Morrison Manager of British Columbia Operations, Fazil Mihlar, Deputy Minister, Climate Leadership and Susanna Laaksonen-Craig, Head, CAS

ISSUE(S): CAPP's submission for the Climate Leadership Plan

BACKGROUND:

The Canadian Association of Petroleum Producers (CAPP) represents companies that explore for, develop, and produce natural gas and crude oil throughout Canada. CAPP's member companies produce about 90 per cent of Canada's natural gas and crude oil. CAPP's mission is to advocate for and enable economic competitiveness and safe, environmentally and socially responsible performance.

As part of the development of its Climate Leadership Plan (CLP), the Province recently held the second of two consultation periods. Individuals, businesses, First Nations, communities and other stakeholders were invited to provide their ideas, input and comments for the plan. The Ministry of Natural Gas Development has held 5 consultation meetings with CAPP between December and February 2016, with CAS participation. On April 8th, CAPP provided their submission on the CLP. They have requested a meeting in order to discuss their feedback.

DISCUSSION:

CAPP's submission acknowledged BC's climate leadership and affirmed the viability of the Province's plan to meet its GHG reduction goals while maintaining a strong economy and robust natural gas sector. CAPP cited BC's opportunity for BC liquefied natural gas to lower global GHG emissions by displacing the use of coal in growing economies. CAPP also noted the challenges that the natural gas sector faced in the current low commodity price environment and recommended that climate policy be developed with the lens of how it can not only preserve, but enhance the sector's competitiveness.

CAPP cautioned the Province against taking the Climate Leadership Team's recommendation of annual carbon tax increases, stating that this would further diminish competitiveness of the natural gas industry and increase the risk of carbon leakage to competing jurisdictions. They applauded the Province's intentions to protect Emissions

Intensive Trade Exposed (EITE) industries, citing Minister Polak's statement that EITE industries would be "fully protected from any carbon tax increase". CAPP believes that the natural gas sector is an EITE sector.

CAPP stated that greater electrification of the natural gas sector could help BC progress to its emission reduction targets. They cautioned that for electrification to be feasible, they would require reliable and timely in-service transmission capacity and affordable rates and tariffs. CAPP also stated that significant methane emission reductions at existing and new facilities were possible through the use of targets and "fiscal measures" rather than an expansion of the carbon tax. "Fiscal measures" were defined as programs and tools like offsets, royalty credits, or carbon tax credits, that would incentivize the adoption of methane reduction policies and practices.

SUGGESTED RESPONSE:

The Province thanks CAPP for their thoughts on BC's upcoming Climate Leadership Plan. BC shares CAPP's conviction that the Province can meet its emission reduction targets while maintaining a strong natural gas sector. The Province has consulted with the sector and continues to work with them to develop effective climate policy. CAPP's input will help inform the development of the Climate Leadership Plan, which will be delivered in the coming months.

Attachments: Appendix A: Bios for Tim McMillan, Mike Gatens, and Geoff Morrison

Contact:	**Alternate Contact:**	**Prepared by:**
Susanna Laaksonen-Craig, Head	*Neil Dobson*	*Hurrian Peyman*
Climate Action Secretariat	*Climate Action Secretariat*	*Economist, CAS*
250 356-9443	*250 387-9981*	*250 356-7544*

Reviewed by	Initials	Date
DM		
DMO		
ADM	SLC	05/05/16
Dir./Mgr.		
Author		

Appendix A: Bios for Tim McMillan, Mike Gatens, and Geoff Morrison



Tim Mcmillan: Tim McMillan was appointed President and incoming CEO of the Canadian Association of Petroleum Producers (CAPP) in 2014. The Saskatchewan native is responsible for leading activities in education and communications as well as policy and regulatory advocacy on behalf of CAPP. After earning an economics degree from the University of Victoria, he traveled and worked overseas as an Information Technology professional. He later returned to the family farm near Lloydminster and founded and operated an oilfield services company. In 2007, Tim was elected as a Saskatchewan Party MLA in the riding of Lloydminster. From 2010 until his appointment as President of CAPP, Tim held several strategic cabinet portfolios in the Government of Saskatchewan, including Minister of Energy and Resources and Minister of Rural Health.



Mike Gatens: Mr. Gatens has 34 years of oil and gas experience, primarily in unconventional gas, and currently serves as CEO and Director of Unconventional Gas Resources. He also co-founded and is on the Board of Directors of the American affiliate, Unconventional Resources, LLC. Prior to this he co-founded MGV Energy Inc. MGV developed the first commercial Coal Bed Methane (CBM) production in Canada in the Horseshoe Canyon coals. Prior to founding MGV, he was a director and vice president with the consulting firm S.A. Holditch & Associates, specializing in the analysis and development of shale, CBM, and tight gas reservoirs, where he authored or co-authored numerous technical articles. He was also the founding Chairman of the Canadian Society for Unconventional Gas (CSUG). Mike is a registered professional engineer in Texas and Alberta., He served on the Canadian Association of Petroleum Producers (CAPP) Board of Governors from 2004-2008 and 2012-present.



Geoff Morrison: Geoff is the Manager of British Columbia Operations of CAPP. Prior to this position he was the General Manager at Global Public Affairs, a Canadian public relations and lobbying firm. Geoff spent five years as Vice President of Public Affairs at Hill and Knowlton, a global public relations and integrated communications company. He was also a Senior Consultant at National Public Affairs prior to that.

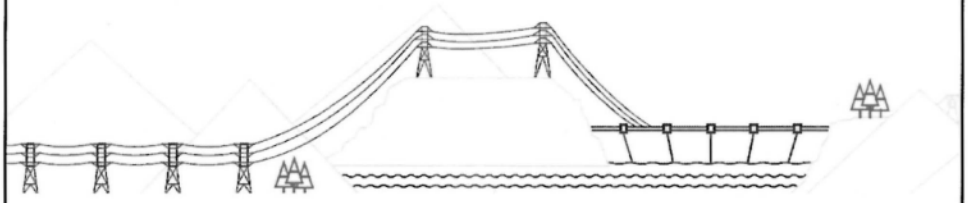
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Electrification of Customer Loads in the South Peace

Presentation to CAPP Electrification Working Group



BC Hydro
Power smart

Objectives:

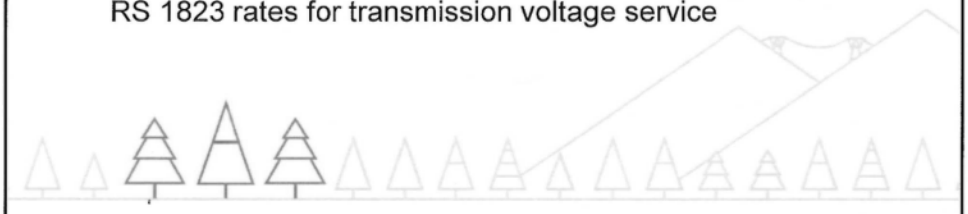
1. Electrify existing and new natural gas processing and compression facilities
2. Make it easier to do business with BC Hydro
3. Align strategic policy interests of industry, BC Hydro and government



BC Hydro
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Our Commitment:

1. Serve new customer loads in an efficient and cost-effective manner
2. Provide certainty to customers re: the timing and costs of grid supply
3. Upstream natural gas processing customers will pay RS 1823 rates for transmission voltage service



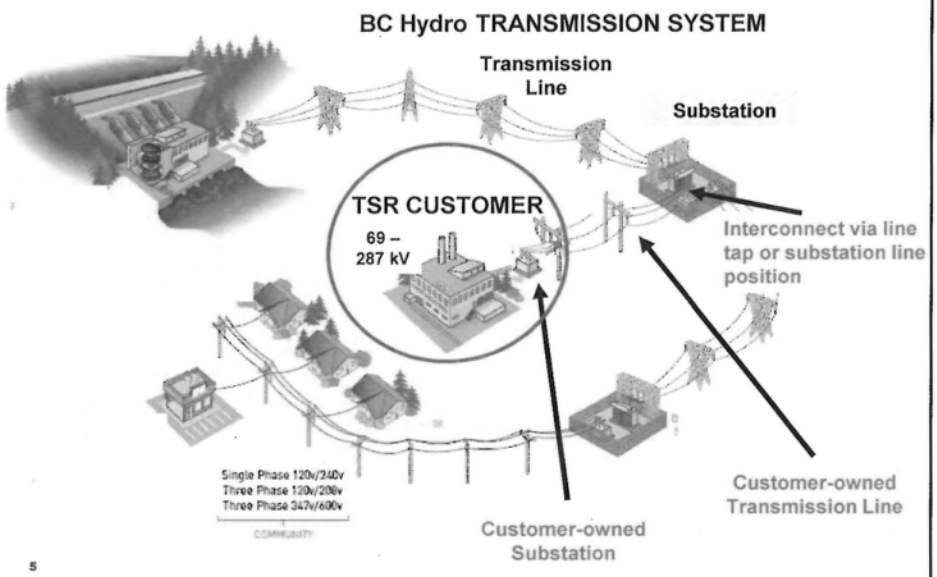
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Grid Supply – Process and Key Agreements



BC Hydro
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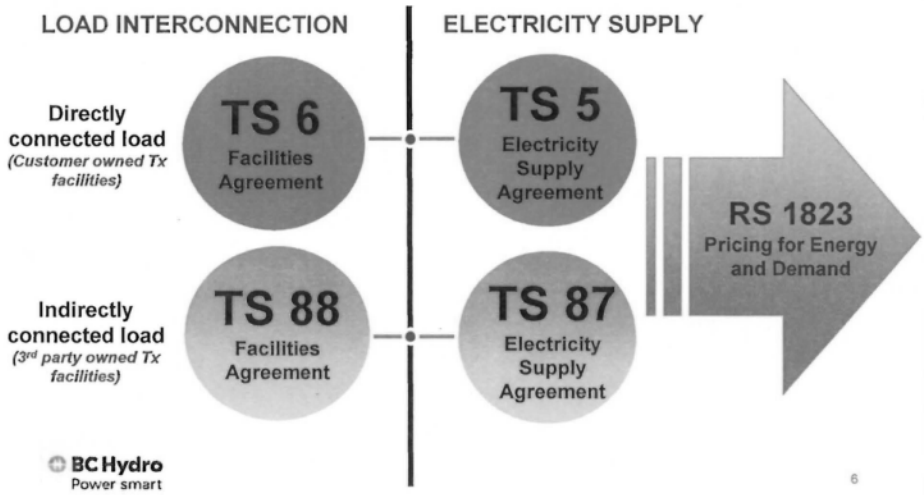
Transmission Voltage Interconnection



5

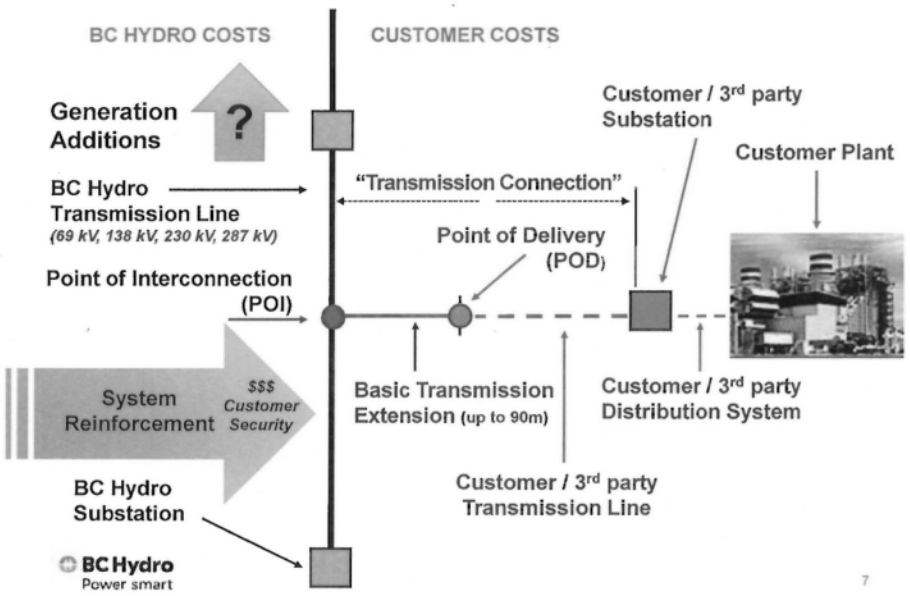
TARIFFS FOR INTERCONNECTION AND SUPPLY

LOAD INTERCONNECTION QUEUE: Business process for BC Hydro studies to determine the location, cost, method and timing of system interconnection.

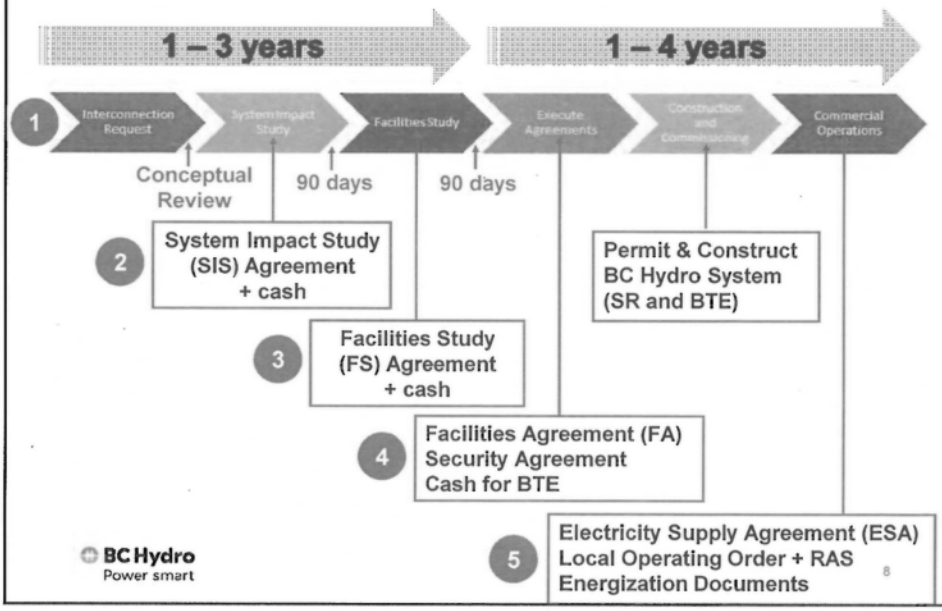


6

ILLUSTRATIVE TRANSMISSION CONNECTION



INTERCONNECTION PROCESS / QUEUE MANAGEMENT



Issue clarity:

1. What's not working now (i.e., what is preventing customers from electrifying loads)? Why? Be specific.
2. Is this a tariff issue, a business process issue, or a policy issue?
3. What can BC Hydro do differently?



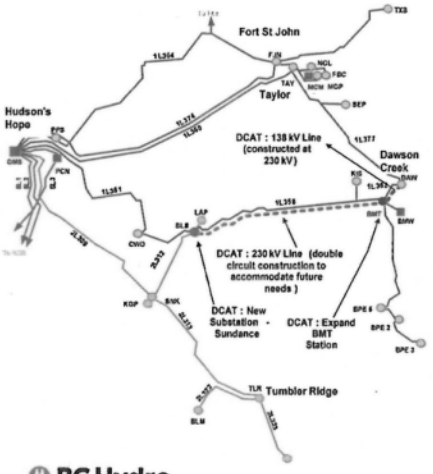
BC Hydro
Power smart

Tx System capacity:

- BC Hydro's transmission system in the South Peace region is potentially constrained prior to approval and completion of the next phase of reinforcement (PRES).
- **How big is the prospective capacity gap?**
- **When is the gap most likely to occur?**
- **What prudent measures might be taken?**
- **How should costs for these measures be fairly allocated?**

BC Hydro
Power smart

Existing and future system capacity:



	N-0 reliability	N-1 reliability	
Prior system capacity	150 MW	75 MW	
Existing system with DCAT	430 MW	185 MW	
DCAT with reinforcement	500 MW	185 MW	
PRES – single circuit	950 MW	430 MW	
PRES – double circuit		805 MW	

BC Hydro Power smart

11

Size and timing of new 'DCAT' loads: 258 MW

New Customer loads with secured* DCAT capacity allocation (in MW)

Customer Loads	F2016	F2017	F2018	F2019	F2020	F2021	F2022	F2023
Tx		21	106	40	33	15	15	15
Dx	3	2	2	1	1	1	2	1
Sub-total	3	23	108	41	34	16	17	16
Base Load	250							
TOTAL	253	276	384	425	459	475	492	508

** Security provided for Tx loads and Dx loads > 10 MW*
** Dx loads are forecast estimates only*

System capacity of 500 MW might be reached by F2023

BC Hydro Power smart

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Size and timing of new 'PRES' loads: 248 MW

Prospective new loads and timing based on customer requests* (in MW)

Customer Loads	F2016	F2017	F2018	F2019	F2020	F2021	F2022	F2023
Tx			16	10	52	50	106	9
Dx		5						
Sub-total		5	16	10	52	50	106	9
DCAT Load	3	23	108	41	34	16	17	16
Base Load	250							
TOTAL	253	281	405	456	542	608	731	756

** No formal commitments have been made for 'PRES' loads*

System capacity of 500 MW might be exceeded in F2020 ...

Prudent bridging measures needed to mitigate capacity gap

BC Hydro Power smart

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Prospective Bridging Measures:

1. Advancing PRES in-service could reduce the need/cost for bridging and provide (N-1) service reliability earlier for all customers*
2. Installation of temporary generation – size and location to be determined*
3. Commercial agreements for customer generation*

*** Robust options assessment to prudently meet service commitments and fairly allocate costs and risk**

BC Hydro Power smart

14

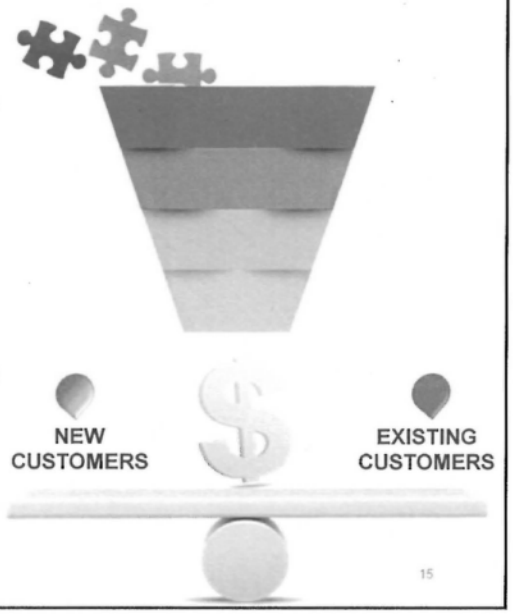
CONCEPTUAL ALLOCATION OF COSTS

Need Considerations:

- N-1 reliability planning criteria
- Load uncertainty
- Market downturn

Cost Considerations:

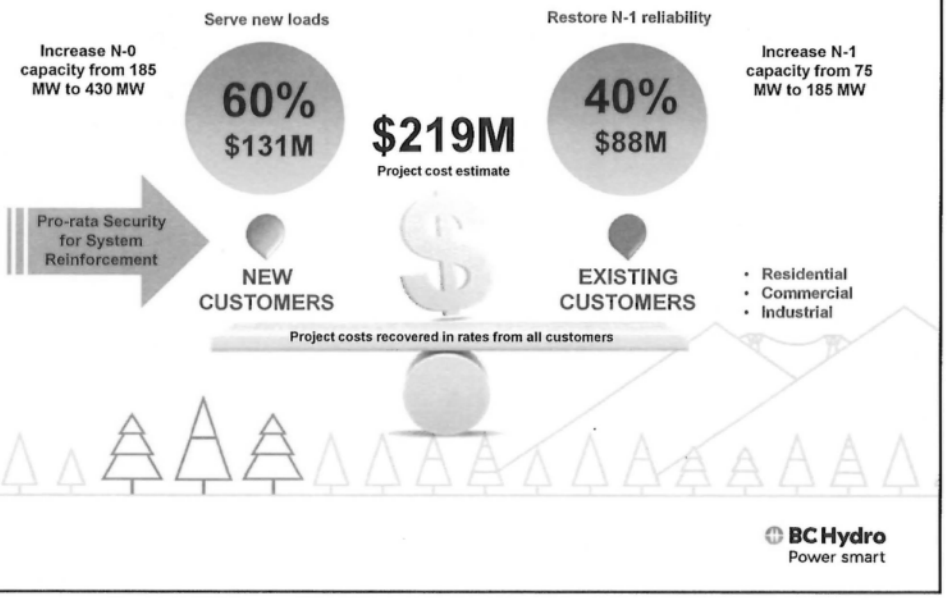
- System Reinforcement (project scope to reflect need)
- Bridging measures
- Rate impacts



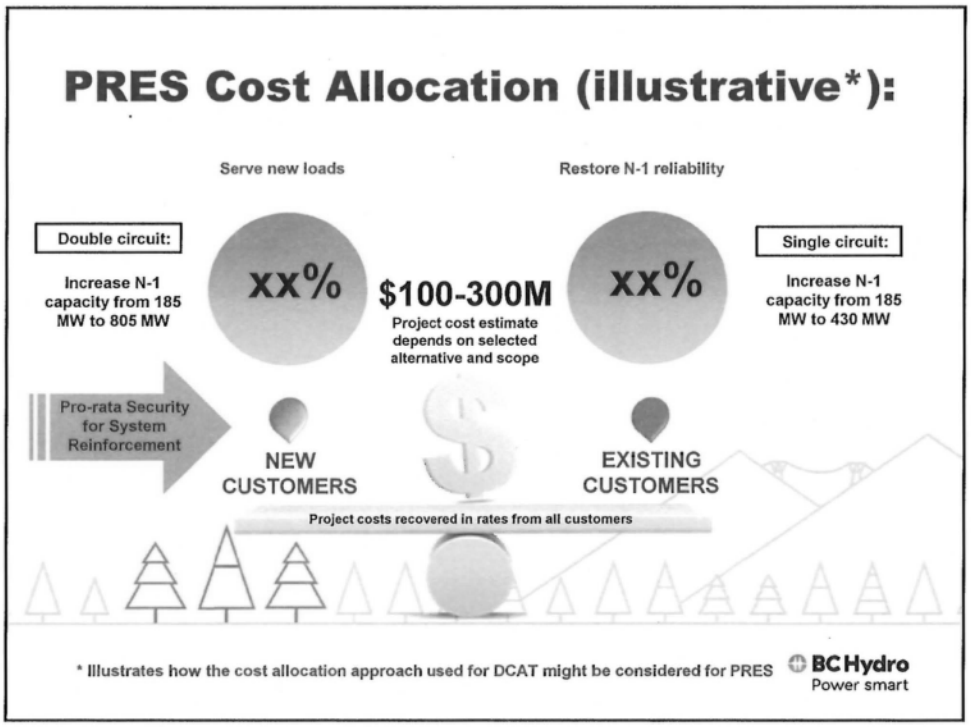
BC Hydro
Power smart

15

DCAT Cost Allocation:



BC Hydro
Power smart


PRES Cost Allocation (illustrative*):
Serve new loads
Restore N-1 reliability
Double circuit:
Increase N-1 capacity from 185 MW to 805 MW
xx%
$100-300M
Project cost estimate depends on selected alternative and scope
xx%
Single circuit:
Increase N-1 capacity from 185 MW to 430 MW
Pro-rata Security for System Reinforcement
NEW CUSTOMERS
EXISTING CUSTOMERS
Project costs recovered in rates from all customers
* Illustrates how the cost allocation approach used for DCAT might be considered for PRES
BC Hydro
Power smart

Doing things better together.

B.C. Climate Leadership Team Recommendations Consultation with Oil and Gas Industry

Framing Meeting

Calgary, January 13th, 2016 – 9:30 am-10:30 am MT

CAPP Meeting Room A – Conference call: s.15

CAPP
CEPA
BCLNGA. three Lawr... Docum...

Tyler DAVID

AGENDA

1. Introductions
2. Government's engagement objectives for all working groups
3. Timelines
4. Industry feedback

CAPP. CAMBRIAN - CHEVRON - NEXEN - WOODFIBRE - BCLNGA. - CAPP - Progresso.

① • CLT Recommendations are just that – govt. can take or leave.
• Opportunity to shape future
② • rational approach to methane.
③ • tax.

deliverables
- wording that could go into a climate plan

- overall competitiveness is the BC priority that comes even before clean & CA.
- global solutions need to be acknowledged. balance economic growth
-
* updated production forecasts to reflect near term reduction of drilling.
- economic vs. competition is an important distinction.
* next ~~steps from~~ language from ecofiscal commission report on competition & trade exposed sectors.
- compete for investment
- C tax impacts on that competition by basin
- upstream opportunity for reduction from C. price.

B.C. Climate Leadership Team Recommendations Consultation with Oil and Gas Industry

Working Group 1: Carbon Tax

Calgary, January 13th, 2016 – 10:30 am-12 pm MT

CAPP Meeting Room A – Conference call: s.15

LMA

AGENDA

1. Introductions

2. Objectives and Expectations
   a. Government
   b. Industry

3. Review of the language in the Climate Leadership Team Recommendations report

4. Industry's feedback on:
   a. Carbon Tax and competitiveness
   b. Approach to "trade-exposed" definition
   c. Principles for mechanisms to maintain competitiveness

5. "To do" list for next meeting
   a. Government
   b. Industry

6. Next meeting: Calgary, January 26th, 2016 – 9 am to 12 pm MT

B.C. Climate Leadership Team Recommendations Consultation with Oil and Gas Industry

Working Group 2: Methane and Offsets

Calgary, January 13th, 2016 – 1:00 pm-2:30 pm MT

CAPP Meeting Room A – Conference call: s.15

#6. upstream CH4 16-112a
is
31.

AGENDA

• fugitive/MCF. for methane

1. Introductions

2. Objectives and Expectations
   a. Government
   b. Industry

3. Review of the language in the Climate Leadership Team Recommendations report

4. Industry's feedback on:
   a. Approach to fugitives
   b. Balancing action with sector competitiveness
   c. Timelines for implementation

5. "To do" list for next meeting
   a. Government
   b. Industry

6. Next meeting: Calgary, January 26th, 2016 – 1:00 pm to 2:30 pm MT

B.C. Climate Leadership Team Recommendations Consultation with Oil and Gas Industry

Working Group 3: Electrification

Calgary, January 13th, 2016 – 3:00 pm-4:30 pm MT

CAPP Meeting Room A – Conference call: s.15

Julie chose

GREG R.
MOM.

AGENDA

- 3 buckets of opportunity
- timing & availability of power.

1. Introductions

2. Objectives and Expectations
   a. BC Hydro
   b. Government
   c. Industry

3. Greg Reimer: update on BC Hydro Forecast 2017-19 revenue requirements

4. Review of the language in the Climate Leadership Team Recommendations report

5. Industry's feedback on:
   a. Power supply competitiveness tariff is an issue
   b. Identify key issues related to grid supply

6. "To do" list for next meeting
   a. BC Hydro
   b. Government
   c. Industry

7. Next meeting: Calgary, January 26th, 2016 – 3:00 pm to 4:30 pm MT

Page 115 to/à Page 123

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CAPP
CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers

April 8, 2016

Honourable Mary Polak
Climate Leadership Consultation
Ministry of Environment Climate Action Secretariat
PO BOX 9486, STN PROV GOVT
Victoria B.C. V8W 9W6

via e-mail: climateleadershipplan@gov.bc.ca

Dear Minister Polak:

Re.: Feedback on BC's Climate Leadership Plan Consultation Guide

The Canadian Association of Petroleum Producers (CAPP) submits the following comments in response to the *Consultation Guide: Building B.C.'s Climate Leadership Plan*. CAPP appreciates the opportunity to provide our industry's perspective on addressing climate change in British Columbia as the province finalizes the development of the new Climate Leadership Plan.

It is clear that both generally and in the context of natural gas producing and LNG exporting jurisdictions that BC is a leader on carbon policy and addressing greenhouse gas (GHG) emissions. BC has a unique opportunity to help tackle global climate change by making LNG available to countries looking to move off of coal-fired power generation. We are firmly of the view that the economic benefits from responsible natural-gas production and export can be achieved while also meeting BC's ambitions to tackle global climate change.

CAPP supports a climate policy framework in British Columbia that creates a vibrant and competitive oil and gas sector while efficiently and effectively managing greenhouse gas emissions. To this end, CAPP provides the following key recommendations, aligned with the relevant sections of the Consultation Guide. These views remain consistent with CAPP's submission made to Government September 2015, in response to the Climate Leadership Plan Discussion Paper, which outlined the importance of competitiveness and supporting further emissions reductions opportunities for oil and gas, such as electrification and methane emissions reductions.[1]

***What We Value:* Protecting BC's Competitiveness & Minimizing Carbon Leakage**

From a competitiveness standpoint, BC's upstream natural gas industry faces significant challenges due to a continued low commodity price environment coupled with the unique challenges associated

[1] https://engage.gov.bc.ca/climateleadership/files/2015/12/179_-Canadian-Association-of-Petroleum-Producers.pdf

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1004, 235 Water Street
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310, 1321 Blanshard Street
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with BC's resource plays. We recommend that the BC government consider how any climate policy initiatives undertaken by the province can not only preserve, but enhance the economic competitiveness of BC's upstream oil and gas sector to attract investment and create jobs. Carbon policy design requires full cost accounting of options when evaluating the cumulative burden across policies and regulations in order to prevent further deterioration of industry competitiveness and to minimize the risk of carbon leakage to competing jurisdictions. We offer the following carbon policy recommendation for how to minimize both carbon and investment leakage from BC.

Carbon Tax

The CLT recommended increases to the current $30/tonne carbon price commencing in 2018. Applying additional increases to our sector would further diminish competitiveness of the natural gas industry and increase the risk of carbon leakage to competing jurisdictions. Economic competitiveness is of paramount importance to ensure the industry is able to thrive, attract new investment, create jobs and generate revenues for government.

Emission-Intensive, Trade-Exposed (EITE)

CAPP strongly supports the efforts of the Government of BC to protect EITE industries. On November 27, 2015, Minister Polak stated that the province would only consider changes to its carbon tax under a regime where EITE industries are "fully protected from any carbon tax increase."

CAPP fully supports the government's position to protect EITE industries, and believes the upstream industry clearly qualifies as an EITE industry.

Given BC's strong leadership on carbon pricing, applying further increases in BC's carbon price to our sector without full protection would further impair the competitiveness of the province's oil and gas sector, especially in the current low price environment when operating margins are already suppressed. An EITE policy applied to carbon price increases would recognize the importance of managing inter-jurisdictional competitiveness, until the carbon policies in key trading jurisdictions are equivalent and/or aligned in level of effort and price. Additional policy principles are provided in the Appendix.

***The Way We Work:* GHG Emissions Reduction Opportunities**

CAPP is looking forward to engaging with the B.C. government in the development of the province's Climate Leadership Plan to meaningfully address GHG emission from upstream oil and natural gas activities while enhancing the overall competiveness of the industry in British Columbia. The following section provides recommendations on key emissions reductions opportunities from our industry.

Electrification

The consultation guide references the Climate Leadership Team's recommendation 14 to supply clean electricity for the electrification of the upstream industry in a competitive and timely manner.

CAPP believes competitive electrification of the upstream will help BC move toward its provincial GHG reduction targets, representing a foremost opportunity for significant GHG mitigation for the oil and gas sector in BC. Based on our sector's experience, there exists two significant risks to competitive electrification: Reliable and timely in-service transmission capacity; and economic considerations related to rates and tariffs. Practical work is required by BC Hydro and government to work with our sector to align business processes and to find equitable means to balance risks.

Methane

In 2013, upstream oil and gas methane emissions accounted for approximately 20 per cent of BC's total methane emissions. CAPP is committed to making reductions to methane emissions and recommends the following, taking care that responses to each of these demonstrate leadership in seeking alignment with Canada, other provincial jurisdictions and, where appropriate, with competing jurisdictions like the US:

- Applying enhanced regulated standards to new facilities and a regulated standard of practice for leak detection and repair (LDAR) of fugitive equipment leaks; building on existing LDAR requirements.
- A market-based approach to achieve a specified reduction target using fiscal measures focused on reductions from legacy methane emissions sources installed at existing facilities.
- A specific reduction target for vented and fugitives sources at existing facilities that is ambitious yet achievable with the appropriate policy and fiscal mechanisms in place to provide industry with a pathway to achieve the specified reductions. In addition, this target should align appropriately with other provincial and federal goals, including Alberta's Climate Leadership Plan.

CAPP believes properly designed and prescribed programs will achieve greater reductions than those that would be achieved through a carbon tax approach, which increases operating costs and could discourage needed investment in BC. Consequently, CAPP does not at this time support recommendations to increase the rate or scope of the BC carbon tax, as applied to our sector, and believes that all uncombusted methane should be exempt from carbon tax to enable reductions using the market-based mechanisms above. For legacy assets, a market-based approach to achieving a specified methane emissions reduction target is critical to mitigate the costs of retro-fitting industry's inventory of existing equipment to lower emitting devices.

Fiscal Measures

To incent methane emissions reductions, and to incent greater uptake in electrification, a viable path forward hinges on the development of fiscal mechanisms to enable investment. Given the current competitiveness pressures on our sector (including the cost burden of the carbon tax), industry and government will need to work together on ways to improve the economic value of emission reduction projects. By doing so will contribute to more reductions being achieved.

The following fiscal measures should be considered further by the BC government for application by the industry to emissions reductions opportunities:

- *Offsets*: Could be achieved via BC government guaranteed/targeted purchase of offsets, to provide certainty around supply and price, and/or enabling linkages to other offset markets, to expand demand for BC offsets.
- *Carbon compliance certification*: Reduction in carbon tax payable based on emission reductions achieved.
- *Clean infrastructure royalty credit program*. Investing in innovation and technology will enable BC to reduce emissions while also creating and maintaining jobs. CAPP recommends that the province create a broad clean royalty infrastructure credit program that would support investments in infrastructure/technology to reduce methane emissions. A royalty credit program would contribute to investment economics supplemented by fiscal support through offsets or compliance certificates.

In conclusion, BC needs to find the balance so that it can be both a strong world leader in the fight against climate change and a more competitive place to invest in oil and gas. Climate policy should be designed to focus on targeted emissions reductions through enhanced technology investment and deployment, enable flexible compliance options and prioritize economic competitiveness in order to simultaneously enhance competiveness, attract new investment, while achieving the emissions performance objectives. Going forward industry and government will need to work together to achieve greater GHG reductions in a way that can support or enhance industry's competitiveness. We believe a significant opportunity does exist and can be supported by BC in its climate action plan by: designating EITE industries, supporting upstream electrification, and providing the fiscal mechanism that will enable methane emission reductions. CAPP is committed to working together to find ways to help achieve BC's emissions reduction targets while continuing to grow the economy.

Sincerely,

Brad Herald

Brad Herald
Vice-President, Western Canada

Cc: Hon. Rich Coleman, Minister of Natural Gas Development
Hon. Michael de Jong, Minister of Finance
Hon. Shirley Bond, Minister of Jobs, Tourism and Skills Training and Responsible for Labour
Hon. Todd Stone, Minister of Transportation and Infrastructure
Hon. Peter Fassbender, Minister of Community, Sport and Cultural Development and Responsible for TransLink

CAPP

CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS

Canada's Oil and Natural Gas Producers

April 8, 2016

Appendix: Emission-Intensive, Trade-Exposed (EITE) Policy Design Principles

Currently, many different carbon management regimes around the world utilize an emission-intense trade-exposed (EITE) methodology to determine the need to protect industries competiveness and minimize carbon leakage under carbon pricing policies. The EITE designation serves to recognize those segments of the economy that represent a leakage risk, whereby investment could shift jurisdiction with less stringent carbon policies providing no gain in global GHG reductions but shrinking economic benefit for BC through loss of investment, jobs and government revenue.

CAPP has worked with industry associations along the natural gas value-chain in British Columbia to consider other jurisdictions' EITE methodologies and develop policy design principles for EITE. Through this effort, the following principles have been established and should be part of a BC mechanism for EITE determination:

- *Fair and transparent*, creating competitive parity across competing jurisdictions.
- *Science-based*, with a strong analyses and understanding of implications in practice.
- *Clear, predictable and simple to administer*, with clear and established processes for review of EITE protection.
- *Cost-efficient*, offsetting the difference in incremental carbon price that exists between competing jurisdictions.
- *Balanced and efficient*, recognizing the totality of emissions policies on industry.
- *Viable*, with readily available compliance pathways that support open market mechanisms.
- *Consistent with developing a clean LNG industry*, achievable within the context of a growing and transitioning lower carbon economy.
- *Recognizes the risk of carbon leakage*, and that BC is currently a world leader in carbon price and industry emissions regulations.
- *Does not disadvantage BC natural gas producers*, in existing North America markets and in emerging international markets.

Using these principles as a framework for EITE policy design, CAPP looks forward to working further with the BC government to further develop a BC solution to EITE determination and application.

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BRITISH COLUMBIA | Ministry of Natural Gas Development



BC Carbon Capture and Storage Policy Framework

CCS Regulatory Policy Framework

- The BC Natural Gas Strategy (2012) committed government to promote the use of CCS by completing the development of a regulatory framework.
- The CCS Regulatory Framework:
  - Identifies and addresses regulatory gaps to ensure that CCS is done safely to protect the public and the environment.
  - Provides transparency in CCS development.
  - Addresses regulatory policy barriers to CCS projects and provides certainty to industry to ensure regulatory regime is in place for CCS projects to proceed and to ultimately reduce GHG emissions.

CCS Regulatory Policy Overview

- BC has a comprehensive regulatory regime that regulates all oil and gas industry activities including acid gas disposal and natural gas storage.
- A proposed CCS Regulatory Policy Framework (CCS RPF) has been drafted by a cross-government team which included the BC Oil and Gas Commission.
- The CCS regulatory policy framework is a robust regulatory model that will address key issues such as reservoir selection, security of CO2 storage, monitoring and long-term liability.

Principles

- Builds on the existing oil and gas regulatory framework currently in place
- Based on sound science and best practices
- Consistent, transparent and fair
- Outcomes and risk-based
- Long-term risk sharing between government and industry

Proposed CCS Regulatory Framework

The CCS Regulatory Policy Framework proposes to:

- Clarify and align storage and disposal rights management system for the needs of CCS.
- Establish a rigorous site selection and project application process for CCS.
- Create requirements for CCS monitoring and post-closure assurance.
- Transfer long-term liability back to the Crown when performance measures are met.
- Create a reservoir stewardship fund from an industry injection levy to provide for government's ongoing stewardship obligations and long-term liabilities.

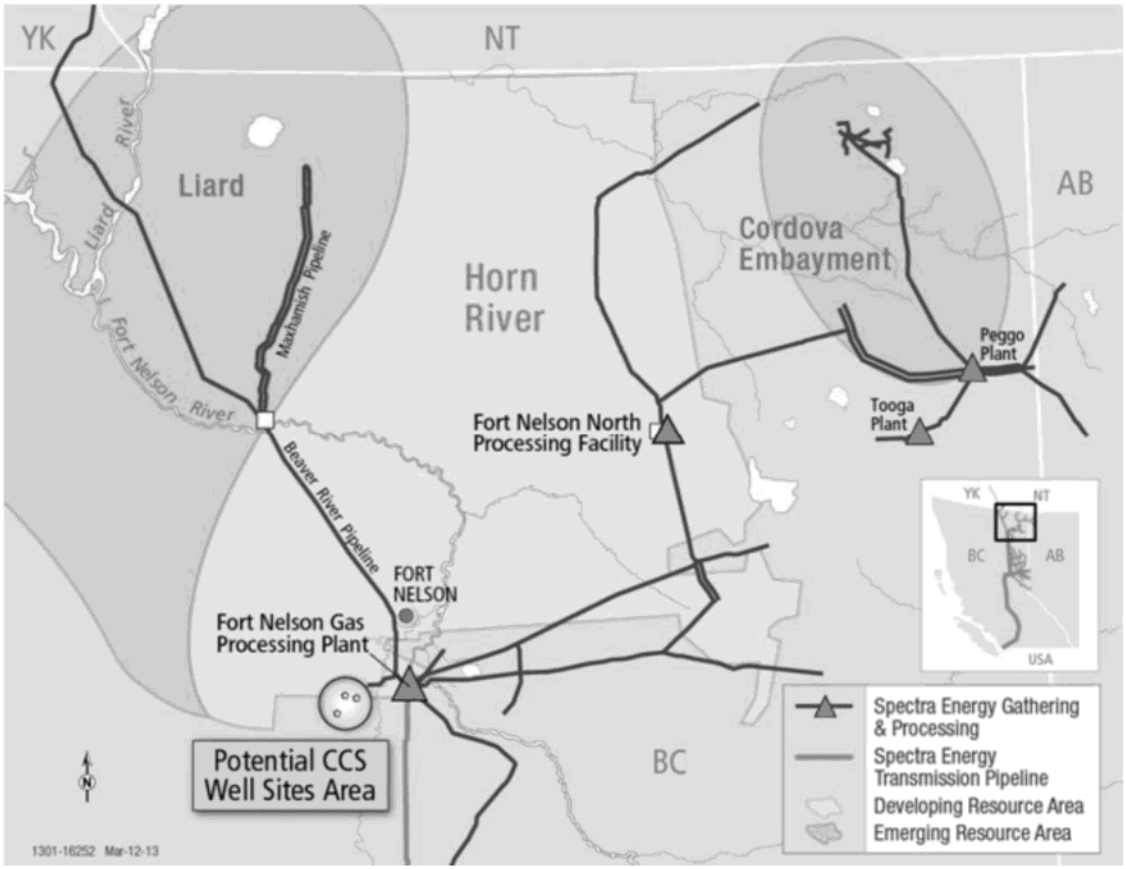
2014 Engagement Summary

- Public consultation process (gov.bc.ca/carboncapture).
- Discussion paper on proposed regulatory policy for CCS.
- Goal to provide information and to obtain feedback on the proposed CCS RPF from key stakeholders and the general public.
- Targeted key NEBC regional stakeholders including First Nations, communities and industry.
- Comments were collected and compiled in a 'Consultation Summary Report'.
- Target CCS regulatory policy to be in place: 2017.

Horn River Basin CCS Opportunity

- Unconventional gas resource 448 Tcf potential in the HRB
- Additional Liard and Cordova Embayment potential
- Almost no development now, but could re-start if LNG projects provide the demand
- 1.3 Bcf/d processing capacity in place
- Long life shale gas supply with 10% to 14% CO_2 composition

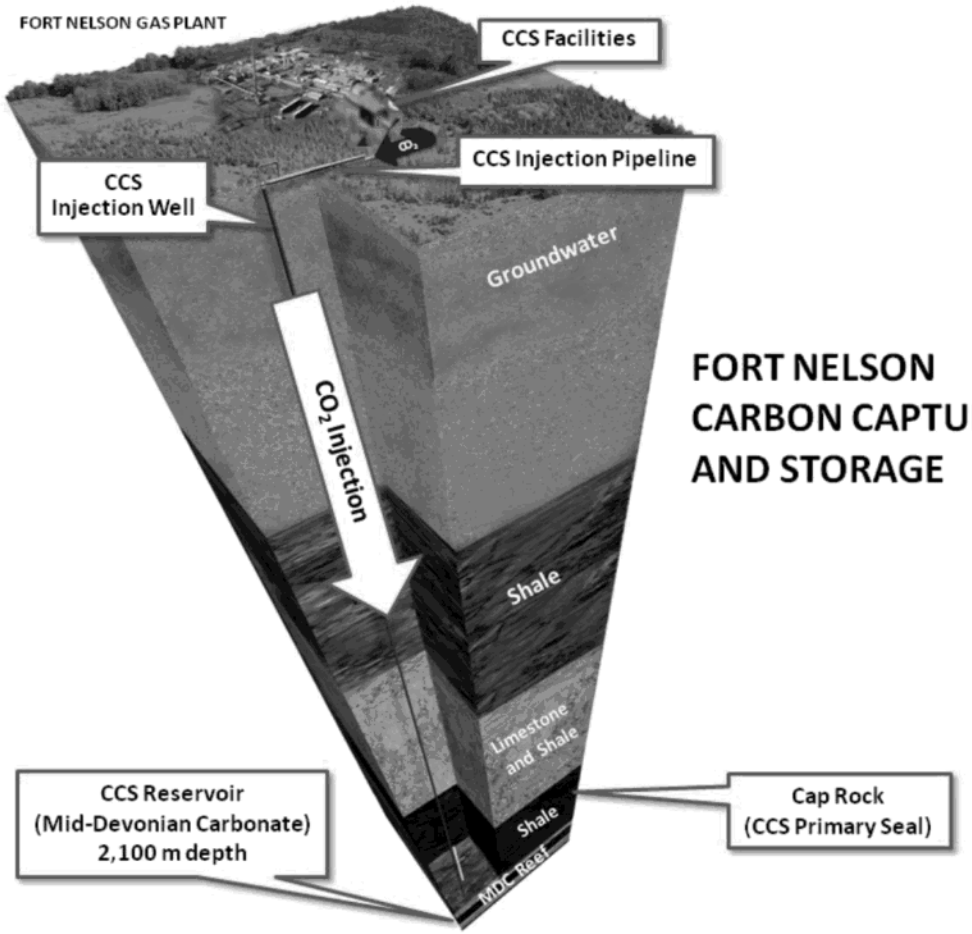
➢ Long useful life for CCS facilities



Source: Spectra Energy

Spectra Energy Fort Nelson CCS Project

- Work to date suggests that the Fort Nelson CCS project is technically feasible.
- Deep Saline Aquifer meets necessary technical specifications:
  - ✓ Storage Capacity
  - ✓ Injectivity
  - ✓ Containment
- Potential 2.2 million tonnes/year of formation CO2 sequestered.



Source: Spectra Energy

Spectra Fort Nelson CCS Status

- Feasibility Study has concluded – an excellent storage reservoir exists
- Injection Well is now in a long term suspension configuration
- Licence for a Storage Reservoir is in place
- Well re-entry for CCS when CCS regulations & commercial viability are realised



BC Methane Table

May 6, 2016 – 8:00 am – 10:30 am Pacific Time

Boardroom 8036 - 1810 Blanshard, 8th floor, Victoria

Conference Call: s.15

1. Welcome (MNGD)
2. Roundtable (all)
3. Purpose of meeting (MNGD)
4. Developments in other jurisdictions: Federal – Alberta – Saskatchewan (all)
5. Joint technical group developments (CAS)
6. NRCan funding for oil and gas projects (CAPP/OGC)
7. The role of CSA and other organizations in standards development (all)
8. CIRCP & Offsets interactions (MNGD/CAS)
9. Next steps and timelines

Action items from last meeting:

1. **CAS (Tim)** will put everybody in the technical group in touch so they start meeting – their first task: clean up the 2014 inventory to use as base for target.
    - Industry: Marie Johnson from Progress
    - CAPP: Troy Jones
    - CAS: Hurrian Peyman
    - OGC: Tony Wakelin
    - MNGD: Don D'Souza

2. **CAPP (Brad?)** to look into projects that NRCAN might be proposing in the oil and gas space (Brad indicated CAPP might already have the list)

3. **OGC (Ken Paulson)** to follow up with NRCAN about funding and applicability of funds to writing standards

4. **CAPP (Mikaela)** to add a column to the LDAR scan analysis and send back to the group - DONE

5. **MNGD (Michelle) and CAS (Tim?)** will work on a draft concept on how the CIRCP and offsets can play together to incent methane emission reductions. They will also explore how to validate the approach and ensure it's successful (potential for industry "focus group"?)

6. **MNGD (Ines)** to set up next meeting – May 6th in Victoria

Agenda September 21, 2016

11:00	**Introductions/Welcome**
11:15 – 12:15	**CAPP High Level Overview**
12:15 – 12:45	**Lunch and Discussion**
1:00 – 2:30	**CAPP Technical Review – Emission Source Categories** **Each Presentation 20 min + 10 min Q&A**
2:30 – 2:45	**Coffee Break**
2:45 – 3:45	**CAPP Technical Review –Emission Source Categories** **Each Presentation 20 min + 10 min Q&A**
3:45 –5:00	**All Attendees Additional Discussion and Next steps**

Page 12 of 321 MOE-2016-62676-CAS3

Page 013 to/à Page 134

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Laaksonen-Craig, Susanna ENV:EX

From: Morrison, Geoff <geoff.morrison@capp.ca>
Sent: Tuesday, September 15, 2015 4:16 PM
To: Brunnen, Ben
Cc: Piccinino, Ines MNGD:EX; Lesiuk, Tim ENV:EX; Dunn, Richard (Richard.Dunn@EnCana.com); Ferguson, Alex; Laaksonen-Craig, Susanna ENV:EX
Subject: RE: Follow-up and clarification on comments today

Thanks Ben

I appreciate you clarifying these points quickly.

I would like to add, to government, while we do appreciate the opportunity to take part and answer questions, the very short notice was a problem and it didn't give any opportunity to us to prepare a deck or other materials.

Will there be other opportunities to input into the CLT group? It didn't quite feel like we had an equal footing and we could have made our points more clearly if we had had a chance to prepare and provide a presentation as other invitees where able to do.

Given the importance of the upstream industry in the emissions portfolio and potential reduction portfolio in BC it is disappointing to be thought of and added to the CLT process in such an ad-hoc manner.

Having said, that we do appraised the ongoing direct engagement with government hope that work continues.

Geoff

Geoff Morrison | Manager of British Columbia Operations
Victoria: 778.410.5040 | Cell: 250.634.4010| Calgary: 403.776.1409

From: Brunnen, Ben
Sent: Tuesday, September 15, 2015 3:25 PM
To: Daniel Johnston (danieljohnston@pacificresolutions.com)
Cc: Ines.Piccinino@gov.bc.ca; tim.lesiuk@gov.bc.ca; Morrison, Geoff; Dunn, Richard (Richard.Dunn@EnCana.com); Chouan, Alexis ENV:EX; Ferguson, Alex
Subject: Follow-up and clarification on comments today

Hello Dan

As a follow-up to our call today, attached is CAPP's submission to the BC Climate Leadership Plan consultations.

From a clarification perspective, please note our comment regarding regulator engagement:

- In its 2015 Speech from the Throne, the government committed to reducing red tape and easing unnecessary burdens in order to save time and make things more efficient. In the spirit of these objectives, CAPP recommends that the province could continue to look for opportunities to reduce red tape and GHG emissions at the same time. Government and industry combined efforts to successfully eliminate routine flaring and

venting is one example of a successful approach in this regard, and future opportunities could include reforms in areas such as well testing.

Please note we are not advocating for increased regulation in the upstream, rather, that the government work with the regulator and industry to review their framework and find opportunities for reform on a permissive/ enabling basis.

We are also supportive of a voluntary approach in relation to methane emission reduction.

I look forward to further engagement with the panel on these and other matters, and will follow-up with further info and comments shortly. Please reach out regarding next steps and additional opportunities for input/ clarification.

Thanks

Ben

Ben Brunnen | Manager, Fiscal and Economic Policy

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers

D: 403.267.1160 | Email: ben.brunnen@capp.ca | Website: www.capp.ca

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Laaksonen-Craig, Susanna ENV:EX

From: Ferguson, Alex <alex.ferguson@capp.ca>
Sent: Friday, October 2, 2015 9:27 AM
To: Laaksonen-Craig, Susanna ENV:EX
Subject: FW: CAPP Submission to Alberta's Climate Change Advisory Panel
Attachments: CAPP_EDMS-#270590-v1-Submission_to_Alberta_s_Climate_Change_Advisory_Panel_-_October_1__2015.PDF

Susanna:

Thought you might find this of interest. Attached is our submission to the Alberta climate change advisory panel. If you have any questions, I'm sure we can find some time to discuss.

Regards,

Alex

Alex Ferguson | Vice President, Policy & Performance

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers

Email: Alex.Ferguson@capp.ca | Website: www.capp.ca

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Laaksonen-Craig, Susanna ENV:EX

From: Morrison, Geoff <geoff.morrison@capp.ca>
Sent: Monday, October 5, 2015 10:34 AM
To: warren@bell; Lesiuk, Tim ENV:EX; Grieve, Richard MNGD:EX; Piccinino, Ines MNGD:EX; MacLaren, Les MEM:EX; Laaksonen-Craig, Susanna ENV:EX; Wieringa, Paul MEM:EX
Subject: PDF version of CAPP 's Alberta submission on climate action.
Attachments: CAPPCapp submission to Alberta _Climate_Change_Advisory_Pan....pdf

Follow Up Flag: Follow up
Flag Status: Completed

Categories: COP22

Hello everyone please find attached a PDF version of. CAPP's Alberta submission on climate action. There is a marginal abatement cost curve include which I think you will find informative.

Geoff

Sent from my BlackBerry 10 smartphone on the Bell network.

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Laaksonen-Craig, Susanna ENV:EX

From: Ferguson, Alex <alex.ferguson@capp.ca>
Sent: Monday, October 19, 2015 5:29 AM
To: Piccinino, Ines MNGD:EX; Laaksonen-Craig, Susanna ENV:EX
Cc: Morrison, Geoff
Subject: BC Climate Leadership Team
Attachments: 2015 Q1 Industry Fiscal Pulse - ARC Financial.pdf; CAPP_EDMS-#271099-v7-BC_Climate_Leadership_Team_Presentation.PPT

Ines, Susanna:

As promised ... I've attached the discussion deck we used on Friday. I've also attached a recent report by ARC Financial, that should be of interest to the Team. This report is an "accounting snapshot" of the oil/gas industry across Canada, and should provide some insight as to the context in which the BC-based sector functions.

Please let me know if you need any further information on any specific topic.

Alex

Alex Ferguson | Vice President, Policy & Performance

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers

Email: Alex.Ferguson@capp.ca | Website: www.capp.ca

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Laaksonen-Craig, Susanna ENV:EX

From: Morrison, Geoff <geoff.morrison@capp.ca>
Sent: Friday, April 8, 2016 2:29 PM
To: Shoemaker, Wes ENV:EX; Mihlar, Fazil AVED:EX; Laaksonen-Craig, Susanna ENV:EX; Lesiuk, Tim ENV:EX
Subject: Fw: For Review: CAPP Feedback on BC's Climate Leadership Plan Consultation Guide
Attachments: Microsoft Word - CAPP_EDMS-#279029-v18-DRAFT_submission_to_BC_regarding_Climate_Leadership_Plan_-_March_2016.DOC.pdf

Wes, Fazil, Susanna, and Tim

Please find CAPP's feedback on the climate leadership consultation process.

Geoff

Sent from my BlackBerry 10 smartphone on the TELUS network.

From: Tate, Shirley <shirley.tate@capp.ca>
Sent: Friday, April 8, 2016 2:19 PM
To: climateleadershipplan@gov.bc.ca
Cc: JTST.Minister@gov.bc.ca; mngh.minister@gov.bc.ca; FIN.Minister@gov.bc.ca; CSCD.minister@gov.bc.ca; Minister.Transportation@gov.bc.ca
Subject: For Review: CAPP Feedback on BC's Climate Leadership Plan Consultation Guide

To: Honourable Mary Polak
Climate Leadership Consultation
Ministry of Environment Climate Action Secretariat

Cc: Hon. Rich Coleman, Minister of Natural Gas Development
Hon. Michael de Jong, Minister of Finance
Hon. Shirley Bond, Minister of Jobs, Tourism and Skills Training and Responsible for Labour
Hon. Todd Stone, Minister of Transportation and Infrastructure
Hon. Peter Fassbender, Minister of Community, Sport and Cultural Development and Responsible for TransLink

Please find attached the Canadian Association of Petroleum Producers (CAPP) feedback on BC's Climate Leadership Plan Consultation Guide.

Sincerely,
Shirley Tate on behalf of

Brad Herald | VP, Western Canada

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers
2100, 350-7th Avenue SW, Calgary, AB T2P 3N9
D: 403.267-1113 | Email: herald@capp.ca | Website: www.capp.ca




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Duncan, Laurie ENV:EX

From:	Weilinger, Gary <gweilinger@spectraenergy.com>
Sent:	Friday, April 22, 2016 5:11 PM
To:	Minister, ENV ENV:EX; Minister, MNGD MNGD:EX; Minister, MEM MEM:EX; Minister, JTST JTST:EX; Minister, FIN FIN:EX
Cc:	Shoemaker, Wes ENV:EX; Mihlar, Fazil ENV:EX; Carr, Steve PREM:EX; Sweeney, Neil PREM:EX; Nikolejsin, Dave MNGD:EX; McKnight, Elaine L MEM:EX; athana.mentzelopolous@gov.bc.ca; Baskerville, Shannon JTST:EX
Subject:	Spectra Energy's Perspectives in Response to the B.C. Climate Leadership Panel Recommendations
Attachments:	Spectra Energy_BC Climate Leadership Plan Response_Final.pdf

Dear Minister Polak,
On behalf of Spectra Energy, please find enclosed for your consideration our perspectives on the Climate Leadership Panel recommendations. We appreciate the opportunity to participate in this important dialog, particularly as British Columbia continues to work with the Government of Canada in meeting the commitments coming out of COP 21. As you are aware, this is a critical time not only for our industry, but for our business in Western Canada, and these perspectives are provided in the context of ensuring there will continue to be a vibrant natural gas industry in British Columbia for future generations.
We would like to see British Columbia play a pivotal role in helping more carbon intensive countries like China break away from a dependency on coal, which ultimately kick-starts our LNG industry and gets people in British Columbia working again. As your government has stated many times, GHG reductions are a global matter, and British Columbia has a very significant role to play in helping to reduce CO_2.
Best regards,
Gary.

GARY C. WEILINGER VP, EXTERNAL RELATIONS | SPECTRA ENERGY
o. 403.699.1523 | c. 403.650.8216 | gweilinger@SpectraEnergy.com



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Duncan, Laurie ENV:EX

From: Reder, Mark <mark.reder@fleishman.ca>
Sent: Monday, April 25, 2016 4:39 PM
To: Mihlar, Fazil ENV:EX
Subject: Woodside Canada LNG

Fazil:

Executives from Woodside LNG will be in Vancouver on May 3, 2016. As you may know, Woodside has a sole proponent agreement with the Province to negotiate a tenure for an LNG export facility at Grassy Point, near Prince Rupert. Woodside is building capacity in Canada and a strategic plan to carry the company through environmental assessment and ultimately project development and operation. A key planning consideration for Woodside over the longer term is GHG emissions policy in BC and Canada. In this respect, they would be grateful for an opportunity to introduce themselves to you and discuss the current status of GHG policy development. I would like to think that this would be the beginning of a constructive and ongoing working relationship.

If you have some time on May 3 and are amenable to meet (around 1:30 or 2 pm would be ideal), I will coordinate with Woodside and provide you with names, titles, etc.

Best regards,

Mark Reder
Senior Vice President and Senior Partner, General Manager
FleishmanHillard | *777 Hornby Street – Suite 1920*| *Vancouver*| *B.C.* | *Canada*
O *604-688-2505 ext. 226* | M *604-318-4282*| F *604-688-2519*
E *mark.reder@fleishman.ca*

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Duncan, Laurie ENV:EX

From: Peyman, Hurrian ENV:EX
Sent: Thursday, May 5, 2016 11:26 AM
To: D'Souza, Don MNGD:EX; troy.james@capp.ca; mjohnson@progressenergy.com; Wakelin, Tony
Subject: Fw: BC Data - Sorted
Attachments: CAPP_EDMS-#281194-v1-BC_UOG_Methane_Data_Mar_2016.XLSX

Hi,

This is the document that was discussed

Hurrian

From: Lesiuk, Tim ENV:EX
Sent: April-21-16 1:34 PM
To: Peyman, Hurrian ENV:EX; Zahariev, Konstantin ENV:EX
Subject: FW: BC Data - Sorted

Tim Lesiuk
Executive Director, Business Development and Chief Negotiator
Climate Action Secretariat, Province of British Columbia
Mobile: 250.216.5893
Email: tim.lesiuk@gov.bc.ca

From: McQuade, Mikaela [mailto:mikaela.mcquade@capp.ca]
Sent: Thursday, April 7, 2016 11:39 AM
To: Lesiuk, Tim ENV:EX
Subject: BC Data - Sorted

As promised.
Best,
Mikaela

Mikaela McQuade
Policy Advisor, Environment
CAPP
(403) 776-1406 | mikaela.mcquade@capp.ca

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Duncan, Laurie ENV:EX

From: Marie Johnson <mjohnson@progressenergy.com>
Sent: Friday, May 6, 2016 6:50 AM
To: Lesiuk, Tim ENV:EX
Cc: Peyman, Hurrian ENV:EX; Jones, Troy (troy.jones@capp.ca); Wakelin, Tony; D'Souza, Don MNGD:EX; Jones, Troy (troy.jones@capp.ca)
Subject: Federal GHG Report Action Item
Attachments: ReportHistory Fed b-88-I.pdf; New Methane Analysis.xls

Hi Tim,

Thank you for taking the time to meet with us yesterday and review and recap the progress to date on the methane file.

I took a look at the figures that were sketched out at our earlier meetings and you are right about the slope of the line being the same. I apologize for the confusion.

There were some action items that came out of the meeting. One of them was for me to take a look at the 2015 federal report that was submitted for our b-88-I facility to see if the methodologies are provided within it. They are but not in great detail. I was also asked for an electronic copy of the spreadsheet that I had yesterday. It is attached. The target values within it were generated to see what an industry target of a 45% reduction might look like, and also if Progress was to set its own target to match industry, what that might look like. The source data is taken from the CAS website.

If there is anything else you need from me please let me know.

http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=47B640C5-1&offset=6&toc=show

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Engineering Estimates:

This type of method may involve estimating emissions based on engineering principles and judgment, using knowledge of the chemical and physical processes involved, the design features of the source, and an understanding of the applicable physical and chemical laws.

Reporters are reminded of the legal requirement to keep copies of the information submitted, together with any calculations, measurements and other data on which the information is based, for a minimum period of three years from the date the information must be submitted.

Currently, there are no specific protocols to define how reporters must calculate their GHG emissions. However, reporters must use methods that are consistent with the methodologies approved by the UNFCCC and developed by the IPCC. Refer to sections 3.1–3.3 for background information and a more complete description of the flexibility allotted to reporters in their estimation procedures. Facilities can also refer to Annexes 3 and 6 of Part 2 of the National Inventory Report to obtain detailed explanations of estimation methodologies and emission factors used by Environment Canada in the development of the estimates.

For further details on the IPCC methodologies, reporters should refer to Table 3, which presents specific references to the relevant sections of the 2006 IPCC Guidelines for the emission sources subject to reporting.

Regards,

Marie Johnson
Regulatory Advisor
T: 403 539-1759

PROGRESS ENERGY

1200, 205 Fifth Ave. SW
Calgary, AB Canada T2P 2V7
ProgressEnergy.com

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Duncan, Laurie ENV:EX

From: D'Souza, Don MNGD:EX
Sent: Monday, May 9, 2016 5:13 PM
To: 'Marie Johnson'; Lesiuk, Tim ENV:EX; Wakelin, Tony; Jones, Troy (troy.jones@capp.ca); Peyman, Hurrian ENV:EX
Subject: Methane baseline for BC
Attachments: BC GHG 2014 methane reductions working copy r3.xlsx

Hi all,

Attached is a spreadsheet with a high-level assessment of methane emissions by source category as well as potential reduction activities and their applicability for BC.

The overview of reported 2014 methane emissions is the same as has been shared previously by Mikeala and Marie (using the reporting reg data for the 211113 NAICS code and limited to venting and fugitive CH4 emissions). I've distributed the emissions into source categories based on a 2013 breakdown of emissions developed by CAS (previously publicly available but no longer online).

I've also looked at various sources to determine control and/or reduction efficiencies for different proposed activities (eg. pump to solar, or high bleed to low bleed) and assumed certain applicability factors to estimate what reductions might look like for BC.

The 'applicability' values are most uncertain as the US ones (when available) may not be entirely appropriate and I've had to make some conservative assumptions in some cases. The 'applicability' tab has some notes from different sources, but any thoughts on how these could be improved would be appreciated. If we have access to disaggregated equipment counts for the various source categories, these numbers could be refined further.

Please let me know if there are any questions or comments.

Cheers,

-Don

From: Marie Johnson [mailto:mjohnson@progressenergy.com]
Sent: Friday, May 6, 2016 6:50 AM
To: Lesiuk, Tim ENV:EX
Cc: Peyman, Hurrian ENV:EX; Jones, Troy (troy.jones@capp.ca); Wakelin, Tony; D'Souza, Don MNGD:EX; Jones, Troy (troy.jones@capp.ca)
Subject: Federal GHG Report Action Item

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http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=47B640C5-1&offset=6&toc=show

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Regards,

Marie Johnson
Regulatory Advisor
T: 403 539-1759

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1200, 205 Fifth Ave. SW
Calgary, AB Canada T2P 2V7
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Duncan, Laurie ENV:EX

From: Fradley, Adria N ENV:EX
Sent: Wednesday, May 18, 2016 8:22 AM
To: Peyman, Hurrian ENV:EX; Leitch, Andrew J ENV:EX; Zahariev, Konstantin ENV:EX
Subject: FW: AB/BC/SK/MB Meeting on Methane
Attachments: CAPP Mt 17MAY2016 - federal methane regulations.pptx; CAPP_EDMS-#282939-v5-Preliminary_Feedback_on_Proposed_Federal_Regulatory_Model_for_Methane.PPT

Fed Presentation to CAPP and CAPP Feedback

From: Piccinino, Ines MNGD:EX
Sent: Tuesday, May 17, 2016 2:04 PM
To: Fradley, Adria N ENV:EX; Cailee Ellis; D'Souza, Don MNGD:EX; Floyd.Wist@gov.sk.ca; Gerald.Palanca@aer.ca; hal.sanders@gov.sk.ca; Heather.Carmichael@gov.ab.ca; Howard.Loseth@gov.sk.ca; joel.rogers@gov.ab.ca; kathleen.rich@gov.ab.ca; Keith.Lowdon@gov.mb.ca; Paulson, Ken OGC:IN; Parsonage, Kevin D OGC:IN; Landon.Fraser@gov.mb.ca; Maria Lavelle; Mark.Taylor@aer.ca; Schwabe, Michelle MNGD:EX; Nauman Anwar; Rhonda.King@aer.ca; Curry, Sean; Sharla.Rauschning@gov.ab.ca; Stephen.Wills@gov.ab.ca; Lesiuk, Tim ENV:EX; Wakelin, Tony
Subject: AB/BC/SK/MB Meeting on Methane

Organizer: Piccinino, Ines MNGD:EX
When: 11:00 - 14:00 May 17, 2016
Subject: AB/BC/SK/MB Meeting on Methane
Location: OGC - 398 Harbour Road, Victoria BC / Please check in at 3rd Floor Reception OR CONF CALL (info below)

Duncan, Laurie ENV:EX

From: Jones, Troy <troy.jones@capp.ca>
Sent: Wednesday, May 18, 2016 3:06 PM
To: D'Souza, Don MNGD:EX; 'Marie Johnson'; Lesiuk, Tim ENV:EX; Wakelin, Tony; Peyman, Hurrian ENV:EX
Cc: XT:Sian, Sherry FLNR:IN
Subject: RE: Methane baseline for BC

Hi Don,

Thank you for your document and I apologize for the delay in responding. I have included a few comments and questions below.

Comments / questions:

- I believe that this work assumes that the entire linear facility of all producers will be included. Enviro Can has indicated that there will be thresholds for inclusion. Can you please confirm whether or not BC intends to include production thresholds in the regulations. If BC intends to define its own thresholds or adopt those proposed by Enviro Can than the impacts referenced in your spreadsheet will be reduced. Would it be possible for CAS to send us a document which describes the production in terms of gas and oil (+ associated gas) for every "facility" in BC in order to assess the impact of thresholds (federal or provincial).
- I note that the potential reduction percentages are based on the break down by emission source in the 2013 data. Two points here; 1) there is a 4% variation between the total emissions in the venting and fugitive emissions based on the 2013 data - totals in column E- and that based on the 2014 data – totals in column B- (i.e., 4% of the emissions assigned to the fugitive category were reassigned to the venting category in this sheet using 2014 data). 2) We have not been provided the data which would allow us to "proof" the emissions by source figures. Would it be possible for you to send us this data (for 2013 and 2014)?
- Reduced emission completions tab. I cannot locate reference to the 95-100% reduction in the reference. Would you mind providing a page number?

Thank you Don, very valuable work.

Troy Jones PhD BScPT, Performance Management Consultant, Western Canada Operations

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers
D: 403.776.1414 | Email: Troy.Jones@capp.ca | Website: www.capp.ca

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From: D'Souza, Don MNGD:EX [mailto:Don.DSouza@gov.bc.ca]
Sent: Monday, May 09, 2016 6:13 PM
To: 'Marie Johnson'; Lesiuk, Tim ENV:EX; Wakelin, Tony; Jones, Troy; Peyman, Hurrian ENV:EX
Subject: Methane baseline for BC [WARNING: SPF validation unavailable]

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Sent: Friday, May 6, 2016 6:50 AM
To: Lesiuk, Tim ENV:EX
Cc: Peyman, Hurrian ENV:EX; Jones, Troy (troy.jones@capp.ca); Wakelin, Tony; D'Souza, Don MNGD:EX; Jones, Troy (troy.jones@capp.ca)
Subject: Federal GHG Report Action Item

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Regards,

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Duncan, Laurie ENV:EX

From: Marsh, Kyle <kyle.marsh@fleishman.ca>
Sent: Friday, June 3, 2016 5:13 PM
To: Mihlar, Fazil ENV:EX
Cc: Quin, Melissa ENV:EX
Subject: FW: Proposed Meeting with Woodside Executives

Good afternoon Fazil,

I wanted to reach out to you as one of our clients, Woodside Energy, will have two of their Senior Executives in BC next week. Robert Edwardes, Executive Vice President of Development will be visiting from Australia and Darren Flynn, Vice President Canada and USA will be visiting from the States.

This seemed like an excellent opportunity to arrange a meeting in order to allow Woodside to provide you with an update on the latest regarding their efforts at Grassy Point, as well as provide you an opportunity to ask any questions of the group that you may have regarding the project.

Unfortunately, their schedule is quite tight. There is a small window when they may be able to meet on the morning of Friday, June 10th in Victoria.

If that will work with your schedule please let me know and I will work with your staff to facilitate a meeting.

Thanks again Fazil. I appreciate your time.

Regards,

Kyle Marsh
Associate Vice President
FleishmanHillard | *Suite 1600* | *777 Hornby Street* | *Vancouver*| *Canada* |*V6Z 2T3*
O *(604) 602-6550* | M *(778) 679-5729* | F *(604) 688-2519*
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Duncan, Laurie ENV:EX

From: Marnie Plant s.22
Sent: Monday, June 6, 2016 9:07 PM
To: Mihlar, Fazil ENV:EX
Subject: Mike McDonald at Policy Session Saturday June 4
Attachments: Fed Govt LetsTalkClimate Input 10 May 2016.pdf; Fed Govt Input 2 LetsTalkClimate Input 30 May 2016.pdf; Fed Govt Input 3 LetsTalkClimate Input 30 May 2016.pdf; Fed Govt Input 3B LetsTalkClimate Input 30 May 2016.pdf; Fed Govt Input 4 LetsTalkClimate Input 30 May 2016.pdf; BCBN Carbon Intensity Liquid Fuels 14 Sept 2016.docx; BC Bioenergy Network SSCFGS 2015.pdf

Hello Fazil,

We have met through a meeting with Michael Weedon, BC Bioenergy Network, some months ago.

I know Mike McDonald and Greg Wilson from 20 years of campaigning together in BC. I know that they are each helping with BCL party platform for Campaign 2017. I asked if they thought the coming Climate Leadership Team Plan would be very likely to stand up to the ENGO's on Clean Energy. They said I should talk to you before the CLT blueprint is finalized.

From my point of view working on Bioenergy / Renewable Fuels projects, we do not want to see all LNG, or all "electrify everything" (CEC), and I actually think you need quite a bit of Bioenergy / Renewable Fuel to sell the LNG piece, as well as to stand up to the CEC people who do not understand Bioenergy / Renewable Fuels, and do not seem very interested in it for some reason. The "32 Recommendations" by the CLT did not promote Bioenergy really at all, despite very well developed inputs by BC Bioenergy Network, Bioenergy 2.0 Association and others. LNG will not get us to 80% below 2007 levels alone, and neither will "electrify everything" through wind, solar, and hydro, and neither really will a mix of LNG with Clean Energy. And what about the waste? Will LNG or Clean Energy deal well with those? We have between 20 and 25 million tonnes of woody biomass, plus municipal and agricultural waste.

You should know that private capital from Alberta and across Canada and the UK, that is normally associated with fossil fuel investment projects, is looking to colleagues of mine in Bioenergy for renewable fuel projects to invest in, to diversify their portfolios. And Suncor is exploring off-take agreements with liquid fuel developers. Forestry companies are signing deals with bio oil developers and other renewable fuel companies. All of these emerging projects will need demonstrations to prove them out. BC Bioenergy Network is one of the world's most accomplished organizations at doing this. They are needed more than ever now that the transition off fossil fuels is becoming more and more active.

There is a strong case to make for Climate Action / Reducing GHG emissions, being a key wedge issue in the coming election. Supporting BC Bioenergy Network with BC Government funding, as well as increasing LCFS blend levels for gasoline and diesel, and possibly introducing renewable gas blend levels would send a strong signal to voters in BC that the government is serious about Climate Action.

To show seriousness will mean that we will need to see a concrete action plan for reducing GHG's by a minimum of 80% below 2007 levels by 2050. It should be quite clear and easy to lay out and see how we get there, although there are a number of scenarios for doing so. Other provinces are pulling these kinds of plans together. The NDP and CEC and ENGO's will be hammering the BCL's on this point.

Meanwhile we have 35 years to prove out solutions and massively deploy them, and have the GHG emissions go far down, while population grows. Staggering.

Bioenergy 2.0 has sent in a series of 5 Inputs and supporting documents to the Federal Government "Let's Talk Climate Action". The main pieces are attached.

Happy to discuss,
Marnie Plant
Bioenergy 2.0
(604) 813-7198

Duncan, Laurie ENV:EX

From: David Keane <david.keane@BCLNGA.CA>
Sent: Tuesday, June 21, 2016 6:24 PM
To: Climate Leadership Plan ENV:EX
Cc: OfficeofthePremier, Office PREM:EX; Minister, CSCD CSCD:EX; Minister, MNGD MNGD:EX; Minister, JTST JTST:EX; Minister, FIN FIN:EX; Transportation, Minister TRAN:EX; Minister, MEM MEM:EX; Bigler, Michael D (michael.d.bigler@exxonmobil.com); Bryan Cox (bcox@mining.bc.ca); Chisholm, Carolyn (RTCMI); David Moliniski (david.molinski@chevron.com); DavidA.Bennett@fortisbc.com; Karina Brino (kbrino@mining.bc.ca); Ken Carrusca; Schick, Dave (DSchick); T. J Parhar (tjparhar@cement.ca); 'Talarico, Trina [Talarico Consulting Inc] (TrinaTalarico@chevron.com)'; 'Tom.Syer@teck.com'; 'colleen sweet'; Mihlar, Fazil ENV:EX
Subject: Letter regarding Energy Intensive and Trade Exposed Industries
Attachments: EITE Letter - June 21, 2016 - Final.pdf

Dear Minster Polak,

Please find the attached letter from David Keane, in regard to Energy Intensive and Trade Exposed Industries.

If you have any questions or require any follow-up, please do not hesitate to get in touch.

Thanks kindly,

Jessica Hollingsworth
Executive Assistant to David Keane, President | BC LNG Alliance
#615-625 Howe Street, Vancouver, BC V6C 2T6
t: 778.379.7646 | e: jessica.hollingsworth@bclnga.ca

2014 British Columbia Reporting Regulation Emissions Report Summary Table: Linear Facilities Operation Summary

Company	Facility	Venting CH4	Fugitive CH4	Total CH4
Aitken Creek Gas Storage ULC	Aitken BC Linear Facilities Operation (LFO)	1,984.50	558.15	3,579.48
AltaGas Ltd.	AltaGas BC Linear Facilities Operation (LFO)	7,415.58	5,314.00	14,281.35
Apache Canada Ltd.	Apache BC Linear Facilities Operation (LFO)	4,985.55	390.48	5,870.15
ARC Resources	ARC BC Linear Facilities Operation (LFO)	41,930.65	14,938.73	69,704.10
Artek Exploration Ltd.	Artek BC Linear Facilities Operation (LFO)	-	-	2,745.75
Aux Sable Canada L.P.	Aux Sable BC Linear Facilities Operation (LFO)	758.20	278.18	4,115.23
Black Swan Energy	Black Swan BC Linear Facilities Operation (LFO)	2,402.78	5,735.40	10,560.43
Bonavista Energy Corporation	Bonavista BC Linear Facilities Operation (LFO)	8,440.45	9,177.95	19,297.36
Canadian Natural Resources Limited	CNRL BC Linear Facilities Operation (LFO)	250,101.00	147,575.00	406,214.15
Canbriam Energy Inc.	Canbriam BC Linear Facilities Operation (LFO)	1,750.13	5,808.68	11,013.88
Cequence Energy Ltd.	Cequence BC Linear Facilities Operation (LFO)	4,987.53	1,562.83	6,983.26
Chinook Energy Inc.	Chinook BC Linear Facilities Operation (LFO)	21,927.96	20,270.93	45,733.20
ConocoPhillips Canada Resources Corp.	ConocoPhillips BC Linear Facilities Operation (LFO)	121,538.85	89,559.73	226,518.95
Crew Energy Inc.	Crew BC Linear Facilities Operation (LFO)	5,526.88	6,168.50	14,340.08
Devon Canada Corporation	Devon BC Linear Facilities Operation (LFO)	61.04	594.46	955.55
Direct Energy Marketing Ltd.	Direct Energy BC Linear Facilities Operation (LFO)	9,165.51	14,625.50	26,129.32
Encana Corporation	Encana BC Linear Facilities Operation (LFO)	249,317.43	35,578.15	319,488.08
Endurance Energy Ltd.	Endurance BC Linear Facilities Operation (LFO)	225,086.27	129,166.43	368,065.07
Enerplus Corporation	Enerplus BC Linear Facilities Operation (LFO)	748.45	4,545.43	8,031.08
EOG Resources Canada Inc.	EOG BC Linear Facilities Operation (LFO)	11,327.03	1,922.20	14,546.68
Harvest Operations Corp.	HARVEST BC Linear Facilities Operation (LFO)	5,390.06	8,468.65	14,897.57
Husky Oil Operations Limited	Husky BC Linear Facilities Operation (LFO)	17,446.03	23,524.71	43,185.02
Imperial Oil Resources Ltd.	Imperial BC Linear Facilities Operation (LFO)	-	-	552.83
Keyera Corporation	Keyera BC Linear Facilities Operation (LFO)	2,274.05	1,871.55	5,094.85
Lightstream Resources Ltd.	Lightstream BC Linear Facilities Operation (LFO)	3,466.06	2,218.16	5,850.48
Lone Pine Resources Canada Ltd.	Lone Pine BC Linear Facilities Operation (LFO)	2,257.20	5,431.90	8,032.58
Murphy Oil Company Ltd.	Murphy BC Linear Facilities Operation (LFO)	4,340.73	1,276.84	9,296.49
Nexen Inc.	Nexen BC Linear Facilities Operation (LFO)	866.75	388.00	8,241.98
Pengrowth Energy Corporation	Pengrowth BC Linear Facilities Operation (LFO)	7,462.35	6,661.25	16,904.08
Penn West Petroleum Ltd.	Penn BC Linear Facilities Operation (LFO)	29,903.50	12,645.08	51,702.00
Polar Star Canadian Oil and Gas Inc.	Polar Star BC Linear Facilities Operation (LFO)	1,534.75	5,942.50	8,282.43
Progress Energy Canada Ltd.	Progress BC Linear Facilities Operation (LFO)	48,367.95	63,391.57	163,069.87
Quicksilver Resources Canada Inc.	Quicksilver BC Linear Facilities Operation (LFO)	-	15,697.50	19,201.78
Ramshorn Canada	Ramshorn BC Linear Facilities Operation (LFO)	707.28	9,279.88	10,264.33
Shell Canada Limited	Shell BC Linear Facilities Operation (LFO)	26,656.73	25,974.00	75,086.73
Spectra Energy Midstream Corporation	Spectra BC Linear Facilities Operation (LFO)	4,142.75	159.56	30,298.54
Spectra Energy Transmission	Spectra BC Linear Facilities Operation (LFO)	76,776.48	81,542.47	199,218.08
Suncor Energy Inc.	Suncor BC Linear Facilities Operation (LFO)	661.78	2,400.11	3,673.88
Taqa North Ltd.	Taqa BC Linear Facilities Operation (LFO)	4,544.93	4,607.54	10,664.93
Terra Energy Corporation	Terra BC Linear Facilities Operation (LFO)	3,477.63	6,429.36	11,719.32
Tourmaline Oil Corp.	Tourmaline BC Linear Facilities Operation (LFO)	11,275.92	15,264.95	37,579.67
Veresen Energy Infrastructure Inc.	Veresen BC Linear Facilities Operation (LFO)	340.18	91.23	914.95
Whitecap Resources Inc.	Whitecap BC Linear Facilities Operation (LFO)	1,664.20	526.29	2,812.90
TOTAL		1,223,013	787,564	2,463,660
TOTAL VENTING + FUGITIVES			2,010,577	
45% Reduction (Proportional - Demonstrative Only)		550,355.87	354,403.70	
Resulting 2025 Emissions			1,105,817.25	

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Company	Facility	BCFacilityID	Primary NAICS Code	Facility Type	Stationary Fuel Combustion CH4	Flaring CH4	Venting CH4	Fugitive CH4	On-site transportation CH4	Waste CH4	Wastewate	Total CO2 f	Total CH4	GRAND TOTAL in CO2e
Aitken Creek Gas Storage ULC	Aitken BC Linear Facilities Operation (LFO)	12111130001	211113 (Conventional Oil and Gas Extraction)	LFO	20	1,017	1,985	558	-	-	-	-	3,579	52,127
AltaGas Ltd.	AltaGas BC Linear Facilities Operation (LFO)	12111130036	211113 (Conventional Oil and Gas Extraction)	LFO	23	1,529	7,416	5,314	-	-	-	-	14,281	72,442
Apache Canada Ltd.	Apache BC Linear Facilities Operation (LFO)	12111130008	211113 (Conventional Oil and Gas Extraction)	LFO	334	160	4,986	390	-	-	-	-	5,870	40,655
ARC Resources	ARC BC Linear Facilities Operation (LFO)	12111130017	211113 (Conventional Oil and Gas Extraction)	LFO	10,742	2,092	41,931	14,939	-	-	-	-	69,704	243,665
Artek Exploration Ltd.	Artek BC Linear Facilities Operation (LFO)	12111130040	211113 (Conventional Oil and Gas Extraction)	LFO	2,746	-	-	-	-	0	-	-	2,746	68,483
Aux Sable Canada L.P.	Aux Sable BC Linear Facilities Operation (LFO)	12111130021	211113 (Conventional Oil and Gas Extraction)	LFO	2,895	183	758	278	-	-	-	-	4,115	41,095
Black Swan Energy	Black Swan BC Linear Facilities Operation (LFO)	12111131001	211113 (Conventional Oil and Gas Extraction)	LFO	813	1,609	2,403	5,735	-	-	-	-	10,560	40,302
Bonavista Energy Corporation	Bonavista BC Linear Facilities Operation (LFO)	12111130012	211113 (Conventional Oil and Gas Extraction)	LFO	941	738	8,440	9,178	-	-	-	-	19,297	66,482
Canadian Natural Resources Limited	CNRL BC Linear Facilities Operation (LFO)	12111130029	211113 (Conventional Oil and Gas Extraction)	LFO	329	8,209	250,101	147,575	-	-	-	-	406,214	1,161,830
Canbriam Energy Inc.	Canbriam BC Linear Facilities Operation (LFO)	12111131002	211113 (Conventional Oil and Gas Extraction)	LFO	3,016	439	1,750	5,809	-	-	-	-	11,014	61,709
Cequence Energy Ltd.	Cequence BC Linear Facilities Operation (LFO)	12111130170	211113 (Conventional Oil and Gas Extraction)	LFO	419	14	4,988	1,563	-	-	-	-	6,983	12,334
Chinook Energy Inc.	Chinook BC Linear Facilities Operation (LFO)	12111130024	211113 (Conventional Oil and Gas Extraction)	LFO	2,897	637	21,928	20,271	-	-	-	-	45,733	90,014
ConocoPhillips Canada Resources Corp.	ConocoPhillips BC Linear Facilities Operation (LFO)	12111130018	211113 (Conventional Oil and Gas Extraction)	LFO	14,662	759	121,539	89,560	-	-	-	-	226,519	415,634
Crew Energy Inc.	Crew BC Linear Facilities Operation (LFO)	12111130016	211113 (Conventional Oil and Gas Extraction)	LFO	1,406	1,239	5,527	6,169	-	-	-	-	14,340	49,802
Devon Canada Corporation	Devon BC Linear Facilities Operation (LFO)	12111130006	211113 (Conventional Oil and Gas Extraction)	LFO	225	75	61	594	-	-	-	-	956	11,675
Direct Energy Marketing Ltd.	Direct Energy BC Linear Facilities Operation (LFO)	12111130183	211113 (Conventional Oil and Gas Extraction)	LFO	1,735	604	9,166	14,625	-	-	-	-	26,129	110,335
Encana Corporation	Encana BC Linear Facilities Operation (LFO)	12111130010	211113 (Conventional Oil and Gas Extraction)	LFO	31,396	3,196	249,317	35,578	-	-	-	-	319,488	753,881
Endurance Energy Ltd.	Endurance BC Linear Facilities Operation (LFO)	12111130802	211113 (Conventional Oil and Gas Extraction)	LFO	12,605	1,208	225,086	129,166	-	-	-	-	368,065	558,929
Enerplus Corporation	Enerplus BC Linear Facilities Operation (LFO)	12111130022	211113 (Conventional Oil and Gas Extraction)	LFO	2,434	303	748	4,545	-	-	-	-	8,031	42,334
EOG Resources Canada Inc.	EOG BC Linear Facilities Operation (LFO)	12111130031	211113 (Conventional Oil and Gas Extraction)	LFO	1,240	58	11,327	1,922	-	-	-	-	14,547	31,789
Harvest Operations Corp.	HARVEST BC Linear Facilities Operation (LFO)	12111130027	211113 (Conventional Oil and Gas Extraction)	LFO	126	913	5,390	8,469	-	-	-	-	14,898	29,996
Husky Oil Operations Limited	Husky BC Linear Facilities Operation (LFO)	12111130013	211113 (Conventional Oil and Gas Extraction)	LFO	1,425	789	17,446	23,525	-	-	-	-	43,185	120,319
Imperial Oil Resources Ltd.	Imperial BC Linear Facilities Operation (LFO)	12111130005	211113 (Conventional Oil and Gas Extraction)	LFO	439	114	-	-	-	-	-	-	553	21,280
Keyera Corporation	Keyera BC Linear Facilities Operation (LFO)	12111130035	211113 (Conventional Oil and Gas Extraction)	LFO	18	932	2,274	1,872	-	-	-	-	5,095	48,782
Lightstream Resources Ltd.	Lightstream BC Linear Facilities Operation (LFO)	12111131003	211113 (Conventional Oil and Gas Extraction)	LFO	119	47	3,466	2,218	-	0	-	-	5,850	11,406
Lone Pine Resources Canada Ltd.	Lone Pine BC Linear Facilities Operation (LFO)	12111130020	211113 (Conventional Oil and Gas Extraction)	LFO	292	51	2,257	5,432	-	-	-	-	8,033	16,544
Murphy Oil Company Ltd.	Murphy BC Linear Facilities Operation (LFO)	12111130034	211113 (Conventional Oil and Gas Extraction)	LFO	3,267	412	4,341	1,277	-	-	-	-	9,296	157,324
Nexen Inc.	Nexen BC Linear Facilities Operation (LFO)	12111130002	211113 (Conventional Oil and Gas Extraction)	LFO	6,192	796	867	388	-	-	-	-	8,242	136,472
Pengrowth Energy Corporation	Pengrowth BC Linear Facilities Operation (LFO)	12111130028	211113 (Conventional Oil and Gas Extraction)	LFO	2,523	257	7,462	6,661	-	-	-	-	16,904	51,107
Penn West Petroleum Ltd.	Penn BC Linear Facilities Operation (LFO)	12111130009	211113 (Conventional Oil and Gas Extraction)	LFO	8,892	262	29,904	12,645	-	-	-	-	51,702	197,155
Polar Star Canadian Oil and Gas Inc.	Polar Star BC Linear Facilities Operation (LFO)	12111130041	211113 (Conventional Oil and Gas Extraction)	LFO	727	78	1,535	5,943	-	-	-	-	8,282	17,949
Progress Energy Canada Ltd.	Progress BC Linear Facilities Operation (LFO)	12111130039	211113 (Conventional Oil and Gas Extraction)	LFO	27,404	23,906	48,368	63,392	-	-	-	-	163,070	882,638
Quicksilver Resources Canada Inc.	Quicksilver BC Linear Facilities Operation (LFO)	12111130037	211113 (Conventional Oil and Gas Extraction)	LFO	3,504	-	-	15,698	-	-	-	-	19,202	64,380
Ramshorn Canada	Ramshorn BC Linear Facilities Operation (LFO)	12111130038	211113 (Conventional Oil and Gas Extraction)	LFO	8	269	707	9,280	-	-	-	-	10,264	29,363
Shell Canada Limited	Shell BC Linear Facilities Operation (LFO)	12111130007	211113 (Conventional Oil and Gas Extraction)	LFO	20,999	1,457	26,657	25,974	-	-	-	-	75,087	350,943
Spectra Energy Midstream Corporation	Spectra BC Linear Facilities Operation (LFO)	12111130003	211113 (Conventional Oil and Gas Extraction)	LFO	23,605	2,392	4,143	160	-	-	-	-	30,299	249,150
Spectra Energy Transmission	Spectra BC Linear Facilities Operation (LFO)	12111130004	211113 (Conventional Oil and Gas Extraction)	LFO	15,374	25,525	76,776	81,542	-	-	-	-	199,218	4,135,555
Suncor Energy Inc.	Suncor BC Linear Facilities Operation (LFO)	12111130015	211113 (Conventional Oil and Gas Extraction)	LFO	281	330	662	2,400	-	-	-	-	3,674	24,543
Taqa North Ltd.	Taqa BC Linear Facilities Operation (LFO)	12111130014	211113 (Conventional Oil and Gas Extraction)	LFO	837	675	4,545	4,608	-	0	-	5	10,665	55,273
Terra Energy Corporation	Terra BC Linear Facilities Operation (LFO)	12111130025	211113 (Conventional Oil and Gas Extraction)	LFO	1,411	363	3,478	6,429	-	39	-	-	11,719	32,378
Tourmaline Oil Corp.	Tourmaline BC Linear Facilities Operation (LFO)	12111130033	211113 (Conventional Oil and Gas Extraction)	LFO	10,234	805	11,276	15,265	-	-	-	-	37,580	185,433
Veresen Energy Infrastructure Inc.	Veresen BC Linear Facilities Operation (LFO)	12111130042	211113 (Conventional Oil and Gas Extraction)	LFO	20	464	340	91	-	-	-	-	915	92,472
Whitecap Resources Inc.	Whitecap BC Linear Facilities Operation (LFO)	12111131004	211113 (Conventional Oil and Gas Extraction)	LFO	144	478	1,664	526	-	-	-	-	2,813	13,805

Company	Facility	BCFacilityID	Primary NAICS Code	Facility Type	Stationary Fuel Combustion CH4	Flaring CH4	Venting CH4	Fugitive CH4	On-site transportation CH4	Waste CH4	Wastewater CH4	Total CO2 from included biomass	Total CH4	GRAND TOTAL in CO2e
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Artek Exploration Ltd.	Artek BC Linear Facilities Operation (LFO)	12111130040	211113 (Conventional Oil and Gas Extraction)	LFO	2,746	-	-	-	-	0	-	-	2,746	68,483
Aux Sable Canada L.P.	Aux Sable BC Linear Facilities Operation (LFO)	12111130021	211113 (Conventional Oil and Gas Extraction)	LFO	2,895	183	758	278	-	-	-	-	4,115	41,095
Black Swan Energy	Black Swan BC Linear Facilities Operation (LFO)	12111131001	211113 (Conventional Oil and Gas Extraction)	LFO	813	1,609	2,403	5,735	-	-	-	-	10,560	40,302
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Chinook Energy Inc.	Chinook BC Linear Facilities Operation (LFO)	12111130024	211113 (Conventional Oil and Gas Extraction)	LFO	2,897	637	21,928	20,271	-	-	-	-	45,733	90,014
ConocoPhillips Canada Resources Corp.	ConocoPhillips BC Linear Facilities Operation (LFO)	12111130018	211113 (Conventional Oil and Gas Extraction)	LFO	14,662	759	121,539	89,560	-	-	-	-	226,519	415,634
Crew Energy Inc.	Crew BC Linear Facilities Operation (LFO)	12111130016	211113 (Conventional Oil and Gas Extraction)	LFO	1,406	1,239	5,527	6,169	-	-	-	-	14,340	49,802
Devon Canada Corporation	Devon BC Linear Facilities Operation (LFO)	12111130006	211113 (Conventional Oil and Gas Extraction)	LFO	225	75	61	594	-	-	-	-	956	11,675
Direct Energy Marketing Ltd.	Direct Energy BC Linear Facilities Operation (LFO)	12111130183	211113 (Conventional Oil and Gas Extraction)	LFO	1,735	604	9,166	14,625	-	-	-	-	26,129	110,335
Encana Corporation	Encana BC Linear Facilities Operation (LFO)	12111130010	211113 (Conventional Oil and Gas Extraction)	LFO	31,396	3,196	249,317	35,578	-	-	-	-	319,488	753,881
Endurance Energy Ltd.	Endurance BC Linear Facilities Operation (LFO)	12111130802	211113 (Conventional Oil and Gas Extraction)	LFO	12,605	1,208	225,086	129,166	-	-	-	-	368,065	558,929
Enerplus Corporation	Enerplus BC Linear Facilities Operation (LFO)	12111130022	211113 (Conventional Oil and Gas Extraction)	LFO	2,434	303	748	4,545	-	-	-	-	8,031	42,334
EOG Resources Canada Inc.	EOG BC Linear Facilities Operation (LFO)	12111130031	211113 (Conventional Oil and Gas Extraction)	LFO	1,240	58	11,327	1,922	-	-	-	-	14,547	31,789
Harvest Operations Corp.	HARVEST BC Linear Facilities Operation (LFO)	12111130027	211113 (Conventional Oil and Gas Extraction)	LFO	126	913	5,390	8,469	-	-	-	-	14,898	29,996
Husky Oil Operations Limited	Husky BC Linear Facilities Operation (LFO)	12111130013	211113 (Conventional Oil and Gas Extraction)	LFO	1,425	789	17,446	23,525	-	-	-	-	43,185	120,319
Imperial Oil Resources Ltd.	Imperial BC Linear Facilities Operation (LFO)	12111130005	211113 (Conventional Oil and Gas Extraction)	LFO	439	114	-	-	-	-	-	-	553	21,280
Keyera Corporation	Keyera BC Linear Facilities Operation (LFO)	12111130035	211113 (Conventional Oil and Gas Extraction)	LFO	18	932	2,274	1,872	-	-	-	-	5,095	48,782
Lightstream Resources Ltd.	Lightstream BC Linear Facilities Operation (LFO)	12111131003	211113 (Conventional Oil and Gas Extraction)	LFO	119	47	3,466	2,218	-	0	-	-	5,850	11,406
Lone Pine Resources Canada Ltd.	Lone Pine BC Linear Facilities Operation (LFO)	12111130020	211113 (Conventional Oil and Gas Extraction)	LFO	292	51	2,257	5,432	-	-	-	-	8,033	16,544
Murphy Oil Company Ltd.	Murphy BC Linear Facilities Operation (LFO)	12111130034	211113 (Conventional Oil and Gas Extraction)	LFO	3,267	412	4,341	1,277	-	-	-	-	9,296	157,324
Nexen Inc.	Nexen BC Linear Facilities Operation (LFO)	12111130002	211113 (Conventional Oil and Gas Extraction)	LFO	6,192	796	867	388	-	-	-	-	8,242	136,472
Pengrowth Energy Corporation	Pengrowth BC Linear Facilities Operation (LFO)	12111130028	211113 (Conventional Oil and Gas Extraction)	LFO	2,523	257	7,462	6,661	-	-	-	-	16,904	51,107
Penn West Petroleum Ltd.	Penn BC Linear Facilities Operation (LFO)	12111130009	211113 (Conventional Oil and Gas Extraction)	LFO	8,892	262	29,904	12,645	-	-	-	-	51,702	197,155
Polar Star Canadian Oil and Gas Inc.	Polar Star BC Linear Facilities Operation (LFO)	12111130041	211113 (Conventional Oil and Gas Extraction)	LFO	727	78	1,535	5,943	-	-	-	-	8,282	17,949
Progress Energy Canada Ltd.	Progress BC Linear Facilities Operation (LFO)	12111130039	211113 (Conventional Oil and Gas Extraction)	LFO	27,404	23,906	48,368	63,392	-	-	-	-	163,070	882,638
Quicksilver Resources Canada Inc.	Quicksilver BC Linear Facilities Operation (LFO)	12111130037	211113 (Conventional Oil and Gas Extraction)	LFO	3,504	-	-	15,698	-	-	-	-	19,202	64,380
Ramshorn Canada	Ramshorn BC Linear Facilities Operation (LFO)	12111130038	211113 (Conventional Oil and Gas Extraction)	LFO	8	269	707	9,280	-	-	-	-	10,264	29,363
Shell Canada Limited	Shell BC Linear Facilities Operation (LFO)	12111130007	211113 (Conventional Oil and Gas Extraction)	LFO	20,999	1,457	26,657	25,974	-	-	-	-	75,087	350,943
Spectra Energy Midstream Corporation	Spectra BC Linear Facilities Operation (LFO)	12111130003	211113 (Conventional Oil and Gas Extraction)	LFO	23,605	2,392	4,143	160	-	-	-	-	30,299	249,150
Spectra Energy Transmission	Spectra BC Linear Facilities Operation (LFO)	12111130004	211113 (Conventional Oil and Gas Extraction)	LFO	15,374	25,525	76,776	81,542	-	-	-	-	199,218	4,135,555
Suncor Energy Inc.	Suncor BC Linear Facilities Operation (LFO)	12111130015	211113 (Conventional Oil and Gas Extraction)	LFO	281	330	662	2,400	-	-	-	-	3,674	24,543
Taqa North Ltd.	Taqa BC Linear Facilities Operation (LFO)	12111130014	211113 (Conventional Oil and Gas Extraction)	LFO	837	675	4,545	4,608	-	0	-	5	10,665	55,273
Terra Energy Corporation	Terra BC Linear Facilities Operation (LFO)	12111130025	211113 (Conventional Oil and Gas Extraction)	LFO	1,411	363	3,478	6,429	-	39	-	-	11,719	32,378
Tourmaline Oil Corp.	Tourmaline BC Linear Facilities Operation (LFO)	12111130033	211113 (Conventional Oil and Gas Extraction)	LFO	10,234	805	11,276	15,265	-	-	-	-	37,580	185,433
Veresen Energy Infrastructure Inc.	Veresen BC Linear Facilities Operation (LFO)	12111130042	211113 (Conventional Oil and Gas Extraction)	LFO	20	464	340	91	-	-	-	-	915	92,472
Whitecap Resources Inc.	Whitecap BC Linear Facilities Operation (LFO)	12111131004	211113 (Conventional Oil and Gas Extraction)	LFO	144	478	1,664	526	-	-	-	-	2,813	13,805
				TOTAL	218719	85384	1223015	787564		39			2314717	10849784

	Industry	Progress
Just venting and fugitives	2,010,579	111,760
Methane to be reduced to 45%	904,761	50,292
2025 Target	1,105,818	61,468

Report Preview

Company Details

Name

Progress Energy Canada Ltd.

Report Details

Report Status:

Submitted - 31/03/2016 1:11:58 PM

Reporting Period:

2015

Facility Name:

Farrell Creek B-88-I

Facility Address:

Fort St. John (British Columbia) Canada

Report Type:

Report with BC or ON Prepopulation

Report Update Comments:

Verify Facility Information

Company Information

Legal Name *	Progress Energy Canada Ltd.
English Trade Name	Progress Energy Canada Ltd.
French Trade Name	
Business Number	898990171
DUNS Number	111111111

Facility Details

Facility Name *	Farrell Creek B-88-I

Physical Address *	Fort St. John (British Columbia) Canada 56.23700 -122.09700 B-088-I/094-B-01
Primary NAICS Code *	211114
GHGRP ID	G10725 (Assigned by ECCC)
NPRI ID	24059
Alberta Approval Number	

Reporter

Name *	Marie Johnson
Position *	Regulatory Advisor
Mailing Address *	1200 205 5 Avenue Southwest, Calgary (Alberta), T2P 2V7, Canada
Physical Address *	1200 205 5th Avenue Southwest, Calgary (Alberta), T2P 2V7, Canada
Email Address *	mjohnson@progressenergy.com
Telephone Number *	4035391759
Ext.	

Authorized Signing Officer (Certifying Official)

Name *	Mark Fitzgerald
Position *	Sr. Vice President, Production and Facilities
Mailing Address *	1200 205 5th Avenue Southwest, Calgary (Alberta), T2P 2V7, Canada
Physical Address *	1200 205 5 Avenue Southwest, Calgary (Alberta), T2P 2V7, Canada
Email Address *	mfitzgerald@progressenergy.com
Telephone Number *	4035391935
Ext.	

Parent Company Information

Empty

Section A

Stationary Fuel Combustion Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☐	Carbon Dioxide (CO2)	☐	☒	☐	☐	56081.144127	56081.144127
☐	Methane (CH4)	☐	☐	☒	☐	54.469738	1361.743450
☐	Nitrous Oxide (N2O)	☐	☐	☒	☐	1.435558	427.796284

Sub-total 57870.683861

Industrial Process Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Venting Emissions (including vented Formation CO2)

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☐	Carbon Dioxide (CO2)	☐	☐	☒	☐	0.052482	0.052482

☐	Methane (CH4)	☐	☐	☒	☐	70.445675	1761.141875
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total 1761.194357

Flaring Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☐	Carbon Dioxide (CO2)	☐	☒	☐	☐	4073.782554	4073.782554
☐	Methane (CH4)	☐	☒	☐	☐	23.946875	598.671875
☐	Nitrous Oxide (N2O)	☐	☐	☒	☐	0.007762	2.313076

Sub-total 4674.767505

Fugitive Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☐	Carbon Dioxide (CO2)	☐	☐	☒	☐	0.002710	0.002710
☐	Methane (CH4)	☐	☐	☒	☐	8.910338	222.758450
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total 222.761160

On-site Transportation Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Waste Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Wastewater Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		

☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Section B

Biomass Combustion Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		

Section C

Hydrofluorocarbon (HFC) Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	HFC-23 (CHF3)	☐	☐	☐	☐		
☒	HFC-32 (CH2F2)	☐	☐	☐	☐		
☒	HFC-41 (CH3F)	☐	☐	☐	☐		
☒	HFC-43-10mee (C5H2F10)	☐	☐	☐	☐		
☒	HFC-125 (C2HF5)	☐	☐	☐	☐		
☒	HFC-134 (C2H2F4)	☐	☐	☐	☐		
☒	HFC-134a (C2H2F4)	☐	☐	☐	☐		

☒	HFC-143 (C2H3F3)	☐	☐	☐	☐		
☒	HFC-143a (C2H3F3)	☐	☐	☐	☐		
☒	HFC-152a (C2H4F2)	☐	☐	☐	☐		
☒	HFC-227ea (C3HF7)	☐	☐	☐	☐		
☒	HFC-236fa (C3H2F6)	☐	☐	☐	☐		
☒	HFC-245ca (C3H3F5)	☐	☐	☐	☐		

Total

Perfluorocarbon (PFC) Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Perfluoromethane (CF4)	☐	☐	☐	☐		
☒	Perfluoroethane (C2F6)	☐	☐	☐	☐		
☒	Perfluoropropane (C3F8)	☐	☐	☐	☐		
☒	Perfluorobutane (C4F10)	☐	☐	☐	☐		
☒		☐	☐	☐	☐		

	Perfluorocyclobutane (c-C4F8)						
☒	Perfluoropentane (C5F12)	☐	☐	☐	☐		
☒	Perfluorohexane (C6F14)	☐	☐	☐	☐		

Total

Sulphur Hexafluoride (SF6) Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Sulphur hexafluoride (SF6)	☐	☐	☐	☐		

Summary

Total GHG Emissions for the Facility

	Emissions (t)	Emissions (t CO2e)
Carbon Dioxide (CO2)	60154.981873	60154.981873
Methane (CH4)	157.772626	3944.315650
Nitrous Oxide (N2O)	1.443320	430.109360
Hydrofluorocarbons (HFCs)		
Perfluorocarbons (PFCs)		
Sulphur hexafluoride (SF6)		

Facility Total reported to Environment and Climate Change Canada:	64529.406883
Carbon dioxide (CO2) from biomass combustion:	

Comments

General Comments

Comments: (max 4000 characters)

Reasons for Changes in GHG Emissions from Previous Year

Select the applicable reason or reasons

Changes in production levels

Additional Information: **

Confidentiality Request

Environment and Climate Change Canada Confidentiality Request

The Canada Gazette Notice indicated that the Minister of the Environment intends to publish GHG emission totals by gas, by facility. Under the Canadian Environmental Protection Act, 1999 (CEPA 1999), you can request that part or all of the information that you have provided in this report be treated as confidential. You must provide appropriate justification to support this request (see Help for more information).

Are you requesting confidentiality of this report under CEPA 1999? *

No

If yes, you must upload a document containing your written request to Environment and Climate Change Canada with your report submission that includes:
- Identification of the specific information that you wish to keep confidential
- Appropriate justification and supporting documentation

An Environment and Climate Change Canada representative will be in contact with you regarding your request.

Click on the icon located to the right of your screen to upload your Environment and Climate Change Canada Confidentiality Request.

File Name	Date

Report Submission and Electronic Certification

Statement of Certification

Company Name

Progress Energy Canada Ltd.

Facility Name

Farrell Creek B-88-I

Facility Address

Fort St. John (British Columbia)

Reporting Period

2015

Facility Total Emissions reported to Environment and Climate Change Canada (t CO2e)

64529.406883

Report ID

7892

Report Type

Report with BC or ON Prepopulation

GHGRP ID

G10725 (Assigned by ECCC)

Authorized Signing Officer (Certifying Official)

Authorized Signing Officer (Certifying Official)

Mark Fitzgerald

I hereby certify that I have exercised due diligence to ensure that the submitted information is true and complete. The amounts and values for the facility are accurate, based on reasonable estimates using available data. The data for the facility that I represent are hereby submitted using the Environment and Climate Change Canada Single Window system.

I have the authority to bind the reporting company.

Signature: _____

Date:_____

File Name **	Date **
b-88-I Signed Electronic Certification.pdf	31/03/2016 1:11:15 PM

Submit Report

Submitted By

Yori Jamin

Date

31/03/2016 1:11:58 PM

Total 2014 CH4 from upstream fugitive and venting sources

Emission Source	Category	% based on 2013 breakdown	Methane emissions (estimated)	Potential applicability	Potential reductions	Total emissions (CO2e)	Notes
Continuous High-Bleed Device Vents	Venting	11.9	239,137	60%	85%	117,779	Assume 60% applicability, 85% reduction in emissions
Pneumatic Pump Vents	Venting	16.6	333,768	50%	100%	166,884	Assume 50% applicability conversion to solar (or electric), 100% redu
Continuous Low-Bleed and Intermittent Device Vents	Venting	3.5	71,102	0%	0%	71,102	Assume no actions to reduce low bleed and intermittment devices
Dehydrator Vents	Venting	3.3	66,242	40%	100%	39,745	Assume vent capture and reuse at 40% of sites (or dehy optimizatior
Well Venting for Liquids Unloading	Venting	0.2	4,476	0%	0%	4,476	Assume no new requirements for liquids unloading
Well Venting, with or without Hydraulic Fracturing	Venting	0.2	3,325	0%	0%	3,325	Assume no new requirements misc. well venting
Blowdown Vent Stacks	Venting	6.5	130,438	40%	95%	80,872	Assume new requirements for planned blowdown activities (mobile
Well Testing Venting	Venting	0.0	0	-	-	-	
Associated Gas Venting	Venting	0.1	1,061	0%	0%	1,061	Assume no changes to associated gas venting
Centrifugal Compressor Vents	Venting	4.0	80,053	50%	87%	45,061	Assume dry seal use or vent capture
Reciprocating Compressor Vents	Venting	6.3	126,474	50%	0.34	105,161	Assume more frequent replacement of rods
EOR Injection Pump Blowdowns	Venting	0.0	0	-	-	-	
Other Venting Sources	Venting	4.8	96,550	40%	100%	57,930	Assume vent capture and reuse at 40% of sites
Storage Tanks	Fugitive	3.1	61,511	100%	50%	30,755	Assume semiannual LDAR surveys
Gathering Pipeline Equipment Leaks	Fugitive	6.9	139,390	100%	50%	69,695	Assume semiannual LDAR surveys
Equipment Leaks from Valves, Connectors, etc.	Fugitive	28.0	563,953	100%	50%	281,976	Assume semiannual LDAR surveys
Above-Ground Meters/Regulators at Gate Stations	Fugitive	0.4	8,056	100%	50%	4,028	Assume semiannual LDAR surveys
Below-Ground Meters/Regulators/Valves	Fugitive	3.8	75,577	100%	50%	37,789	Assume semiannual LDAR surveys
Third-Party Line Hits	Fugitive	0.0	1	100%	50%	1	Assume semiannual LDAR surveys
Other Fugitive Sources	Fugitive	0.5	9,463	100%	50%	4,732	Assume semiannual LDAR surveys
TOTAL		100.0	2,010,577				

Tonnes CO2e

2,010,577

Fugitive emissions

787,564

Vented emissions

1,223,013

Venting	1,152,625	57%
Fugitives	857,952	43%
Total	2,010,577	100%

Target (after 45%) 1,105,817

693,395	62%	
428,976	38%	
1,122,371	100%	

Difference - 16,554

Actual reduction 44%

ıction

ı)

compressor unit or some other type of capture,

2014 British Columbia Reporting Regulation Emissions Report Summary Table: Linear Facilities Operation Sum

Company	Facility	BCFacilityID	Primary NAICS Code	Stationary Fuel Combustion CO2 (fossil fuel)	Stationary Fuel Combustion CO2 (included biomass)	Stationary Fuel Combustion CH4	Flaring CH4	Venting CH4	Fugitive CH4	Total CH4
Aitken Creek Gas Storage ULC	Aitken BC Linear Facilities Operation (LFO)	12111130001	211113 (Conventional Oil and Gas Extraction)	41,861	-	20	1,017	1,985	558	3,579
AltaGas Ltd.	AltaGas BC Linear Facilities Operation (LFO)	12111130036	211113 (Conventional Oil and Gas Extraction)	48,842	-	23	1,529	7,416	5,314	14,281
Apache Canada Ltd.	Apache BC Linear Facilities Operation (LFO)	12111130008	211113 (Conventional Oil and Gas Extraction)	32,489	-	334	160	4,986	390	5,870
ARC Resources	ARC BC Linear Facilities Operation (LFO)	12111130017	211113 (Conventional Oil and Gas Extraction)	154,649	-	10,742	2,092	41,931	14,939	69,704
Artek Exploration Ltd.	Artek BC Linear Facilities Operation (LFO)	12111130040	211113 (Conventional Oil and Gas Extraction)	50,548	-	2,746	-	-	-	2,746
Aux Sable Canada L.P.	Aux Sable BC Linear Facilities Operation (LFO)	12111130021	211113 (Conventional Oil and Gas Extraction)	35,183	-	2,895	183	758	278	4,115
Black Swan Energy	Black Swan BC Linear Facilities Operation (LFO)	12111131001	211113 (Conventional Oil and Gas Extraction)	16,606	-	813	1,609	2,403	5,735	10,560
Bonavista Energy Corporation	Bonavista BC Linear Facilities Operation (LFO)	12111130012	211113 (Conventional Oil and Gas Extraction)	41,080	-	941	738	8,440	9,178	19,297
Canadian Natural Resources Limited	CNRL BC Linear Facilities Operation (LFO)	12111130029	211113 (Conventional Oil and Gas Extraction)	688,849	-	329	8,209	250,101	147,575	406,214
Canbriam Energy Inc.	Canbriam BC Linear Facilities Operation (LFO)	12111131002	211113 (Conventional Oil and Gas Extraction)	46,232	-	3,016	439	1,750	5,809	11,014
Cequence Energy Ltd.	Cequence BC Linear Facilities Operation (LFO)	12111130170	211113 (Conventional Oil and Gas Extraction)	5,181	-	419	14	4,988	1,563	6,983
Chinook Energy Inc.	Chinook BC Linear Facilities Operation (LFO)	12111130024	211113 (Conventional Oil and Gas Extraction)	37,071	-	2,897	637	21,928	20,271	45,733
ConocoPhillips Canada Resources Corp.	ConocoPhillips BC Linear Facilities Operation (LFO)	12111130018	211113 (Conventional Oil and Gas Extraction)	181,137	-	14,662	759	121,539	89,560	226,519
Crew Energy Inc.	Crew BC Linear Facilities Operation (LFO)	12111130016	211113 (Conventional Oil and Gas Extraction)	24,716	-	1,406	1,239	5,527	6,169	14,340
Devon Canada Corporation	Devon BC Linear Facilities Operation (LFO)	12111130006	211113 (Conventional Oil and Gas Extraction)	10,181	-	225	75	61	594	956
Direct Energy Marketing Ltd.	Direct Energy BC Linear Facilities Operation (LFO)	12111130183	211113 (Conventional Oil and Gas Extraction)	78,994	-	1,735	604	9,166	14,625	26,129
Encana Corporation	Encana BC Linear Facilities Operation (LFO)	12111130010	211113 (Conventional Oil and Gas Extraction)	404,641	-	31,396	3,196	249,317	35,578	319,488
Endurance Energy Ltd.	Endurance BC Linear Facilities Operation (LFO)	12111130802	211113 (Conventional Oil and Gas Extraction)	155,647	-	12,605	1,208	225,086	129,166	368,065
Enerplus Corporation	Enerplus BC Linear Facilities Operation (LFO)	12111130022	211113 (Conventional Oil and Gas Extraction)	31,562	-	2,434	303	748	4,545	8,031
EOG Resources Canada Inc.	EOG BC Linear Facilities Operation (LFO)	12111130031	211113 (Conventional Oil and Gas Extraction)	16,702	-	1,240	58	11,327	1,922	14,547
Harvest Operations Corp.	HARVEST BC Linear Facilities Operation (LFO)	12111130027	211113 (Conventional Oil and Gas Extraction)	7,585	-	126	913	5,390	8,469	14,898
Husky Oil Operations Limited	Husky BC Linear Facilities Operation (LFO)	12111130013	211113 (Conventional Oil and Gas Extraction)	71,219	-	1,425	789	17,446	23,525	43,185
Imperial Oil Resources Ltd.	Imperial BC Linear Facilities Operation (LFO)	12111130005	211113 (Conventional Oil and Gas Extraction)	19,887	-	439	114	-	-	553
Keyera Corporation	Keyera BC Linear Facilities Operation (LFO)	12111130035	211113 (Conventional Oil and Gas Extraction)	37,202	-	18	932	2,274	1,872	5,095
Lightstream Resources Ltd.	Lightstream BC Linear Facilities Operation (LFO)	12111131003	211113 (Conventional Oil and Gas Extraction)	5,108	-	119	47	3,466	2,218	5,850
Lone Pine Resources Canada Ltd.	Lone Pine BC Linear Facilities Operation (LFO)	12111130020	211113 (Conventional Oil and Gas Extraction)	7,965	-	292	51	2,257	5,432	8,033
Murphy Oil Company Ltd.	Murphy BC Linear Facilities Operation (LFO)	12111130034	211113 (Conventional Oil and Gas Extraction)	142,172	-	3,267	412	4,341	1,277	9,296
Nexen Inc.	Nexen BC Linear Facilities Operation (LFO)	12111130002	211113 (Conventional Oil and Gas Extraction)	120,832	-	6,192	796	867	388	8,242
Pengrowth Energy Corporation	Pengrowth BC Linear Facilities Operation (LFO)	12111130028	211113 (Conventional Oil and Gas Extraction)	31,902	-	2,523	257	7,462	6,661	16,904
Penn West Petroleum Ltd.	Penn BC Linear Facilities Operation (LFO)	12111130009	211113 (Conventional Oil and Gas Extraction)	107,893	-	8,892	262	29,904	12,645	51,702
Polar Star Canadian Oil and Gas Inc.	Polar Star BC Linear Facilities Operation (LFO)	12111130041	211113 (Conventional Oil and Gas Extraction)	8,938	-	727	78	1,535	5,943	8,282
Progress Energy Canada Ltd.	Progress BC Linear Facilities Operation (LFO)	12111130039	211113 (Conventional Oil and Gas Extraction)	544,213	-	27,404	23,906	48,368	63,392	163,070
Quicksilver Resources Canada Inc.	Quicksilver BC Linear Facilities Operation (LFO)	12111130037	211113 (Conventional Oil and Gas Extraction)	44,516	-	3,504	-	-	15,698	19,202
Ramshorn Canada	Ramshorn BC Linear Facilities Operation (LFO)	12111130038	211113 (Conventional Oil and Gas Extraction)	17,153	-	8	269	707	9,280	10,264
Shell Canada Limited	Shell BC Linear Facilities Operation (LFO)	12111130007	211113 (Conventional Oil and Gas Extraction)	262,213	-	20,999	1,457	26,657	25,974	75,087
Spectra Energy Midstream Corporation	Spectra BC Linear Facilities Operation (LFO)	12111130003	211113 (Conventional Oil and Gas Extraction)	192,224	-	23,605	2,392	4,143	160	30,299
Spectra Energy Transmission	Spectra BC Linear Facilities Operation (LFO)	12111130004	211113 (Conventional Oil and Gas Extraction)	1,838,351	-	15,374	25,525	76,776	81,542	199,218
Suncor Energy Inc.	Suncor BC Linear Facilities Operation (LFO)	12111130015	211113 (Conventional Oil and Gas Extraction)	18,417	-	281	330	662	2,400	3,674
Taqa North Ltd.	Taqa BC Linear Facilities Operation (LFO)	12111130014	211113 (Conventional Oil and Gas Extraction)	35,665	-	837	675	4,545	4,608	10,665
Terra Energy Corporation	Terra BC Linear Facilities Operation (LFO)	12111130025	211113 (Conventional Oil and Gas Extraction)	17,434	-	1,411	363	3,478	6,429	11,719
Tourmaline Oil Corp.	Tourmaline BC Linear Facilities Operation (LFO)	12111130033	211113 (Conventional Oil and Gas Extraction)	138,272	-	10,234	805	11,276	15,265	37,580
Veresen Energy Infrastructure Inc.	Veresen BC Linear Facilities Operation (LFO)	12111130042	211113 (Conventional Oil and Gas Extraction)	41,167	-	20	464	340	91	915
Whitecap Resources Inc.	Whitecap BC Linear Facilities Operation (LFO)	12111131004	211113 (Conventional Oil and Gas Extraction)	6,065	-	144	478	1,664	526	2,813
Total				**6,082,367**	**-**	**218,718**	**85,384**	**1,223,013**	**787,564**	**2,314,718**

Total CH4	2,314,718
Fugitive and venting CH4	2,010,577
45% emissions reductions	904,760
Emissions after reduction	1,105,817

2013 GHG breakdown for BC oil and gas sector

Emission Source	Category	Total (tCO2e)	Percentage	Total (CH4 basis)	Percentage
Stationary Combustion: Natural Gas	Stationary Combustion	5,389,000	53		
Stationary Combustion: Other Fuels	Stationary Combustion	296,000	2.9		
Electricity Generation	Electricity generation	271,000	2.7		
Well Testing Flares	Flaring	141,000	1.4		
Associated Gas Flares	Flaring	17,300	0.2		
Flare Stacks	Flaring	391,000	3.8		
Continuous High-Bleed Device Vents	Venting	187,000	1.8	187,000	11.9
Pneumatic Pump Vents	Venting	261,000	2.6	261,000	16.6
Continuous Low-Bleed and Intermittent Device Vents	Venting	55,600	0.6	55,600	3.5
Acid Gas Removal	Venting	2,088,000	20.5		
Dehydrator Vents	Venting	51,800	0.5	51,800	3.3
Well Venting for Liquids Unloading	Venting	3,500	0	3,500	0.2
Well Venting, with or without Hydraulic Fracturing	Venting	2,600	0	2,600	0.2
Blowdown Vent Stacks	Venting	102,000	1	102,000	6.5
Well Testing Venting	Venting	-	-	-	
Associated Gas Venting	Venting	830	0	830	0.1
Centrifugal Compressor Vents	Venting	62,600	0.6	62,600	4.0
Reciprocating Compressor Vents	Venting	98,900	1	98,900	6.3
EOR Injection Pump Blowdowns	Venting	-	-	-	
Other Venting Sources	Venting	75,500	0.7	75,500	4.8
Storage Tanks	Fugitive	48,100	0.5	48,100	3.1
Gathering Pipeline Equipment Leaks	Fugitive	109,000	1.1	109,000	6.9
Equipment Leaks from Valves, Connectors, etc.	Fugitive	441,000	4.3	441,000	28.0
Above-Ground Meters/Regulators at Gate Stations	Fugitive	6,300	0.1	6,300	0.4
Below-Ground Meters/Regulators/Valves	Fugitive	59,100	0.6	59,100	3.8
Third-Party Line Hits	Fugitive	1	0	1	0.0
Other Fugitive Sources	Fugitive	7,400	0.1	7400	0.5
Wastewater Processing	Wastewater	140	0		
TOTAL		10,165,200	100	1,572,231	100.0

Venting emissions

	CH4	Total
	891,568	891,568

Fugitive emissions

	CH4	Total
	609,099	609,099

1,500,667

Potential applicability of emissions reduction strategies		Estimated applicability		
Emission type	**Mitigation**	**US EPA**	**Proposed federal requirements**	**EDF/ICF study**
General fugitives	LDAR programs	Assumes 100% applicability All new facilities would require LDAR programs, except: - low production wells (with less than 15 boe/day of production) - well sites that contain only wellheads (known as 'Christmas trees')	Assumes 100% applicability All new facilities would require LDAR programs, except: - single well heads	Assumes 100% applicability
High bleed pneumatics	High to low bleed conversions	Not estimated. EPA rules are for new builds.	Assumes near 100% applicability - "Must use non-emitting equipment at facilities with gas compressors. At other facilities, must use low-bleed pneumatic controllers".	Assumes different applicability for different areas: - 60% of the inventory of high bleed controllers in transmission, storage, and LNG, - 80% in processing - 90% in other segments The study also assumes that 30% of gathering, 50% of processing, and 30% of transmission high bleed devices can be converted to instrument air
Pumps	Convert to solar or electric (or capture and destroy)	Assumes 80% applicability for chemical injection pumps.	Assumes 100% applicability - "Emissions from pneumatic pumps must be conserved or destroyed".	Assumes 60% applicability for chemical injection pumps. Not given for kimray pumps
General venting	vent capture and re-use/destruction		Assumes most facilities will be covered - "facility-wide venting limit to restrict venting of natural gas from facilities producing oil and gas – uncontrolled emissions reduced by 95% with conservation or destruction. Exemptions for facilites whose vented emissions remain below 3,350 m3 per month for 12 consecutive months"	
Compressor stations	rod packing replacement	Assumes 100% applicability.	Assumes 100% applicability. Includes annual measurement of all compressor vents with portable flowmeters: - for reciprocating compressor rod packing vents, an emission rate exceeding 0.017 m3/min requires action, within 30 days	Assumes different applicability for different areas: - 25% for processing - 70% for transmission, storage and LNG.
Compressor stations	wet to dry seal replacement	Assumes 100% applicability.	Assumes 100% applicability. Includes annual measurement of all compressor vents with portable flowmeters: - for centrifugal compressor vents, an emission rate exceeding 0.42 m3/min requires action, within 90 days	Assumes different applicability for different areas: - between 75% and 90%

LDAR

Source 1:
US EPA, Regulatory Impact Analysis for Oil and Natural Gas Proposed NSPS
https://www3.epa.gov/airquality/oilandgas/pdfs/og_prop_ria_081815.pdf

Activity	Potential reductions
Annual surveys	40%
Semiannual surveys	60%
Quarterly surveys	80%

Source 2:
REGULATORY ANALYSIS for Proposed Revisions to Colorado Air Quality Control Commission Regulation Numbers 3, 6 and 7
https://www3.epa.gov/airquality/oilandgas/2014papers/Attachment_GG_EDF.pdf

Activity	Potential reductions
Annual surveys	40%
Quarterly surveys	60%
Monthly	80%

Source 3: (based on previous EPA)
Pembina Institute/EDF/ICF International, Economic Analysis of Methane Emission Reduction Opportunities in the Canadian Oil and Natural Gas Industries
https://www.pembina.org/reports/edf-icf-methane-opportunities.pdf

Activity	Potential reductions
Quarterly surveys	60%

Source 4:
Carbon Limits, Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Program Using Infrared Cameras
http://www.catf.us/resources/publications/view/198

Assumes baseline of annual surveys (from Canadian data)

Activity	Potential reductions
Semiannual	50%
Quarterly surveys	68%

Compressor Stations

Source 1:
US EPA, Control Techniques Guidelines for the Oiland Natural Gas Industry(Draft)
https://www3.epa.gov/airquality/oilandgas/pdfs/og_ctg_draft_081815.pdf
Section 5.3
Reciprocating compressors
- replacing rod packing on a three year schedule (or 26,000 hours)
Gathering and boosting stations

Variable	Value	Unit
Emissions_old	25.9	scf/h-cylinder (CH4)
Emissions_new	11.5	scf/h-cylinder (CH4)

Percent reduction: 0.18

Processing stations

Variable	Value	Unit
Emissions_old	57	scf/h-cylinder (CH4)
Emissions_new	11.5	scf/h-cylinder (CH4)

Percent reduction: 0.34

- Gas recovery

Activity	Percent reduction
Route to VRU	95-100%
Route to flare	95%

Section 5.4
Centrifugal compressors

Variable	Value	Unit
Emissions_old	47.7	scf/min (CH4)
Emissions_new	6	scf/min (CH4)

Percent reduction: 87%

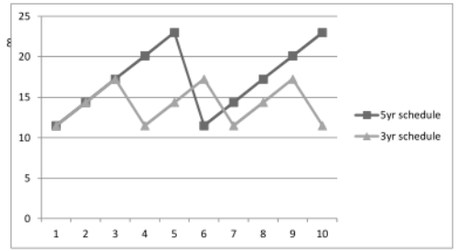
- Gas recovery

Activity	Percent reduction
Route to VRU	95-100%
Route to flare	95%

Source 2:
Carbon Limits, Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Programs Using InfraredCameras
http://www.carbonlimits.no/wp-content/uploads/2015/06/Carbon_Limits_LDAR.pdf

Gathering and boosting												operating hours	
Emission rate	Operating year	1	2	3	4	5	1	2	3	4	5	151,197.60	0.18
Start 11.5	5yr schedule	11.5	14.38	17.26	20.14	23.02	11.5	14.38	17.26	20.14	23.02	123,445.92	
End 25.9		1	2	3	1	2	3	1	2	3	1		
	3yr schedule	11.5	14.38	17.26	11.5	14.38	17.26	11.5	14.38	17.26	11.5		

Processing													
Emission rate	Year	1	2	3	4	5	1	2	3	4	5	260,172.00	0.34
Start 11.5	5yr schedule	11.5	20.6	29.7	38.8	47.9	11.5	20.6	29.7	38.8	47.9	172,484.40	
End 57		1	2	3	1	2	3	1	2	3	1		
	3yr schedule	11.5	20.6	29.7	11.5	20.6	29.7	11.5	20.6	29.7	11.5		



Pumps

Source 1:
US EPA, Control Techniques Guidelines for the Oiland Natural Gas Industry(Draft)
https://www3.epa.gov/airquality/oilandgas/pdfs/og_ctg_draft_081815.pdf
Section 7.3

Pump replacement

Activity	Percent reduction
to solar	100%
to electric	100%
to instrument air	100%

- Gas recovery

Activity	Percent reduction
Route to VRU	95-100%
Route to flare	95%

Pneumatic devices

Source: The Prasino Group, Final ReportFor Determining Bleed Ratesfor Pneumatic Devices in British Columbia
http://www2.gov.bc.ca/assets/gov/environment/climate-change/stakeholder-support/reporting-regulation/pneumatic-devices/prasino_pneumatic_ghg_e

Common replacement for pressure controllers

Variable	Value	Unit
Emissions_Fisher 4150	0.4209	m3/hr (CH4)
Emissions_C1	0.0649	m3/hr (CH4)

Percent reduction
85%

Level controllers

Activity
no control

Transducer

Activity
Fisher i2p

:f_final_report.pdf

Reduced emissions completions

Source 1:
US EPA, Reduced Emissions Completions forHydraulically Fractured Natural Gas Wells
https://www3.epa.gov/gasstar/documents/reduced_emissions_completions.pdf

Activity	Percent reduction
Use REC	95-100%

Source 1: (based on previous EPA)
Pembina Institute/EDF/ICF International, Economic Analysis of Methane Emission Reduction Opportunities in the Canadian Oil and Natural Gas Ind
https://www.pembina.org/reports/edf-icf-methane-opportunities.pdf

Activity	Potential reductions
Blowdown capture	95%

ustries

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Page 210 to/à Page 222

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BC Bioenergy Network
PARTNERING FOR A GREENER FUTURE

Written Submission
Legislative Assembly of British Columbia
Select Standing Committee on Finance and Government Services

October 15, 2015

Many thanks to the BC Government Ministry of International Trade, and the Hon. Minister Virk, Ministry Technology, Innovation and Citizen Services, for all their support of the BC Bioenergy Network, Bioenergy Panel, June 23rd, as part of the BC-Korea Investment & Trade Forum. Attached with this submission are the key documents that describe and celebrate our strategic success through this memorable event:

1. Bioenergy Panel Video Announcement;
2. Press Release, "Prospering Through BC-Korea Trade";
3. POSCO Power presentation, "Overview of New and Renewable Energy in Korea";
4. Our Event Summary Post Korea Forum; and
5. Wood Pellet Association of Canada trade dispute resolution report.

BC Bioenergy Network seeks Re-capitalization from the BC Government to continue the historic work we have begun in BC, as well as in Korea, to accelerate deployment of new technologies for converting organic waste to energy, which can reduce GHG emissions.

The BC-Korea Forum gave us an opportunity to showcase the remarkable new technologies emerging from our partnerships with Korea. Korea imports over 95% of their energy. They have set a goal of 20% Renewables by 2030. The new technologies being developed through our BC Bioenergy Network / Korea Research Exchange, are accelerating development times, so that both BC and Korea will have a better chance to reach their GHG reducing and energy goals.

BC has at least 65.8 kilotonnes of GHG emissions to try to reduce to zero in 35 years. It is a daunting, daunting task. We are making progress with solutions, but we must keep working hard to succeed in de-carbonizing by 2050 – the time that the scientific community says we must get to carbon neutral to avoid climate catastrophe.

$25 million over the next five years 2015 to 2020, can help to bring drop-in fuels to market in BC, as well as solid and gas fuels which are near ready, but still in need of further development. BC Bioenergy Network is partnering on three low carbon fuel projects this year, and expects to support a further two or three in the next couple of years. These can make dramatic reductions in our provincial GHG emissions; not just in

BC Bioenergy Network

the transportation sector, but in industries and remote communities where heavy machinery and electricity generation are diesel powered.

Also attached in this written submission is the presentation we made to the Kamloops Public Hearing of the SSCFGS on September 17, 2015. As well we have included our Written Submission to the Climate Action 2.0 Review, made September 14, 2015.

Please recommend that the BC Government Re-capitalize the BC Bioenergy Network; either through a $25 million lump sum, as was the case when we were founded in 2008, or through a series of $5 million per year installments.

Many thanks for your consideration.

BC Bioenergy Network
Vancouver, BC

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Update: Trade Restriction on Korean Wood Pellet Imports

By Gordon Murray

September 15, 2015

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Legislative Assembly of British Columbia

Select Standing Committee on Finance and Government Services

Advancing BC's Economy and Climate Action through BC Bioenergy Network 5 Year Plan - 2015 to 2020

Michael Weedon
Executive Director

Kamloops
Public Hearing

September 17, 2015

BC Bioenergy Network
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Two Options for Recapitalization

$25 million Lump Sum

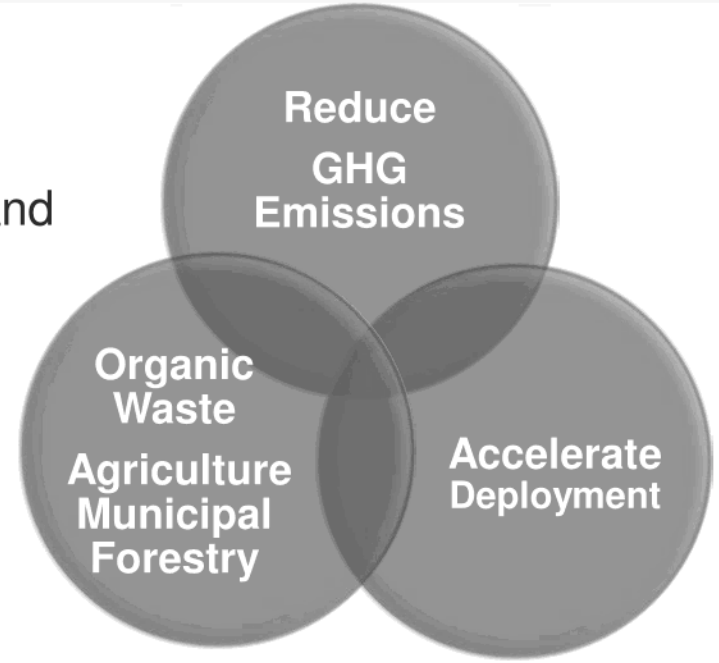
$5 million per year for 5 years

BC Bioenergy Network Mandate

- Founded March 30, 2008
- Part of BC Government Bioenergy Strategy
- Not-for-profit society
- With a specified bioenergy mandate
- $25 million grant
- Funders: BC Ministries of Environment and Energy Mines and Petroleum Resources

High Quality Bioenergy Investments throughout BC

- 22 Large Technology Development and Demonstration Projects
- 11 Capacity Building Projects
- $19 million Committed
- Capital Leveraged @ 7:1



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New Technologies Reduce GHG Emissions

With economics to "pay" for energy conversion
With global markets to attract private capital
Need Demonstration to accelerate deployment to market



1st Generation Torrefaction

Higher energy per tonne

Higher market selling price



2nd Generation Torrefaction

Lower transportation cost



Liquid Fuels from Wood

Higher selling price

Used locally

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Continuing Success for BCBN Projects Since SSCFGS 2014



HARVEST POWER, Richmond BC

New VP Western Canada to expand sales, using the Richmond $50 million plant as a reference centre



NEXTERRA SYSTEMS, UBC

$60 million contract in the UK, using the UBC facility as a reference centre for buyers and investors to do due diligence



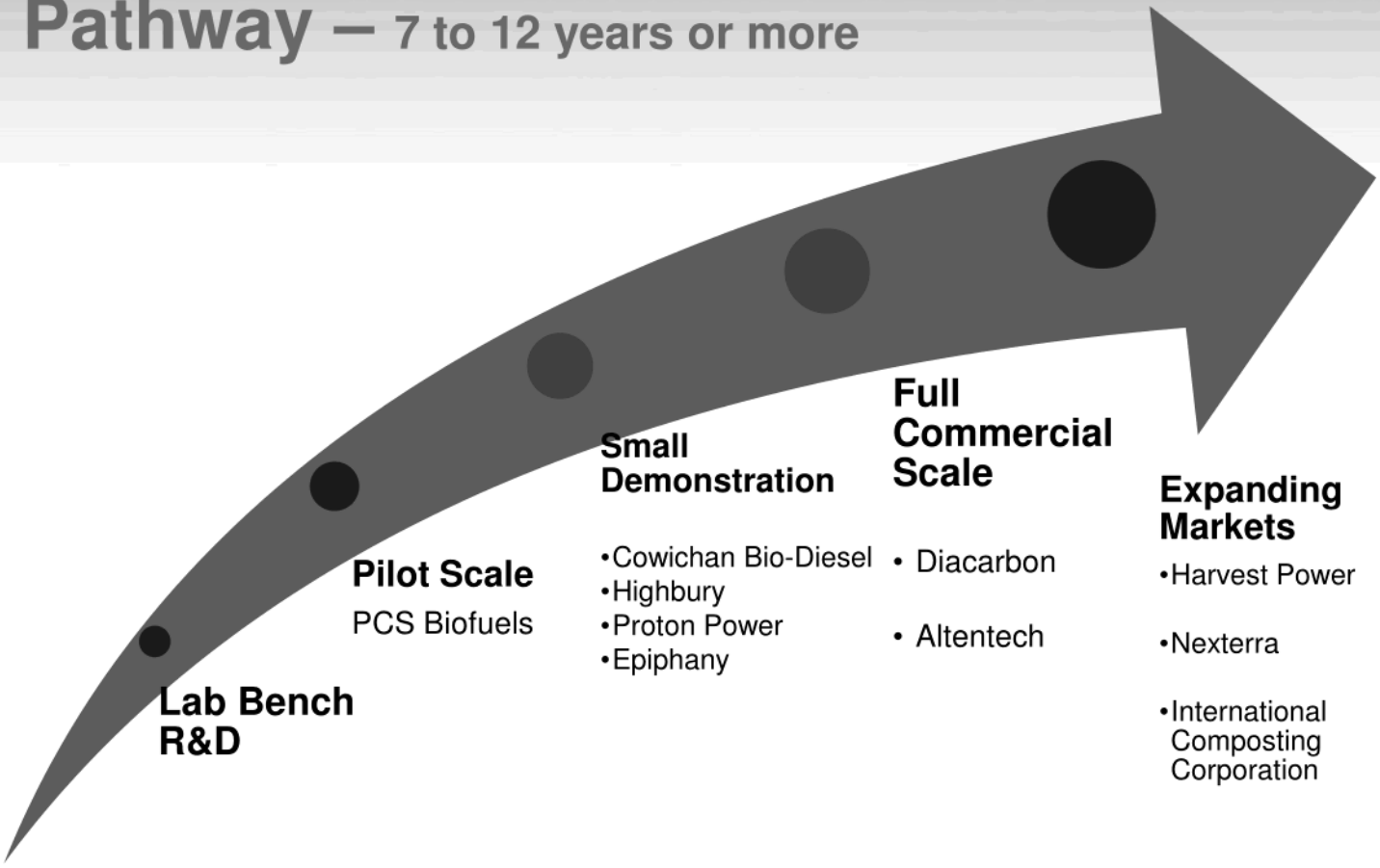
BC-KOREA FORUM

Bioenergy Panel – June 23, 2015

BC Bioenergy Network / KETEP Research Exchange Successes

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The Technology Development Pathway – 7 to 12 years or more



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The Line-up to be Second

Why we need Demonstration projects

To de-risk new technologies in stages, which increases their chances of success;

To attract investment capital;

To protect shareholders of public companies from losses due to new technology development failure;

To introduce a new way of doing things that is necessary in the public interest, but has not been considered part of “business as usual”; and

To overcome the inertia of the status quo in traditional industries and sectors where innovation of any kind is often resisted.

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Demonstrations Needed 2015 to 2020

Biogas	• Municipal Landfill Gas Utilization • Compressed Biogas • Liquified Biogas
Liquid Fuels	• Drop-in Diesel • Gasoline • Jet Fuel
Solid Biofuels	• Drop-in Coal Replacement from Municipal • Drop-in Coal Replacement from Agricultural • Drop-in Coal Replacement from Forestry
Biomass Processing	• Fire Damaged, MPB, Non-Merchantable • Short Rotation Crops • Bio-Char

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Budget Allocation for Demonstrations Needed 2015 to 2020

Biogas	• $5 million
Liquid Fuels	• $5 million
Solid Biofuels	• $10 million
Biomass Processing	• $5 million

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Context for Recapitalization for BC Bioenergy Network

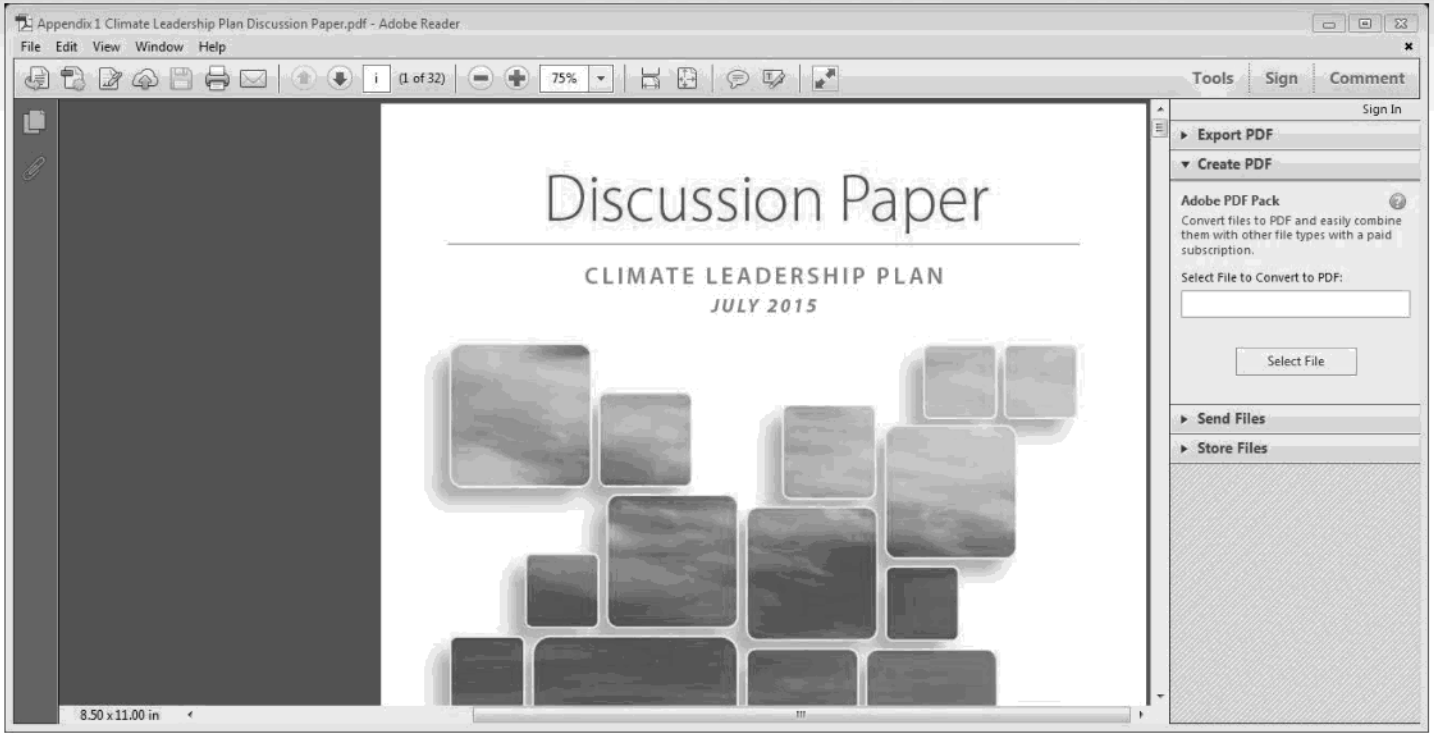
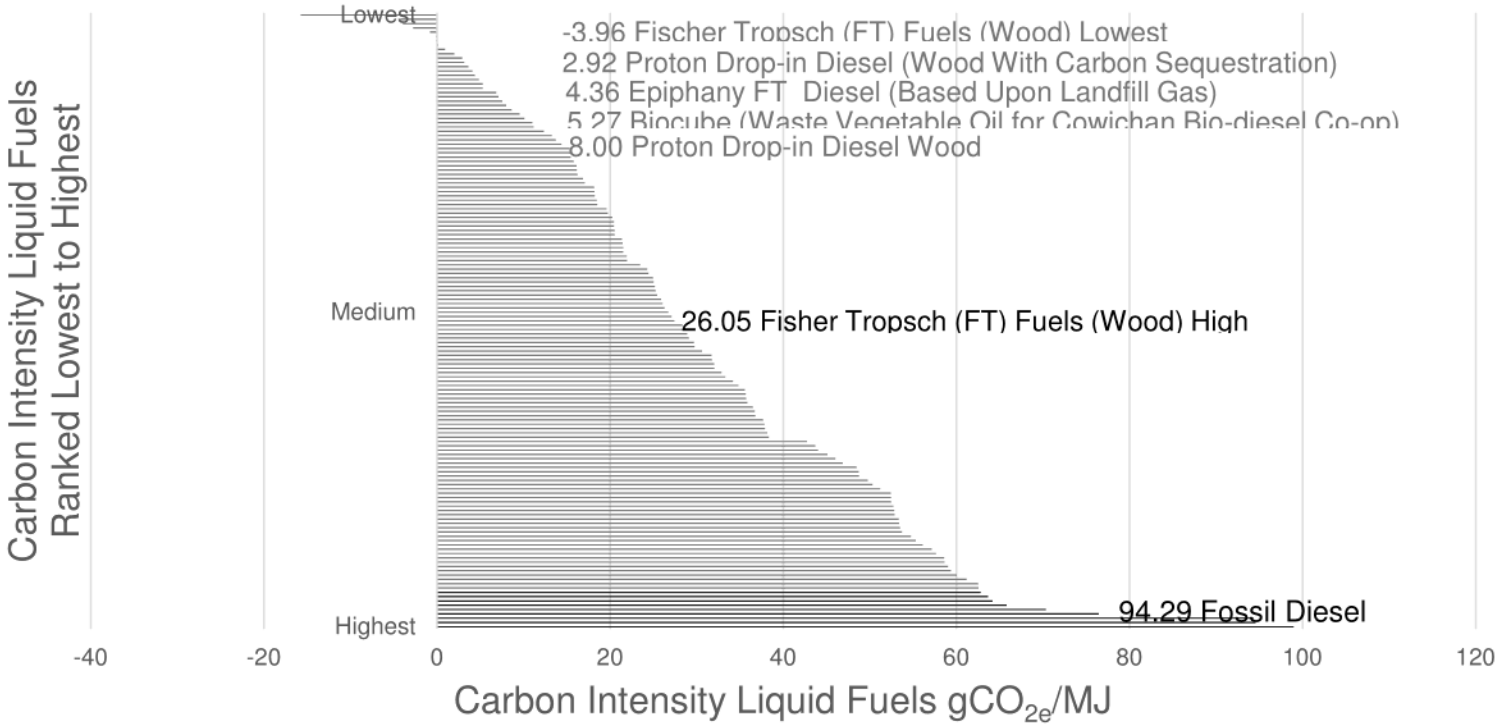


Table 2
Carbon Intensity Liquid Fuels $gC0_{2e}/MJ$
BC Approved Carbon Intensities
Information Bulletin RLCF-012
Observations Based Upon GHGenuis 4.03a



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We need to be at 80% below 2007 levels of GHG emissions by 2050.

That is, we need to complete the transition in 35 years.

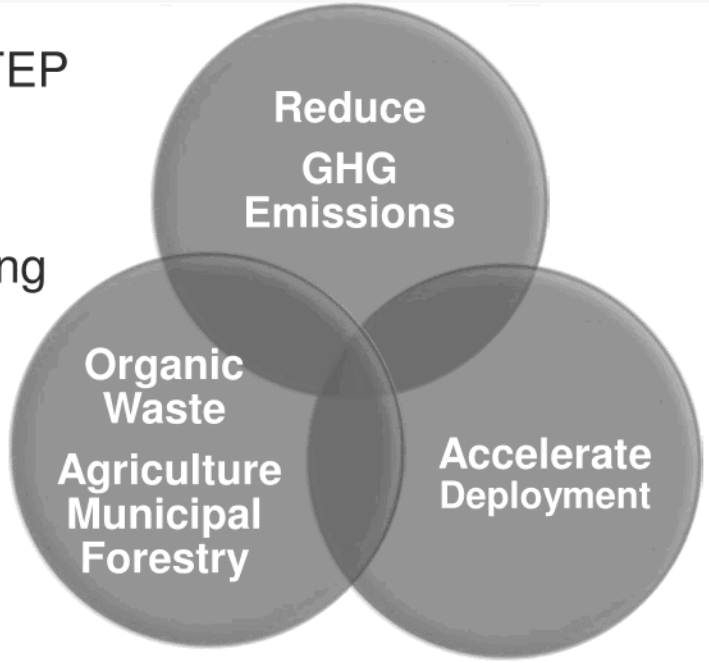
Through acceleration, it can be 3 to 5 years to drop-in solid and liquid fuels from organic feedstocks, fully demonstrated and ready for further commercialization.

We will then have 20 to 30 years to dramatically expand low-carbon solid and liquid fuel production, sufficient to replace current volumes of fossil fuel consumption, to reach the 2050 targets.

Governments must step in to require change, and to fund the demonstrations that will accelerate adoption of the technologies that can succeed in reducing GHG emissions.

To Reach 80% Below 2007 Levels GHG Emissions We Need to Accelerate Deployment

- Expand the BC Bioenergy Network / KETEP Research Exchange
- Establish a BC Bioenergy Network / Beijing University of Chemical Technologies Exchange
- Recapitalize BC Bioenergy Network
  $25 million



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Two Options for Recapitalization

$25 million Lump Sum

$5 million per year for 5 years

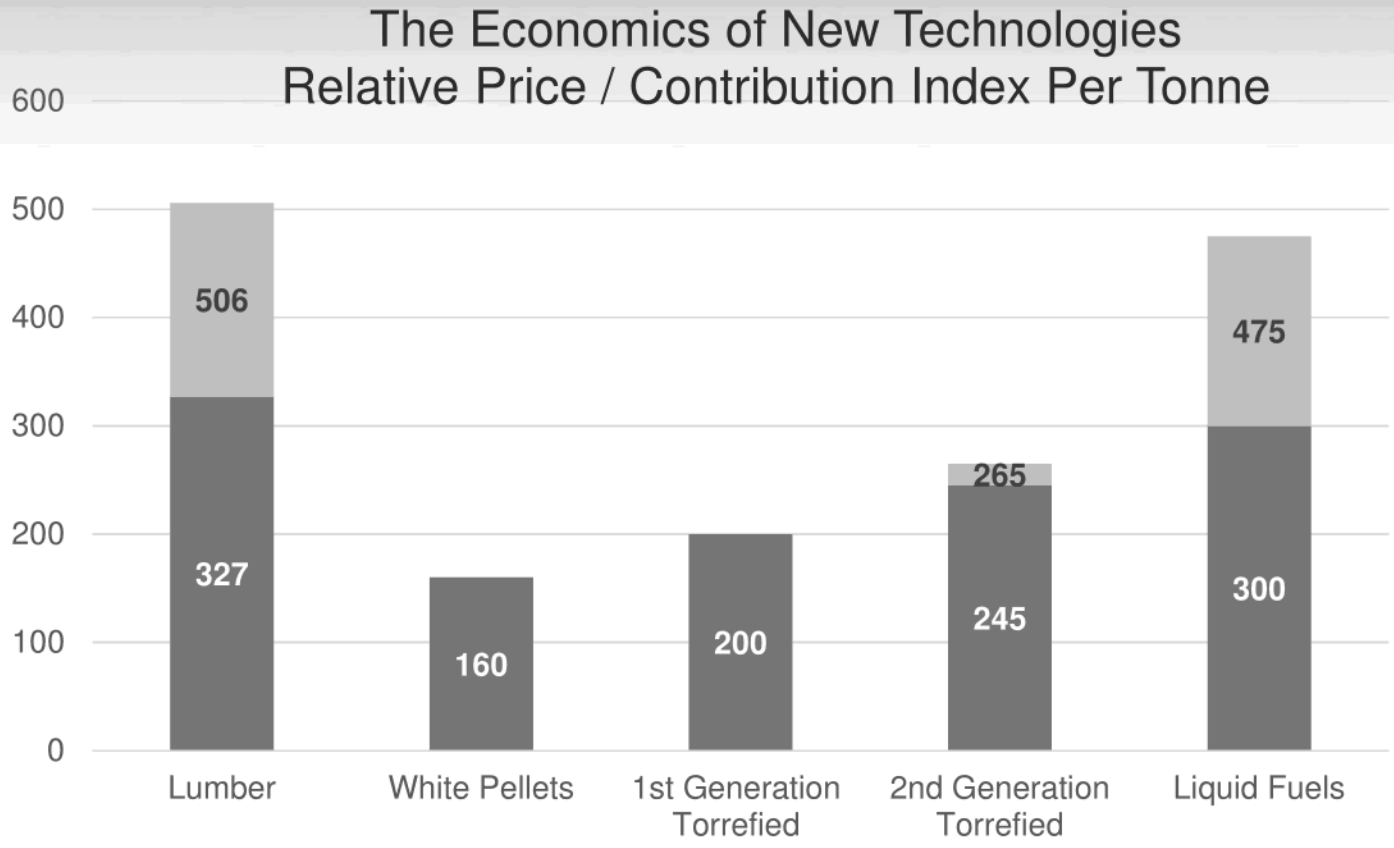
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Thank you!



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New Technologies will allow us to extract more value from unutilized forest resources



KETEP – BC Bioenergy Network Research Exchange 2011 to 2015



Dr Ahn, President KETEP
Michael Weedon, Executive Director BCBN, 2012



KETEP, KIST and BCBN
Whistler, BC
August 6, 2012



BC Premier Christy Clark, Dr Heon Jung of KIER, and BCBN Chair Brent Sauder
Seoul, Korea 2013

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BC Government New Innovation Strategy: 8 Key Sectors Bioenergy Supports

Agriculture	• Clean Up Water Pollution from Dairy • Mix AG, Municipal, Forestry Residuals for Advanced Biofuels • Short Rotation Tree "Crops" like Willow, Poplar
Advanced / International Education	• Korea Research Exchange Since 2012 • China Research Exchange Starting 2015 • Austria Research Exchange Since 2009
Forestry	• Altentech BioVertiDryer for Lowest Energy and Emissions • Torrefaction • Liquid Fuels • Biogas
Mining	• Towards Sustainability in Mining - Clean Energy Solutions • MGX Minerals, Highbury Energy and Eaton Corp • Wastewater treatment technologies

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BC Government New Innovation Strategy: 8 Key Sectors Bioenergy Supports

Technology

- Rising Sub-sector of CleanTech
- Attracting Venture Capital to Biofuels
- Coal replacement in demand Canada, USA, Korea
- Integrated systems can achieve greater energy / GHG reductions

Tourism

- Trade Missions
- Conferences and Conventions like International Bioenergy Conference Prince George
- International Methane conference
- Hosting Centre for Demonstration Projects like Nexterrra, Harvest Power
- BC-Korea Forum June 22 to 24, 2015

Transportation

- Renewable Fuels for Low Carbon Fuel Standards Program
- Drop-in Diesel for Heavy Engines
- Cleaner Marine Diesel
- Fuel Supply security for Small and Remote Communities
- Jet Fuel Development

LNG

- Biofuels to Liquid Fuels will transfer to LNG
- Technology for Compressors to Help Make LNG Cleaner

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Drivers of Bioenergy Development in BC

Carbon Tax	Changes Fossil fuel Consumption	GHG Emission Reductions	Creates new Opportunities
GHG Emission Targets	CEEI / Municipal and PowerSmart / Industry	Search for Technologies and Processes to Reduce GHG's	NEEDS $$$ TO IMPLEMENT
BC Bioenergy Network Mandate	Accelerate Deployment of Technology - Organic Waste to Energy / Reduce GHG's	3 Sectors AG, Municipal, Forestry	NEEDS $$$ TO IMPLEMENT
Low Carbon Fuel Standards	Set schedule for % Renewable Fuels in Gas and Diesel	Technologies to Produce Renewable Transportation Fuels	NEEDS $$$ TO IMPLEMENT

Biography Michael G. Weedon - Extract

Executive Director BC Bioenergy Network, since 2008
Various large corporate assignments (1976-2008)
BA, University of Toronto; MBA, Ivey School of Business



1993 – 1997 Sherritt Inc.
Executive VP and Chief Operating Officer

Increased market capitalization from $280 million to $2.4 billion in four years
Increased net income from $42 million loss to $184 million profit over 3 years
Implemented a $10 million overhead cost reduction program in 1993
Tripled the fertilizer business / revenues through acquisition and pricing
Identified and capitalized upon $60 million in cost reduction and operating improvements following the fertilizer acquisition
Sold oil and gas operations for $100 million

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BC Bioenergy Network
PARTNERING FOR A GREENER FUTURE

BC Bioenergy is… 3 Sectors for Organic Waste-to-Energy Conversion



Municipal

- Source separated organics to biogas & electricity
- Landfill methane gas captured to biogas



Agricultural

- Animal waste to biogas & electricity
- Agricultural residues to biogas and liquid fuels



Forestry

- Mill waste to syngas to electricity
- Mill waste to first generation torrefaction

BC Bioenergy Network
PARTNERING FOR A GREENER FUTURE

Harvest Power: A BC Super Success Story



1. The facility was a recipient of KPMG's top 100 global infrastructure projects in its Infrastructure 100: World Cities Edition (2012).
2. Harvest Power was also selected by Bloomberg New Energy Finance as a 2013 New Energy Pioneer.
3. Duplicated at Walt Disney World, Orlando Florida, USA
4. Being duplicated by New York City, USA

"*BCBN's support has been far more than financial in nature. BCBN is the best and most valuable partner we have — they take the "N" in networking seriously.*" – Wayne Davis, HP

Page 269 to/à Page 300

Withheld pursuant to/removed as

Copyright

Honourable Mary Polak
Minister of Environment
Climate Leadership Consultation
Ministry of Environment Climate Action Secretariat
P.O. Box 9486, Stn. Prov Govt
Victoria, B.C.
V8W 9W6

Submitted via e-mail to climateleadershipplan@gov.bc.ca

Re: British Columbia Climate Leadership

Dear Minister Polak:

As government continues to move British Columbia's (B.C.) climate leadership forward with an updated plan, the industries that steward the responsible development of British Columbia's natural resources, and are emissions intensive and trade exposed (EITE), formed an EITE industry coalition in April 2016. The Mining Association of British Columbia, RioTinto, Canadian Association of Petroleum Producers, the Cement Association of Canada, the Chevron Burnaby Refinery and the BC LNG Alliance appreciate the opportunity to share our perspective with the Government of B.C. regarding the 2016 Climate Action Plan.

EITE industries employ approximately 111,000 British Columbians and contribute to B.C.'s diverse economy:

For context setting, according to Natural Resources Canada, B.C. natural resource industries contribute 11% to overall provincial GDP.[1] This translates into more than 111,000 people with natural resource-related careers spanning 75+ resource dependent communities from across British Columbia. Continued investment in B.C.'s natural resources also matters in the lower mainland. In fact, 55.5% of all jobs generated by B.C.'s natural resource industries in the province — direct, indirect, and induced — are in the urban region, according to a 2014 study by Resource Works.[2] It is widely recognized that the natural resource industries have a myriad of economic linkages with different sectors; however, many don't realize the convergence of natural resource development and clean technology (cleantech). For example, among the largest customers of innovative technology products are EITE industries. In order to drive the breakthrough

[1] Source: Employment and GDP: Natural Resources Canada estimates, based on Statistics Canada 2014 data
[2] Resource Works

innovations required to reach climate targets, partnerships with industry, cleantech, government and academia will continue to be needed. B.C. has a proven track record in this regard with such companies as Evok Innovations and Saltworks.

B.C. EITE industries must be globally competitive in order to contribute to B.C.'s Climate Leadership:

Not only do B.C. EITE industries positively impact the provincial economy and provide 111,000 good paying jobs, we contribute significantly to B.C.'s climate leadership. We recognize the challenges in addressing climate change and the need for local and global action. The EITE industries acknowledge the importance of the Ministry of Environment's recent sectorial consultations and the recommendations being offered by British Columbians on opportunities to support greenhouse gas (GHG) reductions domestically through energy efficiency, built environments, increased renewable energy, transportation infrastructure, and fuel switching.

To support the creation of an effective Climate Leadership plan, we are pleased to offer the Government of B.C. a number of important considerations to support competitiveness and climate action results. Our recommendations include proposed improvements to B.C.'s carbon-pricing regime to provide greater investment certainty and eliminate the trade disparity caused by the existing framework for EITE industries. We currently pay amongst the highest carbon prices in the world. Absent targeted policies to address trade exposure, the Government of B.C. risks creating further competitive disadvantages for its EITE industries, disadvantages that could negatively impact jobs and investment across the province and actually lead to higher global emissions through carbon leakage to other jurisdictions without climate policies in place.

B.C. stands out as one of the few jurisdictions with robust carbon pricing, but lacks a comprehensive approach to mitigating the unintended consequences to EITE industries. Other jurisdictions that price carbon, including Alberta, Ontario, Quebec, California and the European Union, have mechanisms in place or consultation is currently underway to address trade disparity. Protecting EITE industries was a major focal point of the 2015 Climate Leadership Team's recommendations to government. B.C., however, has yet to implement a solution, thereby removing a critical pathway to address trade disparity, preventing carbon leakage and preserving B.C.'s competitiveness.

We look forward to reinvigorating the carbon-pricing discussions with the Province, and collaborating with government to define a plan, which ensures a competitive EITE mechanism for B.C. industries. To begin our dialogue, we offer the following five recommendations:

Recommendations:

1. Enable economic investment and jobs in B.C.'s natural resource sector by taking steps to address tax fairness and equity, avoiding carbon leakage.
2. Recognize that B.C.'s EITE industries are an integral part of the global transition to a lower carbon footprint.
3. Utilize flexible, harmonized market-based, cost-effective compliance mechanisms to address tax fairness, and trade disparity.
4. Design a carbon pricing mechanism that is achievable within the context of a growing and transitioning lower carbon economy; this should include principles to ensure fairness, predictability and competitiveness.

5. During the transition period to a lower carbon economy, reward early action and support innovation through fiscal policies enabling research, development and demonstration, resulting in Canadian EITE industry competitiveness and innovation for export globally.

Please see *Schedule A* for a detailed overview of these recommendations.

Conclusion:

The Government of B.C. must take global market realities into account when making any changes to the Province's Climate Leadership Plan and factor this into the carbon-pricing policy. Among B.C.'s most significant positive contributions to global climate action is to produce some of the lowest carbon footprint natural resource products and commodities for the end-use sector. This will contribute towards a global transition to lower GHG-intensity fuels, promote improved energy efficient building materials and enable investment in public transportation.

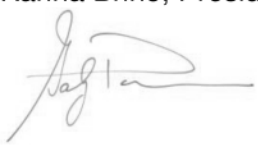
The EITE industries note that growing demand for commodities could be met by B.C.'s natural resource sector, within one of the most stringent environmental regulatory frameworks in the world, while supporting British Columbian families and workers, or alternatively the demand could be met by jurisdictions with weaker regulations and climate policies. B.C,'s EITE industries require carbon policy certainty that provides for carbon tax fairness and equity between asymmetrical carbon policies across competing jurisdictions. We also encourage the Government of B.C. to work with the Federal Government to avoid regulatory overlap, as well as to ensure the most effective emission reduction pathways, while addressing trade disparity.

We are supportive of B.C.'s Climate Leadership. The EITE industries look forward to meaningful dialogue and consultation with the Government of B.C. on the design of competitive carbon pricing mechanisms that will provide much-needed cost certainty for EITE industries as we maintain and expand investment in B.C., creating new jobs and economic prosperity for all British Columbians.

Sincerely,



Karina Brino, President and CEO of the Mining Association of British Columbia



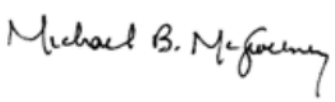
Gaby Poirier, General Manager, B.C. Operations Rio Tinto



David Keane, President and CEO of the BC LNG Alliance



Alex Ferguson, Vice President of Policy and Performance, Canadian Association of Petroleum Producers



Michael McSweeney, President & CEO, Cement Association of Canada



Steve Parker, GM Burnaby Refinery & Canada Country Chairman, Downstream

cc: Honourable Christy Clark, Premier, Province of British Columbia
Honourable Peter Fassbender, Minister of Community, Sport and Culture Development and Minister responsible for Intergovernmental Relations, Province of British Columbia
Honourable Rich Coleman, Minister of Natural Gas Development, Province of British Columbia
Honourable Mike De Jong, Minister of Finance, Province of British Columbia
Honourable Shirley Bond, Minister of Jobs, Tourism and Skills Training, Province of British Columbia
Honourable Bill Bennett, Minister of Energy and Mines
Honourable Todd Stone, Minister of Transportation and Infrastructure

SCHEDULE A:

The EITE industries are pleased to offer recommendations to the Government of B.C. to support considerations for the 2016 Climate Action. Our recommendations include proposed improvements to B.C.'s carbon-pricing regime to provide greater investment certainty and eliminate the trade disparity caused by the existing framework.

RECOMMENDATION ONE: Enable economic investment and jobs in British Columbia's EITE sectors by taking steps to address tax fairness and equity, avoiding carbon leakage.

The EITE industries advocate that the B.C. Government consider the fiscal competitiveness of EITE industries in a manner that acknowledges the dynamics of global commodities supply and demand. EITE industries by definition are sensitive to carbon-related pricing escalation. Investment mobility means that B.C. projects and industry must be competitive, including carbon-pricing expenditures, with other global investment prospects, if our Province is to attract the necessary capital and the jobs and the benefits that they bring. Comparable carbon pricing on EITE industries is absent in competing global jurisdictions. This has numerous negative consequences both for B.C.'s economy and for global GHG emissions, including:

- redeployment of investment capital away from B.C. to competing jurisdictions without the same fiscal hurdles or stringent carbon policies;
- increased proportionate global GHG emissions by, or carbon leakage to, jurisdictions with less stringent carbon policies; and
- lost opportunities for jobs and tax revenue in B.C.

RECOMMENDATION TWO: Recognize that B.C.'s EITE industries are an integral part of the global transition to a lower carbon footprint.

Climate change is a global challenge, requiring global solutions. Canada and B.C. must do their part to reduce domestic GHG emissions to meet Canada's international commitments. While Canada represents approximately 1.8% of global GHG emissions,[3] there are actions we can take as a province and country that will positively affect climate change locally and globally. This was acknowledged by the Government of Canada in its five principles leading into the United Nations Conference of Parties (COP 21), including committing Canada to support developing countries in accessing clean technologies and promoting lower carbon economies. We support this goal.

We believe that providing access to B.C.'s lower carbon-intensity natural resources is amongst the most significant global GHG abatement effort that B.C. can provide towards the global effort to reduce emissions. We encourage the Government of B.C. to recognize in its Climate Action Plan that 93% or more of B.C.'s electricity is generated through hydro-electricity, and as such, the EITE industry that operates in B.C. already leverages a best-in-class GHG generation mix. For the global end-use sector to reduce its own carbon footprint, B.C.'s natural resources and products can support improved reliability and durability, energy efficiency, fuel switching and enable new public infrastructure. The EITE industries note that growing demand for commodities could be met by B.C.'s natural resources, within one of the most stringent regulatory environmental frameworks in the world, while supporting British Columbian families and workers.

[3] International Energy Agency (2012) CO2 Emissions from Fuel Combustion Highlights

RECOMMENDATION THREE: Utilize flexible, harmonized, market-based, cost-effective compliance mechanisms to address tax fairness and trade disparity.

It is imperative that the B.C. Government also engage the Federal Government in order that cross-border tax issues be effectively resolved.

When reviewing the history of carbon pricing policy in British Columbia relative to EITE sectors, it is important to understand the context within which EITE industries were expecting the policy to develop over time. When the B.C. carbon tax came into effect, there were significant and substantive parallel activities occurring within the Western Climate Initiative (WCI) that envisioned a transition to a cap-and-trade system. Such a transition would have involved a more comprehensive approach to carbon pricing amongst WCI members and helped to address EITE industries competing within these jurisdictions.

With the subsequent demise of a transition to a comprehensive cap-and-trade system, the EITE sectors in B.C. were left without an adequate policy framework to address competiveness (trade) impacts. While characterized as "revenue-neutral", the revenue-neutral provisions of the carbon tax provided only a small amount of tax relief relative to carbon tax payments paid by many industries, and did not effectively reduce their carbon tax compliance costs to a level comparable to that faced by competing jurisdictions. Over the past number of years, only modest adjustments have occurred to recognize the negative impact the B.C. carbon tax policy has on EITE sectors.

While some sectors had limited ability to absorb the cost of the carbon tax in times of higher commodity prices, the same cannot be said when prices are low, such as we see in today's environment. For example, the B.C. carbon tax as a percentage of overall costs, relative to the natural gas sales price, has increasingly grown and now exceeds all royalties paid by the natural gas industry to the Government of B.C. Within the B.C. cement manufacturing sector, the carbon tax burden actually exceeds the cost of purchasing fuel. During times of low commodity prices, the impacts of the carbon tax on capital allocation and investment decision-making become more pronounced. Even in higher commodity price environments, the carbon tax has had a distortive effect on capital allocation – which can exacerbate carbon leakage.

Therefore, we are pleased that following COP 21, both Premier Clark and Minister Polak confirmed that B.C.'s approach to Climate Action will be about reducing emissions, while also benefiting the economy and protecting jobs. We believe that this is best achieved through a market-based carbon-pricing approach that includes a fair and transparent mechanism to address unequal carbon policies across competing jurisdictions.

Moving forward, the EITE industry looks forward to resetting the discussion with the Province on designing an empirically supportive EITE policy framework that will provide much-needed regulatory and cost certainty for EITE industries wanting to maintain and expand investment in B.C.

RECOMMENDATION FOUR: The design of the carbon pricing mechanism should be achievable within the context of a growing and transitioning lower carbon economy and include principles to ensure fairness, predictability and competitiveness.

In designing the 2016 Climate Action Plan, we recommend that government develop a framework that will achieve GHG emissions reductions while protecting jobs and improve the competitiveness in EITE sectors based on the following principles:

- ***Fair and transparent***, creating tax fairness and equity across competing jurisdictions.

- ***D*ata *driven***, underpinned by strong analyses and a firm understanding of the implications in practice.
- ***Clear, predictable and simple to administer***, with clear and established processes for review and withdrawal.
- ***Cost-efficient***, fully offsetting the difference in carbon price that exists between jurisdictions.
- ***Balanced and efficient***, recognizing the totality of emissions policies on industry.
- ***Viable*, with readily available compliance pathways** that support open market mechanisms.
- ***Consistent with developing B.C.'s industries***, achievable within the context of a growing and transitioning lower carbon economy.
- ***Recognizes the risk of carbon leakage***, and that B.C. is currently a world leader in carbon price and industry emissions regulations.
- ***Does not further disadvantage B.C's. EITE industries***, in existing, emerging North American and international markets.

RECOMMENDATION FIVE: During the transition period to a lower carbon economy, reward early action and support clean technology through fiscal policies enabling EITE industries to complete clean tech research, development and demonstration, resulting in Canadian EITE competitiveness and innovation for export globally.

Breakthrough innovation requires fundamental research be undertaken in partnership with academic institutions, industry, the innovation and clean technology sectors and governments. During the transition period to a lower carbon economy, we recommend that government continue to support clean tech through fiscal policies enabling EITE industry to complete clean tech research, development, demonstration and adoption resulting in Canadian EITE competitiveness and innovation for export globally.

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Gary C. Weilinger
VP External Relations

April 20, 2016

Honourable Mary Polak
Climate Leadership Consultation
Ministry of Environment Climate Action Secretariat
PO BOX 9486, STN PROV GOVT.
Victoria B.C. V8W 9W6

Dear Minister Polak

Spectra Energy appreciates the opportunity to submit comments in response to *Building B.C.'s Climate Leadership Plan.* We are encouraged the Ministry of Environment has been keenly focused on advancing constructive policies to advance the Province's long-term economic security and competitiveness, while also addressing the challenges of global climate change.

As one of North America's premier pipeline and midstream infrastructure companies, Spectra Energy has significant insight into the North American natural gas sector. Our operations – across 30 states and 7 Canadian provinces – include more than 33,600 kilometers of natural gas, natural gas liquids, and crude oil pipelines, approximately 300 billion cubic feet of natural gas storage, 4.8 million barrels of crude oil storage; as well as natural gas gathering, processing, and local distribution operations.

As we think about greenhouse gas policy options, practical policies should be simple to administer, efficient and equitable, and drive market-based investment in low-carbon technologies and future infrastructure. I want to outline several opportunities during this consultation process Spectra Energy believes will ensure British Columbia continues to profit from the many environmental, energy security and economic benefits afforded by a world-scale supply of clean-burning natural gas.

Spectra Energy in British Columbia
Spectra Energy has been operating in British Columbia for almost 60 years. Our pipeline business is the backbone of B.C.'s natural gas industry, transporting 60 percent of the gas produced in B.C., with significant growth underway. B.C. is self-sufficient in meeting its own natural gas supply requirements, and our integrated natural gas gathering, processing and transportation system ensures safe and reliable access to B.C. natural gas resources which, in turn, also supply approximately 50 percent of the natural gas demand in the U.S. Pacific Northwest. When combining our natural gas infrastructure in B.C. in the gathering, processing, and pipeline transmission sectors, approximately 70% of all natural gas in B.C. currently touches some part of our system.

Our ability to compete outside of B.C. and in U.S. markets is a function of being interconnected with the North American pipeline grid; however, competition from U.S. supply sources is increasing significantly. As a result, limiting our business competitiveness with increases on

carbon tax will further undermine the future contributions we can make to the British Columbia economy.

Our Commitment to Emissions Reductions

Since the mid-1990s, Spectra Energy's Western Canadian business unit has incorporated carbon capture and sequestration (CCS) and acid gas re-injection (AGR) into our natural gas processing facilities in B.C. and Alberta and we have been recognized by the United Nations Intergovernmental Panel on Climate Change as a world leader in CCS. Today, Spectra Energy's CCS/AGR facilities in Western Canada continue to safely capture and store CO_2 as part of our ongoing operations; however, the proposed Fort Nelson CCS project (with the potential to store approximately 2.2 million tonnes of CO_2 per year) remains uncertain. We continue to preserve the opportunity to advance this project should there be a return to natural gas development in the Horn River Basin. Most importantly however, the necessary policy framework within B.C. and competing jurisdictions to recognize the value of permanent CO_2 sequestration by placing a price on carbon and carbon offsets needs to be advanced.

As we strive to continuously improve our operations, Spectra Energy greenhouse gas emissions per unit throughput of natural gas continues to decrease in British Columbia. This is mainly due to the decrease of vented sweet natural gas from compressor starts, pipeline segment blowdowns and emergency blowdowns. Spectra Energy considers portable incineration as part of current operational practice for pipeline blowdown and vented gas from pipelines, and will continue to explore opportunities to reduce our carbon footprint. Spectra Energy's longstanding values and commitment to the environment are recognized through our inclusion in the Dow Jones Sustainability World and North America Indexes as well as the CDP's S&P 500 Climate Performance Leadership Index, and a number of other leading ESG indexes.

With respect to the *Consultation Guide: Building B.C.'s Climate Leadership Plan* under consideration, Spectra Energy endorses and incorporates by reference the comments submitted by the Canadian Association of Petroleum Producers (CAPP). Spectra Energy's comments are being provided as a supplement to CAPP's responses to highlight issues of particular interest to Spectra Energy and our customers.

Our Position on Climate Change

We appreciate that balancing fair and equitable energy policies is challenging. A diversified energy policy requires financial investment, skilled labor, and technical innovation. As natural gas is significantly less carbon intensive than other fossil fuels, it is a critical part of the solution to providing the energy our economies require now and in the future. An effective climate change program should recognize the positive role of natural gas in a carbon-constrained economy as a reliable, domestically abundant and cleaner alternative to other fuels. We support the growth of renewable energy. Unfortunately, the sun doesn't always shine and the wind doesn't always blow, so natural gas will continue to fill that void.

An effective climate change program should allow for the likelihood that those companies helping to meet growing demand by producing, processing and transporting more natural gas may increase their direct emissions while serving to reduce overall regional and national emissions, thereby providing a net benefit to the environment. With that economic and environmental balance as a foundation, we would like to share our perspective on climate change policy and principles to support these initiatives.

Keeping in mind British Columbia's leadership position on efforts to address climate change, ultimately Spectra Energy would like to see greater North American collaboration on a continental climate change program over an assortment of state, provincial and regional

measures. We believe this is best achieved by allowing other jurisdictions to "catch-up" with British Columbia, and having the federal government harmonize to ensure a level playing field in British Columbia, and – together with its counterparts in the United States – across the continent.

We believe that any new initiatives at the federal or provincial level should take into account British Columbia's significant progress to date, as well as focus on encouraging increased efficiency, technological innovation and energy conservation. This includes:

• Implement programs and requirements gradually and in conjunction with existing energy regulatory frameworks to avoid undue economic dislocations, leakage or industry movement to unregulated regions;
• Utilize existing, established and approved greenhouse gas quantification and reporting methodologies, particularly those accepted in current mandatory government reporting;
• Support development of a variety of technologies to increase efficiency of end-use consumption;
• Provide certainty about costs of compliance, preferably through a simple, efficient, revenue-neutral carbon tax;
• Although a revenue-neutral carbon tax is the preferred policy approach, a cap-and-trade scheme could prove workable as a primary regulatory mechanism, if the program includes a price cap on allowance prices, recognizes offsets – as long as they are real, quantified, verified, surplus and have clear ownership – as an important tool to encourage lower cost emission reductions; and supports development and investment in carbon capture and storage projects, providing incentives, such as bonus carbon allowances.

Reducing Methane Emissions

Undoubtedly, there is a critical need for more current data and analysis on methane emissions. It is important to understand the sources of methane emissions, how and why methane may be released from gathering, processing and transmission activities including combusted, fugitive, vented and flared sources and how those emissions are measured and reported, and the limitations of current data and reporting requirements. We want to outline a few opportunities Spectra Energy believes will continue the downward trend in methane emissions from natural gas transmission, and gathering and processing facilities.

Over the last five years we have invested $900 million in infrastructure maintenance within B.C., including compressor upgrades, enhanced leak detection and repair, and reduced venting. Emissions reductions are being achieved as a result of industry innovation and voluntary measures. Research has shown that identifying and repairing the *largest* leaks can result in meaningful reductions while avoiding low-yield projects that are costly and disruptive to daily natural gas market activity. Typically, a small number of leaks (less than 10 percent of the total) account for a large percentage (greater than 80 percent) of emissions. This focused approach, typically referred to as Directed Inspection and Maintenance (DI&M), is a derivative of conventional leak detection and repair (LDAR) programs, with DI&M providing similar reductions at lower cost. It is important not to undermine the industry's competitiveness to achieve less than meaningful greenhouse gas reductions.

We are industry leaders in CCS ready projects and based on our experience, we believe CCS holds promise in providing a safe, effective means for reducing greenhouse gases and addressing climate change. To be clear, there remain significant technical and policy challenges facing this nascent technology. While CCS is recognized as a potentially critical tool in the mitigation of greenhouse gas emissions and climate change, a regulatory framework and carbon policy that recognizes the ability to generate carbon offsets which are marketable outside of B.C. to

incentivize investment in large-scale CCS have yet to be defined, creating significant risk and discouraging continued private investment to develop and deploy this technology.

Electrification

As B.C. is a competitive marketplace, Spectra Energy completes necessary analysis (natural gas vs. electricity) on all new infrastructure to ensure the most cost-effective solutions are deployed. This considers a life-cycle approach to the investment in providing safe and reliable capacity to meet the needs of our customers. Without exception, natural gas continues to be the most affordable, accessible, reliable, and cost effective solution vs. electrification, particularly when factoring the associated transmission costs required in delivering the power (if available) when and where it is needed. It is also important to underscore that the existing electricity grid in B.C. does not provide the necessary levels of continuous supply and reliability that the natural gas system provides, and the market expects. Our natural gas infrastructure has built-in redundancy throughout the delivery system, whereas the B.C. Hydro transmission system does not.

It is also important to provide the necessary context as to the scale and scope of Spectra Energy's existing natural gas gathering, processing and transmission system in relation to an electrification alternative as well as the associated GHG emissions from combustion CO_2.

- The natural gas gathering, processing and transmission system operates independently from the B.C. power grid, with associated GHG emissions of approximately 5 million tonnes of CO_2 emissions (a combination of combustion CO_2, and CO_2 separated from raw natural gas through processing) annually.
- This system supplies 100% of the provincial natural gas demand, as well as 50% of the U.S. Pacific Northwest demand in Washington, Oregon, and Idaho.
- Self-generation of power and independence from the B.C. power grid ensures a high degree of system reliability, and also includes necessary redundancy in our energy delivery systems.
- There are natural gas compressors along the B.C. Pipeline from Fort Nelson to Huntington deploying approximately 600,000 horsepower, the energy equivalent of approximately 450 megawatts of electricity. In addition, when adding the energy required to gather and process raw natural gas, there would be an additional 200-250 megawatts required if those facilities were to be electrified.
- The Spectra Energy electricity demand within B.C. at approximately 600-650 megawatts would be the equivalent of 60% of the planned power output of the Site C project currently in development and the equivalent capital cost; considering the cost of conversion of existing facilities, as well as the construction of high voltage transmission lines throughout B.C. to connect these facilities which span the province from the 60th parallel to the U.S. border (typically in exceptionally remote locations.) Given there is no hydro-electric capacity in B.C. to supply this hypothetical demand, there is also no scenario in which a conversion to electricity would be economic while at the same time retaining competitiveness of B.C. natural gas vs. other North American producing regions.

Spectra Energy will continue to ensure that all options are considered in the development of new infrastructure, and will look forward to working with industry, B.C. Hydro, and the Ministry of Energy in exploring new options for electrification as new infrastructure opportunities evolve.

Maintaining Competitiveness

B.C. has a massive supply of stranded natural gas that can be utilized across global markets as economies transition to lower carbon energy sources. Earlier this year we announced $1.2 billion in capital investment in our B.C. pipeline business to serve both domestic and export markets. This is our commitment to more jobs for British Columbians and investment back into our communities in which we live and work.

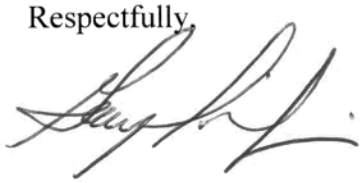
British Columbia is well-positioned to play a lead role in advancing the tremendous liquefied natural gas (LNG) opportunities before us. We are very interested in maintaining the competitiveness of our vast natural gas supply to support the province's interest in exporting LNG. Our concerns are about industries, such as ours, that are exposed to export markets where their competitors do not have to pay a price on carbon.

While we support the theory behind a revenue-neutral carbon tax, in 2015 Spectra Energy (doing business as Westcoast Energy Inc.) paid $80 million dollars in B.C. Carbon Tax on behalf of those who utilize our system. If we add property, corporate, PST and carbon tax we are one of the largest taxpayers in the province. Increasing the cost burden on our sector will have a devastating impact on an industry that is currently struggling in this low commodity price environment.

Conclusion

We appreciate being part of this important dialogue you have fostered with various stakeholders. Our investment has a tremendous impact on jobs and the economy, and has proven to play a critical role in facilitating growth in our sector for the past 60 years. As the Members of the Cabinet Committee on Climate Leadership continues to develop the provincial Climate Action Plan, it is critical to understand the rippling economic implications to the pipeline and midstream industry, and ultimately the delivered cost of energy to consumers.

Respectfully,



Gary Weilinger

Honourable Rich Coleman, Minister of Natural Gas Development and Minister Responsible for Housing and Deputy Premier
Honourable Bill Bennett, Minister of Energy and Mines and Minister Responsible for Core Review
Honourable Shirley Bond, Minister of Jobs, Tourism and Skills Training and Responsible for Labour
Honourable Michael de Jong, Minister of Finance

Fuels Strat Dept Meeting Date 19/3/15.

* Brian Ahearn, Canadian Fuels.
* Carolyn Teske, Imperial
* Dave Shade, Chevron
* Andrei de Bien, Husky
* Mike Suncor.
* Don Marcus, Suncor
* Cheryl, Husky.

* CFA has approached Kyoto from 'Kyoto reconnect' pers. & then put these against CLT.

* References to fuel switching

EITE - non-Canada is a net exporter but mainly from E. Canada not W.
- Western Canada did not see balanced
- ... depends on 'diversity' refinery whether it is trade exposed
- Refiners with ports are not exposed but also need to consider inter province exposure.

* Chevron - absence of EITE language in CT regime is a problem. - Solomon Stenhouse
CFA - suggesting a mechanism for EITE.

CT for fuel type delayed in Ont & QC. Fuel is more administratively difficult to

- California has it now.

- Suggesting we introduce peer standard over by [illegible] early pay it on emission above that level or buy credits.

- Don't feel comfortable with CAT recommend in LCFS
  - nor comfortable with MEM 2014 review

- Conference board of Canada suggested can achieve 12% red° than 2025

BCUC Consultation

Date 17/3/16

Doug Chong
Christine
Todd - infrastructure
- rates

⇒ Does Rec 12 on Clean Energy Act - should it incl. Fortis Elec? Doesn't exist
→ FEI are thinking about bringing forward Clean Energy Act → how would this fit with new clean elec tgts

→ Need to think about cogen wrt #12 too
- cogen are N.G. generally
→ BCUC suggesting overall #12 needs to be broadly thought thru

#13 - Is govt looking here at policy for BCUC to implement or for spec outcomes?
→ If spec outcomes be clear or this
→ To have a remote commenter regime that applies to BCHydro → could apply this to FEI or other
- GCRR doesn't apply to spec utility

#14 - again is govt going to direct the commission or ~~give~~ set an outcome

Page

FORTIS BC CONSULTATION Date 17/3/16

* Want bromethane to be 0 rated for CT
* Want to avoid 'double counting' where LSTC rebates ↑ rates then pay CT on ↑ rates
* ↳ want to expand RNG bill credit to other clean energy activities

* Want programs not tax ∴ of price-inelasticity
  ↳ think it drives ↓ GHG better.

* Proposing a RPA for RNG

A * Email folks my contact details.
  - terminology re RNG "upstream & fugitives" wrt to the agric or landfill methane.

* TES - learn what they are saying
* FAES -
  ↳ explore re-integrate "by this time"

* Is an RNG app around co-gen or #12 or 100% clean energy

Page

BC Bioenergy Network Date 18/3/16

* Michael Weedon / Darren Frew – BCBN.
* Paul, Michael, Les

- Have already submitted last yr & this yr
- Think CT has helped bring emissions down
- Think tgts are important : gives private sector & researchers an mkt to go after
- Built envt – need to Δ them regnt – many communities engaged in Charter has been trying hard.
- Thinks there is lots of opportunity in waste-2-energy saves money & ↓ GHGs

Page

PNG Const.

Date 29/3/16

* Agrees with resetting 2020 & happy at specifics with sectoral tgts

* Pipeline running @ 25% capacity which makes CT Ts etc v challenging ∴ of higher $ rates. If pipeline full & $ rates 30% low than v impact.
Some customers already changing ∴ of P.

* In rural communities a fuel switching is to wood v than electricity
→ & goes in low efficiency fire open fireplaces

+ Minimal amount of DSM - could do v but big rate impact ∴ a small system
→ Interested in ted money to help
+ Concern over where electrical capacity would come from & impact of this.

→ has some biomethane options & other technical options to ↓ CT if could get funding rather than push rates ↑.

- RNG as a vehicle fuel v affordable unlike RNG for pipeline gas which is v expensive

Page

Date

- Rejig the ICE fund & ↑ its size & allow utilities ↑ access to it

& Create ↑ streamline processes for CNG buses b/t Mo Educ^ (school buses) & BC Transit

BRITISH COLUMBIA
Ministry of Environment

Climate Leadership Consultations Summary (by Ministry of Natural Gas Development)

Sector Consulted: Natural Gas value chain

Organizations: Canadian Association of Petroleum Producers, Canadian Energy Pipeline Association, BC LNG Alliance

Subject /Topic	Key Comments and Recommendations
1. Methane emissions	**Key Comments**: Industry is supportive of a methane emission reduction strategy that takes into consideration the many possible growth scenarios for natural gas in the Province. After 2 ½ months of discussions with government, a joint solution was developed that takes into consideration alignment with other Western Provinces and direction on methane emissions the Federal government is expected to take. The solution will form part of "Phase 1" of BC's Climate Leadership Plan **Recommendations/Suggestions**: A three stage proposed approach to methane emissions is recommended. For legacy infrastructure (pre-2014), a target of 45% reduction by 2025 will be established. For future infrastructure (2018 and beyond), industry standards will be created, ideally jointly with other Western Provinces. For the interim period (2014-2018), incentives to accelerate development will be offered in the form of royalty deductions and/or carbon offsets.
2. Electrification	**Key Comments**: Industry is supportive of incenting further electrification of upstream activities. A condition precedent is that the transmission infrastructure needs to be in place on time as once the technological option is made to go with natural gas versus electricity, there is no coming back, no matter what happens to the price of natural gas or carbon during the life of the facility. A second condition is that at this point, natural gas is much cheaper than electricity so industry has no business case to choose electrification **Recommendations/Suggestions:** Create a clear contractural obligation by which BC Hydro commits to having the transmission infrastructure in place on time OR, provide interim generation if delays occur. Get federal funding for infrastructure to support construction of transmission lines. Create a special electricity rate that is below the industrial rate when natural gas prices are below a certain threshold and above the industrial rate when natural gas prices are above a certain threshold. Explore additional use of carbon offsets or carbon tax credit tools to incent electrification.

Climate Leadership Consultations Summary (by Ministry of Natural Gas Development)

Sector Consulted: Natural Gas value chain

Organizations: Canadian Association of Petroleum Producers, Canadian Energy Pipeline Association, BC LNG Alliance

Subject /Topic	Key Comments and Recommendations
3. Carbon Pricing	**Key Comments**: BC's Carbon tax represents about 30% of the total government burden on natural gas upstream activities for a typical well. Because Carbon tax is not sensitive to commodity prices, that burden has grown considerably as natural gas prices declined. **Recommendations/Suggestions:** Further increases to the carbon tax are seen as a serious competitiveness threat to development. If government were to increase the carbon tax, industry requests to be "fully protected" from the increase. Industry is also interested in the definition of "Energy Intense/Trade Expose" for the purposes of carbon tax, and has provided extensive research on approaches in other jurisdictions.
4. Offsets	**Key Comments**: There is only one buyer in BC for carbon offsets – the Province. **Recommendations/Suggestions:** Expanding the offsets market to include other jurisdictions could create a more realistic market for carbon offsets where the laws of supply and demand determine the price of offsets.

Summary

- **Industry provided general principles they would like to see in a Climate Leadership Plan, including a clear message about the need to maintain/improve competitiveness, ensure compatibility with major trading and economic partners and support to long term capital investments.**

From:	Kapac de Frias, Martina E ENV:EX
To:	Rollheiser, Kate ENV:EX
Cc:	Scott, Heidi ENV:EX
Subject:	RE: Meeting Request - Cenovus Energy Inc.
Date:	Tuesday, October 13, 2015 12:04:00 PM

Is this confirmed? Also looks like I will need a meeting room set up for this pls ☺

From: Minister, ENV ENV:EX
Sent: Thursday, October 8, 2015 8:53 AM
To: Kapac de Frias, Martina E ENV:EX
Cc: Scott, Heidi ENV:EX
Subject: FW: Meeting Request - Cenovus Energy Inc.

Hey Martina,

Are you interested in meeting with these fellows?

Cheers,

Kate

From: Stone, Greg [mailto:Greg.Stone@cenovus.com]
Sent: Monday, October 5, 2015 10:48 AM
To: Minister, ENV ENV:EX
Subject: Meeting Request - Cenovus Energy Inc.

Hello,

I hope this email finds you well. My name is Greg Stone and I work for Cenovus Energy and I appreciate your office taking my call earlier today.

I am writing to enquire whether Martina Kapac de Frias would be available to meet on Wednesday October 21, 2015, with Cenovus Energy's Vice President of Government and Community Affairs, Jim Campbell, Cenovus's Senior Specialist, Government Affairs, Jordon Copping, and myself. We would like to briefly introduce Cenovus and how we develop our resources in Canada and advise Ms. Kapac de Frias of a new initiative we have undertaken with BC's clean-tech and innovation sectors. By way of brief introduction, a description of Cenovus Energy follows.

We are currently free from 11:00 on the 21st. I look forward to hearing from you and appreciate your consideration of this request.

Sincerely,

Greg

Cenovus Energy Inc. is a Canadian integrated oil company. It is committed to applying fresh, progressive thinking to safely and responsibly unlock energy resources the world needs. Operations include oil sands projects in northern Alberta which use specialized methods to drill and pump the oil to the surface and established natural gas and oil production in Alberta and Saskatchewan. The company also has 50% ownership in two U.S. refineries. Cenovus shares trade under the symbol CVE and are listed on the Toronto and New York stock exchanges. The company's enterprise value is approximately $19 billion. For more information, please visit cenovus.com.

Gregory W. Stone, DPhil.
Government Affairs | Environment and Corporate Affairs | Cenovus Energy Inc.
Direct 403.766.5726 | Mobile 403.992.1648 | Greg.Stone@Cenovus.com

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communication and any copies immediately. Thank you.
http://www.cenovus.com

From:	Kapac de Frias, Martina E ENV:EX
To:	Minister, ENV ENV:EX
Subject:	Re: 291818 Request to meet-Canadian Propane Association
Date:	Tuesday, November 3, 2015 4:28:22 PM

Go ahead -1/2 hour pls

On Nov 3, 2015, at 1:17 PM, Minister, ENV ENV:EX <ENV.Minister@gov.bc.ca> wrote:

> Should I set this one up? They just phoned to follow up today.
>
> **From:** Cynthia Waldmeier [mailto:cynthia@impactcanada.com]
> **Sent:** Thursday, October 15, 2015 12:57 PM
> **To:** Polak.MLA, Mary LASS:EX; Minister, ENV ENV:EX
> **Subject:** 291818 Request to meet-Canadian Propane Association
>
> Dear Minister Polak,
>
> I'm reaching out to you on behalf of the Canadian Propane Association (CPA), which has over 400 member companies located from coast-to-coast, many in British Columbia. Our industry employs over 23,000 Canadians and generates over $16 billion for the economy each year. Propane is a highly portable, clean burning and safe fuel that is sourced primarily from natural gas, and therefore shares its low-emission, clean burning properties. In British Columbia, supply is abundant and an expansive infrastructure exists to make it readily available and competitively priced.
>
> The propane industry understands the importance of sustainable energy for British Columbia. In this period of intense environmental concern, propane stands above most fuels and rivals the cleanest, while also offering great value. For almost 100 years, propane has played a key role in communities across the country and hundreds of thousands of Canadians rely on it as an energy solution for their homes, businesses, farms and fleets. Every year our sector invests in local economies through employment, purchases and taxes, and our companies have been working hard for decades to understand and exceed our customers' needs.
>
> The CPA's Executive Director, Senior Director of Public Affairs & Policy and Western Regional Manager will be Victoria meeting with policy officials on November 18th and would very much appreciate some of your time to speak further on how propane can play a key role in lowering emissions, continue to provide jobs and help grow the economy.
>
> I look forward to hearing from you.
>
> Best,
>
> Cynthia
> Cynthia Waldmeier
> Cynthia@impactcanada.com
> 613-233-8906

From:	Kapac de Frias, Martina E ENV:EX
To:	Polak, Mary ENV:EX
Cc:	Knudsen, Mark ENV:EX; Denniston, Tristan M MEM:EX
Subject:	FW: media request - BIV - C02 fugitive methane
Date:	Wednesday, November 25, 2015 1:04:00 PM
Importance:	High

For approval pls

Martina,

approved by Susanna and MNGD.

reporter: Nelson Bennett, Business In Vancouver

deadline: 3pm

request: BC climate action and GHG's.

suggested response:

1.An update on the climate action plan revision. Where does that process stand?

- BC's new Climate Leadership Plan is being assembled with the advice of the Climate Leadership Team, and through public consultation.

- The team was tasked to consider a broad range of actions across industrial, transportation and buildings sectors including new programs and policies to achieve our GHG reduction targets, and government's economic and resource objectives.

- Government is reviewing the Climate Leadership Team's recommendations, and will release a draft plan in December when British Columbians will have a second opportunity for review.

- B.C.'s new Climate Leadership Plan will be released in 2016.

2. Does it extend the carbon tax to upstream CO2 or fugitive methane?

It is premature to speculate what the final Climate Leadership Plan might include.

3. How many natural gas processing plants are there in B.C. and how many are already

doing CCS? (I understand Spectra Energy is one that is already doing CCS on some of it's plants). While we're at it, any idea how much CO2 these plants produce that are currently vented?

There are 103 natural gas processing plants in the province including eight small scale acid gas disposal operations. Acid gas is a mixture of hydrogen sulphide and carbon dioxide that is separated from the natural gas stream at a processing plant. Total injection in 2014 was approximately 83 million m3 of acid gas in those eight operations, (both H2S and CO2). Individual sites ranged from 5 to about 60 e3m3 per day. (E3m3 is 1000s of cubic meters.)

Amendments introduced by the Province on October 8, 2015 are the first steps to allow new carbon capture and storage projects to move forward in B.C.

Carbon capture and storage projects prevent CO2 emissions from being released into the atmosphere. They can help B.C. reach greenhouse gas reduction targets and maintain the highest standards for an environmentally responsible natural gas sector. Regulations will ensure CCS is safe and appropriate oversight is in place, and will address site selection, monitoring, long-term stewardship and liability.

There is broad international support for CCS, offering industry the ability to reduce emissions and meet stronger environmental standards.

We will continue to encourage industry to incorporate CCS into their plans for their BC-based projects.

CO2 emissions, including vented emissions for all reporting facilities in BC are available online (http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/industrial-facility-ghgs).

4. As I understand it, CCS for natural gas processing is comparatively easy (compared to doing it for oil sands or coal fired plants) because the CO2 is already being stripped out. But it is currently not economically viable for some operations, for a variety of reasons, one of which is that there is no price placed on vented CO2.

The cost for the capture component of CCS would be lower for a natural gas processing plant than, for example, a coal-fired power plant. Other costs, including transportation and storage would vary from project to project. Equally important as the costs for a CCS system is ensuring adequate geological storage sites. Incremental costs to produce natural gas in British Columbia also has an impact on the competitiveness of the BC natural gas sector, and the Province would have to take that impact into consideration.

Additional information on CCS in BC can be found online:

http://www2.gov.bc.ca/gov/content/industry/natural-gas-oil/responsible-oil-gas-development

If the carbon tax were to be extended to the upstream, and increased, I'm told that that would go some way to providing the economic incentive. The other alternative would simply put regulations in place saying all gas processing plants has to do CCS.

It is premature to speculate what the final Climate Leadership Plan might include.

From:	Kapac de Frias, Martina E ENV:EX
To:	Polak, Mary ENV:EX
Subject:	FW: media request - BIV - C02 fugitive methane
Date:	Wednesday, November 25, 2015 1:53:00 PM
Importance:	High

Revised for approval

From: Karn, David GCPE:EX
Sent: Wednesday, November 25, 2015 1:50 PM
To: Crebo, David GCPE:EX; Kapac de Frias, Martina E ENV:EX
Cc: Hudson, Kimberley GCPE:EX
Subject: Re: media request - BIV - C02 fugitive methane

Noted and revised below.

Sent from my BlackBerry 10 smartphone on the TELUS network.

From: Crebo, David GCPE:EX
Sent: Wednesday, November 25, 2015 1:41 PM
To: Karn, David GCPE:EX; Kapac de Frias, Martina E ENV:EX
Cc: Hudson, Kimberley GCPE:EX
Subject: RE: media request - BIV - C02 fugitive methane

Not using 'draft plan' anymore. 'Framework for Climate Leadership Plan' instead

---

From: Karn, David GCPE:EX
Sent: Wednesday, November 25, 2015 12:48 PM
To: Kapac de Frias, Martina E ENV:EX; Crebo, David GCPE:EX
Subject: RE: media request - BIV - C02 fugitive methane

Assume you refer to Q1 bullet 3.

Same was provided to National Observer yesterday.

From: Kapac de Frias, Martina E ENV:EX
Sent: Wednesday, November 25, 2015 12:39 PM
To: Crebo, David GCPE:EX; Karn, David GCPE:EX
Subject: FW: media request - BIV - C02 fugitive methane

Do we need to re jig – third bullet?

From: Karn, David GCPE:EX
Sent: Wednesday, November 25, 2015 10:48 AM
To: Kapac de Frias, Martina E ENV:EX
Cc: GCPE Communications - Environment; Laaksonen-Craig, Susanna ENV:EX; Shoemaker, Wes ENV:EX; Denniston, Tristan M ENV:EX; Woods, Emily GCPE:EX; Gordon, Matt GCPE:EX; Woolley, Paul GCPE:EX
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From: Polak, Mary ENV:EX
To: Kapac de Frias, Martina E ENV:EX
Subject: Re: media request - BIV - C02 fugitive methane
Date: Wednesday, November 25, 2015 1:56:58 PM

K - good to go

Sent from my iPad

On Nov 25, 2015, at 1:53 PM, "Kapac de Frias, Martina E ENV:EX" <Martina.KapacdeFrias@gov.bc.ca> wrote:

> Revised for approval
>
> **From:** Karn, David GCPE:EX
> **Sent:** Wednesday, November 25, 2015 1:50 PM
> **To:** Crebo, David GCPE:EX; Kapac de Frias, Martina E ENV:EX
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From:	Polak, Mary ENV:EX
To:	Crebo, David GCPE:EX
Cc:	Chin, Ben PREM:EX; Shoemaker, Wes ENV:EX
Subject:	Re: For Ben, Wes, MMP
Date:	Thursday, November 26, 2015 11:08:42 AM

I like that approach to the question. It's consistent with what PCC will be saying about next steps in the development of the final plan

Sent from my iPad

On Nov 26, 2015, at 11:01 AM, "Crebo, David GCPE:EX" <David.Crebo@gov.bc.ca> wrote:

> Yes, and I think the answer is that we'll sit down with industry to get their views? The CLT recommends lots of stuff – eliminate PST on electricity rates, innovation fund, and targeted support. Nothing is being ruled out at this point, but first we need to liaise directly with EITE sectors?
>
> **From:** Chin, Ben PREM:EX
> **Sent:** Thursday, November 26, 2015 10:56 AM
> **To:** Crebo, David GCPE:EX
> **Cc:** Polak, Mary ENV:EX; Shoemaker, Wes ENV:EX
> **Subject:** Re: For Ben, Wes, MMP
> I'm fine with that but we'll need an example of mitigations for EITE for q and a
>
> Ben Chin
> Executive Director
> Communications & Issues Mgmt
> Office of Premier Christy Clark
> Government of British Columbia
> 250-588-3113
>
> On Nov 26, 2015, at 10:49 AM, "Crebo, David GCPE:EX" <David.Crebo@gov.bc.ca> wrote:
>
> > Two slight changes in the NR I've been advised we should make, that I'll just share with you 3.
> > 1) From Susanna, re: our response to recs to lower emissions:
> > "Recommendation: The CLT recommends 2030 targets to reduce emissions across three broad sectors: Built Environment, Industry and Transportation by 40%, compared to 2007"
> > It should be "a target" (singular). The 40 percent reduction is a single, economy-wide target that's different from the 30-30-50 sectoral targets (from 2015 levels) that's one of the recs.
> > 2) from staff re: the BG about our climate leadership and recent actions we've taken. s.13,s.16
> > s.13,s.16

Any concerns with either of those edits?

Dave Crebo
Communications Director
Ministry of Environment
(250) 812-5747 - cell

From: Cadario, Michele PREM:EX <Michele.Cadario@gov.bc.ca>
Sent: Thursday, November 26, 2015 8:48 AM
To: Crebo, David GCPE:EX; Polak, Mary ENV:EX
Cc: Chin, Ben PREM:EX; Shoemaker, Wes ENV:EX; Kapac de Frias, Martina E ENV:EX
Subject: RE: Nov 25th final NR

With fresh eyes this morning, I have one last suggestion.
I think we may need to just clear up throughout the NR when we are talking about the government's plan versus the CLT plan – it gets confusing – such as in the first para – at the end BC Government's new CLP today.
And maybe its:
CLT Recommendation:
BC Government Response:
Michele

Michele Cadario
Deputy Chief of Staff to Premier Christy Clark

From: Crebo, David GCPE:EX
Sent: Wednesday, November 25, 2015 7:37 PM
To: Polak, Mary ENV:EX
Cc: Chin, Ben PREM:EX; Cadario, Michele PREM:EX; Shoemaker, Wes ENV:EX; Kapac de Frias, Martina E ENV:EX
Subject: Nov 25th final NR

Minister – this is the final version

Page 015 to/à Page 059

Withheld pursuant to/removed as

s.12;s.13

From:	Kapac de Frias, Martina E ENV:EX
To:	Karn, David GCPE:EX
Cc:	Crebo, David GCPE:EX
Subject:	FW: Canadian Propane Association - interview request for Minister Polak
Date:	Tuesday, January 26, 2016 11:52:00 AM
Attachments:	The Honourable Mary Polak_Q & A_January 2016.docx

I think this is for MMP – can you check?

From: Scott McFadyen [mailto:scottmcfadyen@propane.ca]
Sent: Tuesday, January 26, 2016 10:18 AM
To: Denniston, Tristan M EDUC:EX
Cc: Kapac de Frias, Martina E ENV:EX; Reeve, Soledad ENV:EX; Allan Murphy
Subject: Canadian Propane Association - interview request for Minister Polak

Dear Minister Bond,

The Canadian Propane Association (CPA) would like to interview you for our magazine Energized | Énergisé, and we have attached a list of proposed questions. ***Energized*** promotes the use of clean, safe, and reliable Canadian propane, and its role in reducing emissions and pollution. The magazine features news about propane industry activities, interviews with political decision-makers and regulatory updates affecting the propane sector.

Each issue of ***Energized*** is sent to thousands of subscribers in virtually every community in Canada. Our readership represents the entire propane supply chain, including equipment manufacturers, producers, transporters, refiners and local retailers. Past issues have featured interviews with former federal Natural Resources Minister Greg Rickford, former Alberta Energy Minster Ken Hughes, Ontario Minister Bob Chiarelli and B.C. Deputy Premier Rich Coleman.

You can view copies of ***Energized*** via the link above or by visiting our website at www.propane.ca and clicking on the Media & Resources tab.

The interview would be structured through a list of questions submitted to you as attached, and you can reply in writing back to scottmcfadyen@propane.ca.

If possible, could your office respond by Friday, February 12, 2016? If you require any further background, please do not hesitate to contact me.

Best regards,

Scott McFadyen
Regional Manager, West | Gestionnaire regional ouest
Canadian Propane Association | Association canadienne du propane
81 Garry Street, Unit 62
Winnipeg, MB R3C 4J9
Winnipeg cell: 204.930.3665
Calgary number : 403.543.6505
scottmcfadyen@propane.ca
www.propane.ca
Twitter: @CanadaPropane



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If you no longer wish to recieve electronic communications from the Canadian Propane Association, click this link to send us an email: UNSUBSCRIBE or send us an email at info@propane.ca. If you have questions about the Canadian Propane Association, please visit www.propane.ca.

Si vous ne désirez plus recevoir de communications électroniques de la part de l'Association canadienne du propane, vous pouvez nous faire parvenir une requête par courriel en cliquant sur le lien suivant : DÉSABONNEZ-MOI ou en nous faisant parvenir un courriel à

l'adresse info@propane.ca. Si vous avez des questions au sujet de l'Association canadienne du propane, visitez le www.propane.ca.

From:	Kapac de Frias, Martina E ENV:EX
To:	Carr, Michelle EAO:EX
Cc:	Knudsen, Mark ENV:EX; Scott, Heidi ENV:EX
Subject:	Re: Meeting Request from Woodside Energy for Minister Polak
Date:	Wednesday, February 10, 2016 2:47:48 PM

Thanks!

> On Feb 10, 2016, at 2:18 PM, Carr, Michelle EAO:EX <Michelle.Carr@gov.bc.ca> wrote:
>
> My apologies. I thought I had responded. Obviously I didn't!
>
> I don't have any concerns. We will send over an updated IN.
>
> -----Original Message-----
> From: Kapac de Frias, Martina E ENV:EX
> Sent: Wednesday, February 10, 2016 2:16 PM
> To: Carr, Michelle EAO:EX
> Cc: Knudsen, Mark ENV:EX; Scott, Heidi ENV:EX
> Subject: RE: Meeting Request from Woodside Energy for Minister Polak
> Importance: High
>
> HI Michelle - do you have any info? Thanks, M
>
> -----Original Message-----
> From: Kapac de Frias, Martina E ENV:EX
> Sent: Tuesday, February 9, 2016 9:16 AM
> To: Carr, Michelle EAO:EX
> Cc: Knudsen, Mark ENV:EX; Scott, Heidi ENV:EX
> Subject: Meeting Request from Woodside Energy for Minister Polak
>
> Michelle,
>
> Your advice on this meeting request below?
>
>
>
> Representatives from Woodside Energy will be in Victoria on the morning of Monday February 22nd. We are wondering if Minister Polak has any time for a meeting with them? Woodside would like to update the Minister on their ongoing BC activities.
>
>
> Woodside Energy is Australia's largest independent oil and gas company. Woodside has operated their landmark Australian project, the North West Shelf, for 28 years and it remains one of the world's premier liquefied natural gas facilities. With the successful start-up of the Pluto LNG Plant in 2012, Woodside now operates six of the seven LNG processing trains in Australia, helping to meet the demand for cleaner energy from pipeline customers in Australia and LNG customers in the Asia Pacific region and beyond. Here in B.C., Woodside has a sole proponent agreement with the Province of British Columbia for a piece of land at Grassy Point and is a partner with Chevron Canada in the Kitimat LNG Project.
>
>
> Attending from Woodside will be:
>

> Greg Rodar, Executive Vice President, Business Development and Growth
>
> Mike Scott, Vice President, Strategic Business Development & Growth
>
> Natalie Poole-Moffat, Head of Corporate Affairs Canada
>
>

Q & A with the Honourable Mary Polak
B.C.'s Minister of the Environment

The CPA reached out to the Minister for her thoughts on the opportunities that exist for the propane industry to contribute to British Columbia's environmental goals and help meet emissions targets.

1. What thoughts come to mind when you hear the word propane? Do you associate propane with anything in particular?

2. British Columbia is at the forefront of combatting climate change and has shown great leadership in terms of tangible and practical solutions to reducing emissions and pollution. Do you have any thoughts on how propane can assist British Columbia and Canada in meeting its emissions targets?

3. You interact with many stakeholders that play a role in environmental policy development. What steps can the Canadian Propane Association take to more effectively promote propane to provincial environment ministries?

4. Propane is a low-emission, efficient and affordable energy source, and because of its portability, is available in every corner of British Columbia. For many communities in British Columbia, and across Canada, propane is replacing diesel in mining and other resource development activities. This reduces the impact of brownfields and lowers emissions. How can industry and government continue to work together to develop the resources of British Columbia in a sustainable way?

5. Propane is recognized by the B.C. Ministry of Energy & Mines as a low carbon fuel for transportation, it has a lower carbon footprint than traditional fuels, and is sourced primarily from natural gas, therefore sharing its low-emission, clean burning properties. Do you have any advice for the propane industry on how to leverage this advantage and assist the British Columbia government with meeting and surpassing emissions targets?

From:	Kapac de Frias, Martina E ENV:EX
To:	Morrison, Geoff
Subject:	Re: Letter regarding carbon taxation of non-combusted f natural gas and pneumatics
Date:	Friday, February 19, 2016 4:08:45 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png

---

Thanks Geoff. M

On Feb 17, 2016, at 9:05 PM, Morrison, Geoff <geoff.morrison@capp.ca> wrote:

> Hello Martina
> Apologies, for not engaging and giving you a heads-up on this letter previously; it mainly a carbon tax issue which caught the upstream natural gas industry a bit by surprise in December. We've been engaged with Mof and MNDG. Minister Polak was CC'd on the letter as it may relate to how methane may be managed in the future under an updated climate action plan. I believe CAS is well aware of the issue. There is both a financial impact and a point of principle in regard to the application of carbon tax for uncombusted natural gas. Regardless of the financial impact the issue has really struck a chord across CAPP's membership.
> We'll continue to engage with the ministries of MNGD, MoF and CAS to seek a path forward. I would be happy to discuss the matter further if you have any concerns or questions.
> Geoff
> Geoff Morrison | Manager of British Columbia Operations
> Victoria: 778.410.5040 | Cell: 250.634.4010| Calgary: 403.776.1409
>
> **From:** Morrison, Geoff
> **Sent:** Wednesday, February 17, 2016 4:56 PM
> **To:** 'kim.henderson@gov.bc.ca'; 'Nikolejsin, Dave MEM:EX'; Shoemaker, Wes ENV:EX; Athana Mentzelopoulos (athana.mentzelopoulos@gov.bc.ca)
> **Cc:** Inés Piccinino (Ines.Piccinino@gov.bc.ca); 'Susanna Laaksonen-Craig PhD (susanna.laaksonencraig@gov.bc.ca)'; Tim Lesiuk (tim.lesiuk@gov.bc.ca); Paul.Flanagan@gov.bc.ca
> **Subject:** Letter regarding carbon taxation of non-combusted f natural gas and pneumatics
> Dear Deputy Ministers:
> Please find attached a copy of a letter from CAPP (Feb 3, 2016) to Minister de Jong outlining the upstream natural gas industry's concern with respect to the Carbon Tax Bulletin (MTF-CT 001) which was updated and posted on December 17, 2015. As you know the revised bulletin created significant discussion when it was released. I hope you find the letter clear. Its main points are that the upstream industry is emissions-intensive-and-trade-exposed (EITE) and that CAPP and its members are currently constructively engaged with the B.C. government to finds ways to better manage and reduce methane emissions. CAPP believes the application of a carbon tax on non-combusted gas associated with pneumatic devices negatively impacts the competitiveness of the upstream natural gas industry, which is EITE, and is a sub-

optimal approach to finding meaningful methane emission reductions in the upstream industry. We hope Minister de Jong will consider our request and we look forward to our mutual ongoing efforts to find competitive means to reduce emissions and achieving the goals of the Jobs Plan, and the Natural Gas and LNG Strategies.
Please feel free to contact me with any questions or discussion. Apologies for not getting this letter to you more promptly.
Regards;
Geoff Morrison

Geoff Morrison | Manager of British Columbia Operations
Victoria: 778.410.5040 | Cell: 250.634.4010| Calgary: 403.776.1409 | Website: www.capp.ca

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From:	Carole Brownlees on behalf of Chris Bloomer
To:	Kapac de Frias, Martina E ENV:EX
Subject:	Pipelines are Safe and Reliable - But the Industry Needs Clarity on Policies and Processes
Date:	Friday, February 26, 2016 4:23:17 PM
Attachments:	image001.png Final op-ed _Feb 17_2016.pdf

Martina

Attached is a copy of an editorial that will run in tomorrow's Globe and Mail subject to slight editorial adjustments. We believe this highlights some important considerations in the current regulatory debate surrounding pipeline development in Canada and hope the messages are well received. Happy to discuss further should you wish.

Chris

Chris Bloomer
President and CEO
Canadian Energy Pipeline Association
Suite 200, 505–3rd St. SW
Calgary, Alberta, T2P 3E6
Phone 587-293-2972
Cell 403-605-1611
Fax 403-221-8760
cbloomer@cepa.com

aboutpipelines.com

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From:	Polak, Mary ENV:EX
To:	Shiff, Alexander ENV:EX
Subject:	Fwd: Meeting thanks
Date:	Monday, March 14, 2016 10:34:48 AM

for correspondence

Sent from my iPad

Begin forwarded message:

From: "Roder, Greg" <GREG.RODER@woodside.com.au>
Date: March 10, 2016 at 7:32:40 PM PST
To: "Mary.Polak@gov.bc.ca" <Mary.Polak@gov.bc.ca>
Cc: "Poole-Moffatt, Natalie" <NATALIE.POOLE-MOFFATT@woodside.com.au>, "Scott, Mike" <MIKE.SCOTT@woodside.com.au>
Subject: Meeting thanks

Dear Minister Polak,

On behalf of Woodside Energy, I would like to thank you for taking the time to meet with us on Monday 22nd February. The time you spent with us and your comments were very much appreciated. I know your role is busy and demanding, so I do appreciate you making the time to see us.

As I think you are aware, Woodside Energy is Australia's largest and most experienced independent natural gas company. Canada, of course, has large, proven natural gas reserves and under-developed gas export infrastructure. Woodside sees Canada as a stable investment market where we could grow our natural gas portfolio while developing a nascent industry and providing tax revenues as well as creating jobs.

Woodside Energy is a world-class leader in sustainable energy development. We will continue to minimize our footprint by integrating world-class environmental management into the design, construction and operation of our facilities. Woodside Energy has also taken the time in Australia to develop a deep appreciation of the sensitive environments in which we operate, as well as working on strong relationships with the Indigenous communities. We appreciate the need to understand the Canadian environment and the views of the First Nations – parts of our work which we believe are critical.

We look forward to bringing the benefit of our experience to Canada – and learning how best to apply that experience and skill set to the Canadian environment. We aim to continue to develop a positive relationship with your government over the coming years and, again, appreciate the time you have given us in this regard.

Sincerely,

Greg Roder
Executive Vice President
Business Development & Growth
Woodside Energy Ltd.

Woodside Plaza

240 St Georges Terrace

Perth WA 6000

Australia

T: +61 8 9348 5230

M: +61 434 225 909

F: +61 8 9226 3552

E: greg.roder@woodside.com.au

Personal Assistant : Katy Armstrong : katy.armstrong@woodside.com.au ; T +61 8 9348 7189

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From:	Kapac de Frias, Martina E ENV:EX
To:	Scott, Heidi ENV:EX
Subject:	FW: Speaker Invitation for Minister Polak
Date:	Monday, April 11, 2016 1:24:00 PM
Attachments:	A5139C60-A149-4D80-AB30-27F279E3AE47[2].png general_brochure_EC2016.pdf

---

Pls seek advice from staff on this request –thanks, M

From: Jessica McIlroy [mailto:jessica.mcilroy@bcsea.org]
Sent: Monday, April 11, 2016 11:58 AM
To: Kapac de Frias, Martina E ENV:EX
Subject: Speaker Invitation for Minister Polak

Hi Martina,

I hope this finds you well. The BC Sustainable Energy Association is hosting an event in Vancouver on June 3rd called Energy Connections 2016. The purpose of the event is to provide BC citizens, community groups and small businesses with the information and connections needed to make choices and take action on clean energy. The themes are clean energy generation, energy efficiency and conservation, and low carbon transportation. The goal is to not just raise awareness and educate, but to really provide tools for people to make changes and be engaged in the province's energy and climate action.

We have three speakers joining us from the Ministry of Energy and Mines, and we have generously received sponsorship support through the team in Electricity and Alternative Energy. We are also working with the Climate Action Secretariat to see if they can provide an update on the Climate Leadership Plan. We would like to invite Minister Polak to join us, and speak as a keynote in the closing reception, to provide some greater depth on the support and actions on sustainable energy at the Province.

I've attached an event brochure, and more information on the event can be found on the event website. If you have any questions regarding Energy Connections please let me know. We hope to be able to welcome Minister Polak to the event.

Best,

Jessica McIlroy | *Programs Manager*
1 (604) 992-6462 | jessica.mcilroy@bcsea.org
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Page 071 to/à Page 072

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From:	Kapac de Frias, Martina E ENV:EX
To:	"Jessica McIlroy"
Cc:	Scott, Heidi ENV:EX
Subject:	RE: Speaker Invitation for Minister Polak
Date:	Monday, April 11, 2016 1:26:00 PM
Attachments:	image001.png

Jessica,

Thank you for your email, hope you are well.

Thank you for the invitation to speak, we will review the Minister's calendar and get back to you.

Cheers,

Martina

From: Jessica McIlroy [mailto:jessica.mcilroy@bcsea.org]
Sent: Monday, April 11, 2016 11:58 AM
To: Kapac de Frias, Martina E ENV:EX
Subject: Speaker Invitation for Minister Polak

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I hope this finds you well. The BC Sustainable Energy Association is hosting an event in Vancouver on June 3rd called Energy Connections 2016. The purpose of the event is to provide BC citizens, community groups and small businesses with the information and connections needed to make choices and take action on clean energy. The themes are clean energy generation, energy efficiency and conservation, and low carbon transportation. The goal is to not just raise awareness and educate, but to really provide tools for people to make changes and be engaged in the province's energy and climate action.

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Best,

Jessica McIlroy | *Programs Manager*
1 (604) 992-6462 | jessica.mcilroy@bcsea.org
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From:	Kapac de Frias, Martina E ENV:EX
To:	Scott, Heidi ENV:EX
Subject:	FW: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers
Date:	Monday, April 11, 2016 3:27:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png Microsoft Word - CAPP_EDMS-#279029-v18-DRAFT_submission_to_BC_regarding_....pdf

For meeting file pls ☺ thanks!

From: Morrison, Geoff [mailto:geoff.morrison@capp.ca]
Sent: Monday, April 11, 2016 3:26 PM
To: Minister, ENV ENV:EX
Cc: Kapac de Frias, Martina E ENV:EX
Subject: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers

Dear Minister Polak:

I am writing to request a to review and discuss CAPP's feedback on the *Consultation Guide: Building B.C.'s Climate Leadership Plan* (please see attached document which was submitted April 8th, 2016). In addition to this feedback CAPP has been actively participating with government through the sectoral engagement process led by Deputy Minister Dave Nikolejsin at the Ministry of Natural Gas Development. CAPP would appreciate the opportunity to have a dialogue about our submission and the progress made during the sectoral engagement process. As the BC Government finalizes the development of its updated Climate Leadership Plan, CAPP believes it would be useful to have an opportunity to address any questions about the upstream industry's response. Furthermore, CAPP would like to highlight opportunities to reduce GHG through methane management programs, electrification and the importance of maintaining and enhancing competiveness to attract new investment for upstream development and potential LNG exports; creating jobs and developing BC's resources responsibly.

Attending the meeting from CAPP would be:

- Tim McMillian, CAPP President
- Michael Gatens, CAPP Chairman & CEO, Unconventional Gas Resources Canada
- Brad Herald, Vice President of Western Operations and
- myself, Geoff Morrison Manager of British Columbia Operations.

We are requesting a meeting on Monday May 16 in Victoria if possible. We will also be approaching other members of the *Cabinet Working Group on Climate Leadership* for meetings that same day.

Thank you for your consideration. Please contact me if you have any questions or need further information, my phone number in Victoria is (250) 634-4010.

Regards;

Geoff Morrison

Geoff Morrison | Manager of British Columbia Operations

CAPP CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers

| Cell: 250.634.4010| Calgary: 403.776.1409 | Website: www.capp.ca

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CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS

Canada's Oil and Natural Gas Producers

April 8, 2016

Honourable Mary Polak
Climate Leadership Consultation
Ministry of Environment Climate Action Secretariat
PO BOX 9486, STN PROV GOVT
Victoria B.C. V8W 9W6

via e-mail: climateleadershipplan@gov.bc.ca

Dear Minister Polak:

Re.: Feedback on BC's Climate Leadership Plan Consultation Guide

The Canadian Association of Petroleum Producers (CAPP) submits the following comments in response to the *Consultation Guide: Building B.C.'s Climate Leadership Plan*. CAPP appreciates the opportunity to provide our industry's perspective on addressing climate change in British Columbia as the province finalizes the development of the new Climate Leadership Plan.

It is clear that both generally and in the context of natural gas producing and LNG exporting jurisdictions that BC is a leader on carbon policy and addressing greenhouse gas (GHG) emissions. BC has a unique opportunity to help tackle global climate change by making LNG available to countries looking to move off of coal-fired power generation. We are firmly of the view that the economic benefits from responsible natural-gas production and export can be achieved while also meeting BC's ambitions to tackle global climate change.

CAPP supports a climate policy framework in British Columbia that creates a vibrant and competitive oil and gas sector while efficiently and effectively managing greenhouse gas emissions. To this end, CAPP provides the following key recommendations, aligned with the relevant sections of the Consultation Guide. These views remain consistent with CAPP's submission made to Government September 2015, in response to the Climate Leadership Plan Discussion Paper, which outlined the importance of competitiveness and supporting further emissions reductions opportunities for oil and gas, such as electrification and methane emissions reductions. [1]

What We Value: Protecting BC's Competitiveness & Minimizing Carbon Leakage

From a competitiveness standpoint, BC's upstream natural gas industry faces significant challenges due to a continued low commodity price environment coupled with the unique challenges associated

[1] https://engage.gov.bc.ca/climateleadership/files/2015/12/179_-Canadian-Association-of-Petroleum-Producers.pdf

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310, 1321 Blanshard Street
Victoria, British Columbia
Canada V8W 0B5
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Fax 778-410-5001

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with BC's resource plays. We recommend that the BC government consider how any climate policy initiatives undertaken by the province can not only preserve, but enhance the economic competitiveness of BC's upstream oil and gas sector to attract investment and create jobs. Carbon policy design requires full cost accounting of options when evaluating the cumulative burden across policies and regulations in order to prevent further deterioration of industry competitiveness and to minimize the risk of carbon leakage to competing jurisdictions. We offer the following carbon policy recommendation for how to minimize both carbon and investment leakage from BC.

Carbon Tax

The CLT recommended increases to the current $30/tonne carbon price commencing in 2018. Applying additional increases to our sector would further diminish competitiveness of the natural gas industry and increase the risk of carbon leakage to competing jurisdictions. Economic competitiveness is of paramount importance to ensure the industry is able to thrive, attract new investment, create jobs and generate revenues for government.

Emission-Intensive, Trade-Exposed (EITE)

CAPP strongly supports the efforts of the Government of BC to protect EITE industries. On November 27, 2015, Minister Polak stated that the province would only consider changes to its carbon tax under a regime where EITE industries are "fully protected from any carbon tax increase."

CAPP fully supports the government's position to protect EITE industries, and believes the upstream industry clearly qualifies as an EITE industry.

Given BC's strong leadership on carbon pricing, applying further increases in BC's carbon price to our sector without full protection would further impair the competitiveness of the province's oil and gas sector, especially in the current low price environment when operating margins are already suppressed. An EITE policy applied to carbon price increases would recognize the importance of managing inter-jurisdictional competitiveness, until the carbon policies in key trading jurisdictions are equivalent and/or aligned in level of effort and price. Additional policy principles are provided in the Appendix.

The Way We Work: GHG Emissions Reduction Opportunities

CAPP is looking forward to engaging with the B.C. government in the development of the province's Climate Leadership Plan to meaningfully address GHG emission from upstream oil and natural gas activities while enhancing the overall competiveness of the industry in British Columbia. The following section provides recommendations on key emissions reductions opportunities from our industry.

Electrification

The consultation guide references the Climate Leadership Team's recommendation 14 to supply clean electricity for the electrification of the upstream industry in a competitive and timely manner.

CAPP believes competitive electrification of the upstream will help BC move toward its provincial GHG reduction targets, representing a foremost opportunity for significant GHG mitigation for the oil and gas sector in BC. Based on our sector's experience, there exists two significant risks to competitive electrification: Reliable and timely in-service transmission capacity; and economic considerations related to rates and tariffs. Practical work is required by BC Hydro and government to work with our sector to align business processes and to find equitable means to balance risks.

Methane

In 2013, upstream oil and gas methane emissions accounted for approximately 20 per cent of BC's total methane emissions. CAPP is committed to making reductions to methane emissions and recommends the following, taking care that responses to each of these demonstrate leadership in seeking alignment with Canada, other provincial jurisdictions and, where appropriate, with competing jurisdictions like the US:

- Applying enhanced regulated standards to new facilities and a regulated standard of practice for leak detection and repair (LDAR) of fugitive equipment leaks; building on existing LDAR requirements.
- A market-based approach to achieve a specified reduction target using fiscal measures focused on reductions from legacy methane emissions sources installed at existing facilities.
- A specific reduction target for vented and fugitives sources at existing facilities that is ambitious yet achievable with the appropriate policy and fiscal mechanisms in place to provide industry with a pathway to achieve the specified reductions. In addition, this target should align appropriately with other provincial and federal goals, including Alberta's Climate Leadership Plan.

CAPP believes properly designed and prescribed programs will achieve greater reductions than those that would be achieved through a carbon tax approach, which increases operating costs and could discourage needed investment in BC. Consequently, CAPP does not at this time support recommendations to increase the rate or scope of the BC carbon tax, as applied to our sector, and believes that all uncombusted methane should be exempt from carbon tax to enable reductions using the market-based mechanisms above. For legacy assets, a market-based approach to achieving a specified methane emissions reduction target is critical to mitigate the costs of retro-fitting industry's inventory of existing equipment to lower emitting devices.

Fiscal Measures

To incent methane emissions reductions, and to incent greater uptake in electrification, a viable path forward hinges on the development of fiscal mechanisms to enable investment. Given the current competitiveness pressures on our sector (including the cost burden of the carbon tax), industry and government will need to work together on ways to improve the economic value of emission reduction projects. By doing so will contribute to more reductions being achieved.

The following fiscal measures should be considered further by the BC government for application by the industry to emissions reductions opportunities:

- *Offsets*: Could be achieved via BC government guaranteed/targeted purchase of offsets, to provide certainty around supply and price, and/or enabling linkages to other offset markets, to expand demand for BC offsets.
- *Carbon compliance certification*: Reduction in carbon tax payable based on emission reductions achieved.
- *Clean infrastructure royalty credit program*: Investing in innovation and technology will enable BC to reduce emissions while also creating and maintaining jobs. CAPP recommends that the province create a broad clean royalty infrastructure credit program that would support investments in infrastructure/technology to reduce methane emissions. A royalty credit program would contribute to investment economics supplemented by fiscal support through offsets or compliance certificates.

In conclusion, BC needs to find the balance so that it can be both a strong world leader in the fight against climate change and a more competitive place to invest in oil and gas. Climate policy should be designed to focus on targeted emissions reductions through enhanced technology investment and deployment, enable flexible compliance options and prioritize economic competitiveness in order to simultaneously enhance competiveness, attract new investment, while achieving the emissions performance objectives. Going forward industry and government will need to work together to achieve greater GHG reductions in a way that can support or enhance industry's competitiveness. We believe a significant opportunity does exist and can be supported by BC in its climate action plan by: designating EITE industries, supporting upstream electrification, and providing the fiscal mechanism that will enable methane emission reductions. CAPP is committed to working together to find ways to help achieve BC's emissions reduction targets while continuing to grow the economy.

Sincerely,

Brad Herald

Brad Herald
Vice-President, Western Canada

Cc: Hon. Rich Coleman, Minister of Natural Gas Development
Hon. Michael de Jong, Minister of Finance
Hon. Shirley Bond, Minister of Jobs, Tourism and Skills Training and Responsible for Labour
Hon. Todd Stone, Minister of Transportation and Infrastructure
Hon. Peter Fassbender, Minister of Community, Sport and Cultural Development and Responsible for TransLink

CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS

Canada's Oil and Natural Gas Producers

April 8, 2016

Appendix: Emission-Intensive, Trade-Exposed (EITE) Policy Design Principles

Currently, many different carbon management regimes around the world utilize an emission-intense trade-exposed (EITE) methodology to determine the need to protect industries competiveness and minimize carbon leakage under carbon pricing policies. The EITE designation serves to recognize those segments of the economy that represent a leakage risk, whereby investment could shift jurisdiction with less stringent carbon policies providing no gain in global GHG reductions but shrinking economic benefit for BC through loss of investment, jobs and government revenue.

CAPP has worked with industry associations along the natural gas value-chain in British Columbia to consider other jurisdictions' EITE methodologies and develop policy design principles for EITE. Through this effort, the following principles have been established and should be part of a BC mechanism for EITE determination:

- *Fair and transparent*, creating competitive parity across competing jurisdictions.
- *Science-based*, with a strong analyses and understanding of implications in practice.
- *Clear, predictable and simple to administer*, with clear and established processes for review of EITE protection.
- *Cost-efficient*, offsetting the difference in incremental carbon price that exists between competing jurisdictions.
- *Balanced and efficient*, recognizing the totality of emissions policies on industry.
- *Viable*, with readily available compliance pathways that support open market mechanisms.
- *Consistent with developing a clean LNG industry*, achievable within the context of a growing and transitioning lower carbon economy.
- *Recognizes the risk of carbon leakage*, and that BC is currently a world leader in carbon price and industry emissions regulations.
- *Does not disadvantage BC natural gas producers*, in existing North America markets and in emerging international markets.

Using these principles as a framework for EITE policy design, CAPP looks forward to working further with the BC government to further develop a BC solution to EITE determination and application.

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1000, 275 Slater Street
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Tel 613-288-2126
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1004, 235 Water Street
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Canada A1C 1B6
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Fax 709-724-4225

310, 1321 Blanshard Street
Victoria, British Columbia
Canada V8W 0B5
Tel 778-410-5000
Fax 778-410-5001

www.capp.ca • communication@capp.ca

From:	Kapac de Frias, Martina E ENV:EX
To:	Wallace-Deering, Eric MEM:EX
Cc:	Denniston, Tristan M MEM:EX; Knudsen, Mark ENV:EX
Subject:	RE: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers
Date:	Monday, April 11, 2016 4:52:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png

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Thanks Eric – Geoff sent over to us as well.

From: Wallace-Deering, Eric MEM:EX
Sent: Monday, April 11, 2016 4:49 PM
To: Kapac de Frias, Martina E ENV:EX
Cc: Denniston, Tristan M MEM:EX; Knudsen, Mark ENV:EX
Subject: FW: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers

FYI Martina

From: Morrison, Geoff [mailto:geoff.morrison@capp.ca]
Sent: Monday, April 11, 2016 3:27 PM
To: Minister, MEM MEM:EX
Cc: Wallace-Deering, Eric MEM:EX
Subject: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers

Dear Minister Bennett:

I am writing to request a to review and discuss CAPP's feedback on the *Consultation Guide: Building B.C.'s Climate Leadership Plan* (please see attached document which was submitted April 8th, 2016). In addition to this feedback CAPP has been actively participating with government through the sectoral engagement process led by Deputy Minister Dave Nikolejsin at the Ministry of Natural Gas Development. CAPP would appreciate the opportunity to have a dialogue about our submission and the progress made during the sectoral engagement process. As the BC Government finalizes the development of its updated Climate Leadership Plan, CAPP believes it would be useful to have an opportunity to address any questions about the upstream industry's response. Furthermore, CAPP would like to highlight opportunities to reduce GHG through methane management programs, electrification and the importance of maintaining and enhancing competiveness to attract new investment for upstream development and potential LNG exports; creating jobs and developing BC's resources responsibly.

Attending the meeting from CAPP would be:

- Tim McMillian, CAPP President
- Michael Gatens, CAPP Chairman & CEO, Unconventional Gas Resources Canada
- Brad Herald, Vice President of Western Operations and
- myself, Geoff Morrison Manager of British Columbia Operations.

We are requesting a meeting on Monday May 16 in Victoria if possible. We will also be approaching other members of the *Cabinet Working Group on Climate Leadership* for meetings that same day.

Thank you for your consideration. Please contact me if you have any questions or need further information, my phone number in Victoria is (250) 634-4010.

Regards;

Geoff Morrison

Geoff Morrison | Manager of British Columbia Operations

CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
Canada's Oil and Natural Gas Producers
| Cell: 250.634.4010| Calgary: 403.776.1409 | Website: www.capp.ca



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From:	Kapac de Frias, Martina E ENV:EX
To:	"Morrison, Geoff"
Cc:	Scott, Heidi ENV:EX
Subject:	RE: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers
Date:	Thursday, April 21, 2016 10:00:00 AM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png

---

Thanks Geoff – Heidi in our office will be getting back to you shortly.

From: Morrison, Geoff [mailto:geoff.morrison@capp.ca]
Sent: Thursday, April 21, 2016 9:38 AM
To: Kapac de Frias, Martina E ENV:EX
Subject: FW: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers

Hi Martina

Checking in on this meeting request to see if there is any update. We have confirmed a meeting with Minister Coleman at 10 am on Monday May 16th in Victoria.

Regards,

Geoff

Geoff Morrison | Manager of British Columbia Operations

ATTENTION: New phone number

New Victoria #: 778.265.3819 | Same Cell: 250.634.4010| Same Calgary: 403.776.1409 |

New Victoiria Address: 360B Harbour Road, Victoria BC, V9A 3S1

From: Morrison, Geoff
Sent: Monday, April 11, 2016 3:26 PM
To: 'ENV.minister@gov.bc.ca'
Cc: Kapac de Frias, Martina E ENV:EX
Subject: May 16, 2016 - Victoria Meeting request - Canadian Association of Petroleum Producers

Dear Minister Polak:

I am writing to request a to review and discuss CAPP's feedback on the *Consultation Guide: Building B.C.'s Climate Leadership Plan* (please see attached document which was submitted April 8th, 2016). In addition to this feedback CAPP has been actively participating with government through the sectoral engagement process led by Deputy Minister Dave Nikolejsin at the Ministry of Natural Gas Development. CAPP would appreciate the opportunity to have a dialogue about our submission and the progress made during the sectoral engagement process. As the BC Government finalizes the development of its updated Climate Leadership Plan, CAPP believes it would be useful to have an opportunity to address any questions about the upstream industry's response. Furthermore, CAPP would like to highlight opportunities to reduce GHG through methane management programs, electrification and the importance of maintaining and enhancing competiveness to attract new investment for upstream development and potential LNG exports; creating jobs and developing BC's resources responsibly.

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- Brad Herald, Vice President of Western Operations and
- myself, Geoff Morrison Manager of British Columbia Operations.

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approaching other members of the *Cabinet Working Group on Climate Leadership* for meetings that same day.

Thank you for your consideration. Please contact me if you have any questions or need further information, my phone number in Victoria is (250) 634-4010.
Regards;
Geoff Morrison
Geoff Morrison | Manager of British Columbia Operations

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Canada's Oil and Natural Gas Producers
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expediteur et detruire toutes les copies.

From:	Kapac de Frias, Martina E ENV:EX
To:	"Geoff Smith"
Subject:	RE: Driving Clean Growth - Powered by Canadian Electricity
Date:	Tuesday, June 14, 2016 1:10:00 PM

Thanks for sharing Geoff.

From: Geoff Smith [mailto:Smith@electricity.ca]
Sent: Tuesday, June 14, 2016 12:04 PM
To: Kapac de Frias, Martina E ENV:EX
Subject: Driving Clean Growth - Powered by Canadian Electricity

Ms. Kapacde-Frias,

I am contacting you in my capacity as the Canadian Electricity Association's (CEA) Government Relations Director, to bring to your attention CEA's most recent policy paper: *Driving Clean Growth – Powered by Canadian Electricity* (please see attached).

With CEA members operating in every Province and Territory, our Association is engaged in, and monitoring closely, ongoing fed/prov collaboration as part of the development of a post-COP21 national framework to address climate change. As Canada's proven, clean-energy solution, electricity will play a central role in such a framework, while continuing to support Canada's transition to a lower-carbon economy.

Driving Clean Growth outlines the environmental and economic benefits that harnessing the power of clean, safe and reliable electricity, can provide. Clean growth is a huge global challenge - and Canada is well positioned to lead.

I hope you find the paper informative. I would welcome your comments and am available to discuss further at your convenience.

Regards,

Geoff

Geoff Smith
Director of Government Relations
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c 613 852 9696
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Canadian Electricity Association
275 Slater Street, Suite 1500
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Twitter | Facebook | LinkedIn | Blog

It's our 125th birthday!
Check out how Canadian electricity continues to power progress.
C'est notre 125ième anniversaire!
Voyez comment l'électricité Canadienne continue d'énergisé le progrès.

From:	Kapac de Frias, Martina E ENV:EX
To:	Polak, Mary ENV:EX
Cc:	Shiff, Alexander ENV:EX
Subject:	FW: Canadian Electricity Association (CEA) pre-EMMC 2016 meeting letter to Minister Polak
Date:	Monday, June 27, 2016 1:22:00 PM
Attachments:	CEA to Polak 6.24.16.pdf CEA to Energy Ministers (original signed by Hon. Sergio Marchi) 6.23.16.pdf CEA June 2016 - Driving Clean Growth Powered by Canadian Electricity.pdf

Minister – FYI – Alex for CU pls – thanks

From: Geoff Smith [mailto:Smith@electricity.ca]
Sent: Monday, June 27, 2016 12:44 PM
To: Kapac de Frias, Martina E ENV:EX
Subject: Canadian Electricity Association (CEA) pre-EMMC 2016 meeting letter to Minister Polak

Hello Martina,

Please find attached, a letter to Minister Polak from Canadian Electricity Association (CEA) President and CEO, the Hon. Sergio Marchi, regarding CEA's June 23rd letter to provincial energy ministers outlining electricity sector priorities in advance of the August EMMC meeting in Winnipeg (also attached).

Happy to address any questions or concerns.

Regards,

Geoff
Geoff Smith
Director of Government Relations
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c 613 852 9696
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smith@electricity.ca
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It's our 125th birthday!
Check out how Canadian electricity continues to power progress.
C'est notre 125ième anniversaire!
Voyez comment l'électricité Canadienne continue d'énergisé le progrès.

Canadian Electricity Association | Association canadienne de l'électricité

June 24, 2016

The Honourable Mary Polak
Minister of Environment
PO Box 9047 Stn Prov Govt
Rm 112, Parliament Buildings
Victoria BC V8W 9E2

Dear Minister Polak:

Given the integration of environmental and energy policy, attached for your attention is a copy of a June 23rd letter that I wrote to provincial Energy Ministers, in advance of the 2016 Energy, Mines and Minister's Conference (EMMC) taking place in Winnipeg, August 21-23.

I felt it was timely to provide an update on electricity sector priorities and Canadian Electricity Association (CEA) initiatives relating to the August EMMC meeting, as well as the ongoing development of a national framework to meet Canada's GHG emission reduction targets.

Thanks for your attention, and I would welcome any feedback on issues outlined in the letter.

Yours sincerely,



Hon. Sergio Marchi
President and Chief Executive Officer

Attachment: June 23, 2016 CEA letter to provincial Ministers of Energy

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