PEMBINA institute

October 1, 2015

Alberta Climate Panel Submission

Briefing note for the 2015 Alberta Climate Change Advisory Panel

Ed Whittingham | Pembina Institute | edw@pembina.org | 403.899.0578

The Pembina Institute welcomes the opportunity to share its views with the Government of Alberta on a credible approach for the province to address climate change. Leading up to the United Nations climate summit in Paris this December, Alberta needs to demonstrate to domestic and global audiences that it is serious about acting on climate change.

The Pembina Institute makes the recommendations below for Alberta's Climate Leadership process. Taken together, we believe they would enable a peak in Alberta's overall emissions by 2020; enable Alberta to contribute its fair share towards Canada's international 2030 target; and put Alberta on track to achieve an 80% emissions reduction below 1990 levels by 2050.

Carbon Pricing

- Implement a carbon tax on all measurable sources of emissions at a rate of $40 per tonne in 2016, and escalating by $10 per year over the first 10 years of the policy.

Oilsands / Oil and Gas Industry

- Establish an oil and gas methane reduction target of 50% below a 2013 baseline by 2025.
- Sustain oilsands emissions at a peak level in 2022, associated with current and under-construction oilsands projects, until deeper reductions can be achieved with the introduction of new low-carbon production technologies.

Electricity

- Implement an hourly cap on coal-fired generation at 67% of the maximum rated capacity.
- Accelerate end-of-life regulations for coal plants to ensure that all coal plants in Alberta would be phased out by 2030 at the latest.
- Introduce a Renewable Portfolio Standard of 50% renewables by 2030, 40% by 2025 and 20% by 2020.
- Increase the coal royalty rate from $0.55 to $2 per tonne.
- Implement a standard offer program for micro-generation and community-owned distributed generation.
- Remove special credits for cogeneration in favour of regulatory requirements.

Energy Efficiency

- Reduce expected electricity use by 15% by 2030 through increased energy efficiency.
- Reduce expected natural gas use in buildings by 10% by 2030 through increased efficiency.
- Make a commitment to set a target for increased energy efficiency in industrial operations following further research.
- Provide $70 million of quick-start funding for energy efficiency programs in 2016, with funding levels increased to best-in-class over three years.
- Direct the Alberta Utilities Commission to pursue all economic demand-side management.
- Advance energy efficiency codes and standards that are in place or in development in other provinces.

Transportation

- Work with Alberta's major population centres to reduce transportation-related greenhouse gas emissions through land use and transportation planning.

1. Carbon Pricing

Economists have long recognized the flexibility and efficiencies provided by carbon pricing policies in reducing greenhouse gas (GHG) emissions. An increasing number of industry and environmental organizations are also recognizing this fact, and calling on governments to put an effective price on carbon.

Most recently, 43 CEOs across 20 economic sectors — with operations in 150 jurisdictions and $1.2 trillion in revenue in 2014 — called for an explicit or implicit price on carbon as part of their vision of a global climate deal.[1] Similarly, Europe's largest oil and gas companies — while accepting cost implications — jointly called on governments to price carbon for the benefit of providing "a clear roadmap of future investment, a level playing field for all energy sources across geographies and a clear role in securing a more sustainable future."[2]

An increasing number of national and subnational governments are adopting carbon pricing to reduce emissions and guide investment decisions. This trend is likely to continue into future years, and jurisdictions with strong policies will be better positioned to compete in a changing world.

The cornerstone of Alberta's renewed climate strategy must be an effective price on carbon pollution.[3] Delaying such a policy will only make the cost to industry and future generations greater than if we take action now.

To be effective, a price on carbon must:

1. Be at a price level sufficient to motivate real reductions in emissions
2. Apply to all economic sectors to incent broad emission reductions
3. Align with policies in other jurisdictions with proven success
4. Be deployed quickly and minimize administrative requirements

While Alberta was the first jurisdiction in North America to put a price on carbon in 2007, that policy has earned a negative international reputation for being ineffective, lacking in credibility and unnecessarily complex. One reason for this is that the approach deviates significantly from the policies being pursued by leading jurisdictions. British Columbia implemented a carbon tax in 2008 with a four-year schedule of increases. The tax now sits at $30 per tonne on the emissions from almost all fossil fuel combustion, representing the majority of the province's emissions. Ontario recently announced its intent to join California and Quebec in a cap-and-trade system, with auction prices that are currently around $15 per tonne.

Our specific recommendations for the panel are:

- **Replace Alberta's failed Specified Gas Emitters Regulation (SGER) approach to GHG management.** Despite Alberta once leading in carbon pricing in North America, the SGER approach ultimately has not reduced emissions in absolute terms.[4] This has created justified

---

[1] Climate CEOs, "Open Letter from Global CEOs to World Leaders Urging Concrete Climate Action," *Medium.com,* April 16, 2015. https://medium.com/@ClimateCEOs/open-letter-from-global-ceos-to-world-leaders-urging-concrete-climate-action-e4b12689cddf

[2] Helge Lund, Bob Dudley, Claudio Descalzi, Ben van Beurden, Eldar Saetre, and Patrick Pouvanne, *Open letter to France's Foreign Minister Laurent Fabius and Christiana Figueres, Executive Secretary of the UN Framework Convention on Climate Change,* June 1, 2015. http://newsroom.unfccc.int/unfccc-newsroom/major-oil-companies-letter-to-un/

[3] P.J. Partington and Matt Horne, *Carbon Pricing Approaches* (Pembina Institute, 2013). http://www.pembina.org/pub/2414

[4] Simon Dyer, Matthew Bramley, Marc Huot and Matt Horne, *Responsible Action? An assessment of Alberta's greenhouse gas policies* (Pembina Institute, 2011). http://www.pembina.org/pub/2295; and Andrew Read, *Climate Change Policy in Alberta* (Pembina Institute, 2014). http://www.pembina.org/pub/climate-change-policy-in-alberta

skepticism of the system, which continues to draw increasing criticism. Moving Alberta's climate policy towards approaches that have proven successful would demonstrate the province's commitment to addressing climate change.

- **Apply a carbon price to all measureable sources of emissions.** B.C.'s carbon tax has reduced emissions while the economy grew.[5] These reductions occurred predominantly in the transportation sector, a currently unregulated source of GHGs in Alberta. We recommend that Alberta develop an economy-wide price on carbon rather than a cap-and-trade carbon pricing policy. A pre-set price on carbon that increases incrementally over years is a policy that is simpler to design, can be implemented relatively quickly and would provide industry with greater certainty over the long term.

  We recommend a carbon price starting at $40 per tonne of CO_2e in 2016, with a schedule for increasing it by $10 per tonne annually over the first 10 years of the policy. This is generally the level of stringency necessary for Alberta to make a fair contribution to Canada's international commitments.

- **Reinvest revenue generated from a carbon price.** As with any provincial revenues, the government must carefully decide how to invest in ways that best meet the needs of Alberta. Some possibilities, which are not mutually exclusive, include:
  - Investing in renewable energy, energy efficiency and clean transportation systems to help Albertans reduce their carbon emissions.
  - Reducing deficits to allow the government to maintain core services — such as health care and education, and to invest in infrastructure — while increasing investment in a permanent fund to ensure that future generations of Albertans benefit from today's extraction of non-renewable resources.
  - Protecting low-income households from potential adverse impacts of higher energy costs through dividend cheques or tax credits.
  - Protecting the competitiveness of Alberta's industries that could potentially be placed at a material disadvantage because of increasing carbon prices.
  - Funding education and outreach efforts dealing with climate change mitigation and adaptation with First Nations and Métis communities.
  - Reducing other taxes.

2. Oilsands / Oil and Gas

Oilsands emissions

Emissions from Alberta's oilsands sector grew by 79% between 2005 and 2012, increasing from 34 to 61 megatonnes (Mt).[6] By 2030, this may increase by 102 Mt from 2005 levels.[7] As the fastest growing source of emissions in Canada, the pace and scale of oilsands expansion will play a determining role in whether Alberta and Canada will be able to reduce emissions in absolute terms. Oilsands expansion is the principal reason why Canada will not meet its 2020 climate commitments and why, without further action, Canada will be poorly positioned in the upcoming Paris climate negotiations.

---

[5] Matt Horne and Kevin Sauve, *The B.C. Carbon Tax: A backgrounder* (Pembina Institute, 2014). http://www.pembina.org/pub/the-bc-carbon-tax

[6] Environment Canada, *Canada's Emissions Trends*, (2014) 19, Table 6. https://ec.gc.ca/ges-ghg/E0533893-A985-4640-B3A2-008D8083D17D/ETR_E%202014.pdf

[7] Margo McDiarmid, "Rising carbon emissions from oilsands a 'unique' challenge, federal cabinet told", *CBC News*, May 20, 2015. http://www.cbc.ca/m/news/politics/rising-carbon-emissions-from-oilsands-a-unique-challenge-federal-cabinet-told-1.3079444

Current and under-construction oilsands projects would result in raw bitumen production increasing to 3.3 million barrels per day (MMBPD) by 2022, a growth of more than 300% from 2005 levels.[8] With new projects, industry forecasts to increase production to 4.2 MMBPD by 2030.[9] Without rapid decarbonization, this level of production would be inconsistent with climate-safe emissions limits and would result in increased cumulative local impacts.[10]

The International Energy Agency's 450 Scenario "sets out an energy pathway consistent with the 2°C goal through limitation of the concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO_2 equivalent."[11] Due to reduced oil demand and the increased carbon penalty for unconventional oil in the IEA's 450 scenario, oilsands production would not exceed 3.3 MMBPD through to 2035.[12] Current and under-construction oilsands projects are currently expected to meet this production level in 2022, and any production above this level is at risk in a carbon-constrained future.

Our specific recommendations for the panel are:

- **Manage oilsands emissions under the peak level associated with forecasted current and under-construction projects for 2022 until deep reductions from the sector can be achieved with the introduction of low-carbon production technologies.**
- **Use carbon pricing to spur longer-term emission reductions.** A central component of Alberta's efforts to reduce oilsands emissions must be pricing carbon pollution. The price could be set at a lower level in 2016 but should increase incrementally over a period of 10 years (see Carbon Pricing section). Beyond the 2020 emission peak year, a higher, more effective carbon price will motivate continual emission reductions. This market-based approach will result in relatively low compliance cost when prices are set low in initial years, allowing industry to identify the most cost-effective emission reductions while providing longer-term regulatory certainty.

Deep decarbonization of oilsands production through to 2050 will be necessary. Alberta must ensure that the carbon policy of today enables a transition to a world-leading energy sector that can compete in an increasingly carbon-constrained world.

Methane emissions from the oil and gas sector

Alberta was once a global leader in management of venting, flaring and fugitive emissions of methane. The multi-stakeholder Clean Air Strategic Alliance (CASA) Flaring and Venting Project Team had provided recommendations to the Alberta Energy and Utilities Board in the past. The initial recommendations adopted were successful in substantially reducing emissions. However, due to a lack of consensus over measures that would generate further reductions, the CASA team was disbanded. Emissions began rising again after 2005.

Following announcements from the United States government to enhance regulation of methane in its oil and gas sector, the Canadian government announced on May 15, 2015, its intention to align Canadian regulations with those proposed in the U.S. However, this announcement did not include any details as to the specific regulations they would be aligning with or what level of reductions they are targeting with this action.

---

[8] Canadian Association of Petroleum Producers, *Crude Oil Forecast, Markets & Transportation* (2015). http://capp.ca/publications-and-statistics/publications/264673

[9] Ibid.

[10] Simon Dyer, Jennifer Grant and Eli Angen, *Forecasting the impacts of oilsands expansion* (Pembina Institute, 2013). http://www.pembina.org/pub/2455

[11] International Energy Agency, *World Energy Outlook* (2010), 46. http://www.worldenergyoutlook.org/media/weo2010.pdf

[12] Ibid., 144.

Alberta has an opportunity to develop and implement enhanced regulations to reduce methane emissions. Methane is one of the most potent greenhouse gases, and its short-term impact is 25 times greater than carbon dioxide's. Canada's oil and gas sector is the largest source of methane emissions in the country. We estimate that methane from oil and gas accounted for approximately 11%[13] of Alberta's greenhouse gas emissions, equal to 34 Mt.[14] Methane reductions in the upstream oil and gas sector using existing technology represent one of the most cost effective ways to reduce significant volumes of greenhouse gas emissions. Alberta needs to demonstrate action to reduce emission from the oil and gas sector. Championing new oil and gas methane regulations would enhance Alberta's reputation globally.

This opportunity motivated Pembina and the Environmental Defense Fund to jointly commission ICF International to review and evaluate the methane reduction opportunities and associated cost to the Canadian oil and gas sector. The report, *Economic Analysis of Methane Emissions Reduction Opportunities in the Canadian Oil and Natural Gas industries*, will be submitted to the panel, the government and the general public to provide useful information for policy development and decision making.

Our specific recommendations for the panel are:

- **Establish a 2025 methane reduction target of 50% below 2013 levels for upstream oil and gas operations in Alberta.** Pembina and EDF's report will provide a Canadian specific evaluation of opportunities to reduce methane. In light of this research — along with past research demonstrating the cost-effectiveness of reducing methane emissions at oil and gas operations in the U.S.[15] — we recommend Alberta adopts a 2025 reduction target for methane of 50% below 2013 levels across the entire province and sector. This level of ambition demonstrates the commitment of Alberta's oil and gas industry to reducing emissions. This level of ambition is aligned with other jurisdictions, and our initial findings has also shown it is also cost-effective for industry. Achievement of this goal represents a reduction of approximately 17 Mt[16] from upstream oil and gas by 2025, with the potential to achieve significant reductions by 2020.
- **Review and revise Alberta's flaring policy to increase conservation of flared gas.** The primary method to reduce methane – a very potent greenhouse gas - is to capture and flare gas which converts methane into carbon dioxide (CO_2). CO_2 is also a greenhouse gas but it is less potent than methane. While there is a climate benefit, flaring will have local impacts related to air quality. Alberta's flaring regulations are based on an economic test that is primarily based on the value of the gas conserved. It was established 10 years ago when gas prices were higher without consideration of the value in greenhouse gas abatement. Following the collapse of natural gas prices, flaring has steadily increased since 2009.[17] Alberta's flaring requirements should be revised or replaced. Alberta's flaring policy must evolve to motivate increased conservation of flared gas, towards complete avoidance of these emissions in the future. This is aligned with the World Bank initiative to end routine flaring in the oil and gas sector by 2030.[18]

---

[13] Environment Canada, *National Inventory Report: 1990-2013*, Part 3, Table A10-19, 61, (2015)

[14] ICF International, *Economic Analysis of Methane Emission Reduction Opportunities in the Canadian Oil and Natural Gas Industries*, Pembina Institute and Environmental Defense Fund, (2015).

[15] ICF International, *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries,* Environmental Defense Fund, (2014).
https://www.edf.org/sites/default/files/methane_cost_curve_report.pdf

[16] *Economic Analysis of Methane Emission Reduction Opportunities in the Canadian Oil and Natural Gas Industries*.

[17] Alberta Energy Regulator, *Upstream Petroleum Industry Flaring and Venting Report: Industry Performance for Year Ending December 31, 2013*, Table 2, 7.

[18] The World Bank, "Zero Routine Flaring by 2030," September 25, 2015.
http://www.worldbank.org/en/programs/zero-routine-flaring-by-2030

3. Electricity

At present, Alberta burns more coal for electricity than all other provinces combined. This means that Alberta's coal-fired electricity releases roughly the same quantity of greenhouse gases each year as half of all the passenger vehicles on the roads in the entire country, in addition to health-damaging sulphur and nitrogen oxides, mercury and particulate matter.

At the same time, Alberta enjoys some of Canada's most abundant and reliable renewable energy resources, including 150 gigawatts (GW) of potential wind power, 11 GW of potential hydroelectricity and 120 GW of potential demonstrated geothermal power. As for solar photovoltaics, it would be possible to meet Alberta's annual electrical energy needs with solar panels alone; doing so would require 1,746 km^2 — or 0.26% — of the province's total land area.[19]

In light of Alberta's very high-emissions electricity generation and its abundance of alternative supply, the province has a meaningful opportunity to reduce emissions in this sector.[20] At the same time, we can:

- Reduce emissions of criteria air contaminants that harm Albertans' health[21]
- Diversify our future supply to protect consumers against excessive risk exposure from over-reliance on a single fuel source
- Take near- and medium-term strides toward the extensive grid decarbonization necessary to reduce transportation emissions and some industrial emissions
- Demonstrate meaningful action on coal and renewable energy that is visible and well understood around the world.

Combined, the measures to phase out coal power and accelerate renewables discussed in this section could achieve around 3 Mt of reductions in 2020, then 22 Mt in 2025 and 22 Mt in 2030. Added across all years, they could produce 220 Mt of cumulative reductions by 2030.

Our specific recommendations for the panel are:

- **Immediately implement an hourly capacity cap on coal-fired generation.** Alberta has a near-term oversupply of electricity generating capacity, owing in part to the arbitrated return to service of Sundance A in late 2013 and the recent commissioning of the 800 MW Shepard Energy Centre. The province's reserve margin is well above the mandated minimum. Owing to the low marginal cost of coal-fired electricity, however, coal continues to operate at capacity factors well above what the province requires for its energy supply, imposing costs on society via air pollution and carbon emissions. These costs are wholly unnecessary. Given the availability of alternative generating supply, these are wasted drawdowns on the province's carbon budget. As such, beginning January 1, 2016, the province can reduce emissions without compromising reliability and with limited consumer cost impact by limiting the dispatched capacity of coal power in every hour to 67% of the maximum continuous rating. As coal units are decommissioned under an accelerated phase out, the capacity cap could be raised to 75% of the maximum continuous rating if needed, acknowledging the physical and irreversible GHG reductions secured through unit decommissions under the phase-out below.
- **Phase out coal facilities more quickly than under the existing federal coal regulations.** Alberta should implement a coal power transition timeline that phases out unmitigated coal-fired generation by imposing strict, unit-based physical emissions reductions requirements at an

[19] Benjamin Thibault and James Glave, *Power to Change: How Alberta can green its grid and embrace clean energy* (Pembina Institute and Clean Energy Canada, 2014), 1. http://www.pembina.org/pub/power-to-change

[20] Ibid.

[21] Tim Weis et al, *A Costly Diagnosis: Subsidizing coal power with Albertans' health* (Asthma Society of Canada, Canadian Association of Physicians for the Environment, The Lung Association, Alberta & NWT, and Pembina Institute, 2013). http://www.pembina.org/pub/2424

accelerated schedule, to reach the end of coal generation by 2030 at the latest. With existing models, the Alberta Electricity System Operator can be engaged to help find the right balance of system reliability, time lag for replacement generation, GHG reductions and air quality improvements.

One feasible option that could see over 150 Mt of cumulative emission reductions by 2033 — excluding other electricity sector actions like energy efficiency and renewable energy, and accounting for the emissions of replacement generation — would be to set the end of economic life dates in Table 1, by:

- first, accelerating the federal GHG regulation 50-year end-of-life timelines modestly but immediately for the oldest units that can be immediately phased out during our current supply glut;
- then ratcheting up the timeline stepwise, generally consistent with a 40-year end-of-life for the next group of units with a longer advance signal for replacement generation; and
- finally, implementing a set date for the end of conventional coal-fired power in Alberta of 2030, at the latest.

Table 1: Alternative end-of-economic lives for coal units in Alberta to meet "good-as-gas" GHG emissions standard

Facility Name	Unit	Year of Commission	End of PPA	Federal GHG regulations		Accelerated phaseout		Current Capacity (MW)
				End of economic life	Age	End of life	Age	
Battle River	3	1969	2013	2019	50	2016	47	149
Sundance	1	1970	2017	2019	49	2017	47	288
Milner	1	1972	N/A	2019	47	2016	44	144
Sundance	2	1973	2017	2019	46	2017	44	288
Battle River	4	1975	2013	2025	50	2016	41	155
Sundance	3	1976	2020	2026	50	2020	44	368
Sundance	4	1977	2020	2027	50	2020	43	406
Sundance	5	1978	2020	2028	50	2020	42	406
Sundance	6	1980	2020	2029	49	2020	40	389
Battle River	5	1981	2020	2029	48	2021	40	385
Keephills	1	1983	2020	2029	46	2023	40	395
Keephills	2	1983	2020	2029	46	2023	40	395
Sheerness	1	1986	2020	2036	50	2026	40	390
Genesee	1	1989	2020	2039	50	2029	40	400
Sheerness	2	1990	2020	2040	50	2026	36	390
Genesee	2	1994	2020	2044	50	2029	35	400
Genesee	3	2005	N/A	2055	50	2030	25	466
Keephills	3	2011	N/A	2061	50	2030	19	463

This measured approach in the near term allows the time necessary for the policy signal to incent new generation through the market. The smooth, year-over-year decrease employed can be seen in Figure 1, compared to the weak business-as-usual approach outlined under federal GHG regulations. The more stringent approach in later years provides an advanced signal for replacement generation and a clear signal to unit owners to avoid uneconomic unit upgrades and other capital expenditure. The PPA contracts associated with the majority of these units provided

for recovery of their fixed costs within the lifetime of those contracts (for example, all units retired by 2020 in the table will have had their fixed costs fully repaid). The timelines of those units retiring during the post-PPA period of 2021-2029 reflect the residual effective life of those units as agreed to by the parties and codified within the PPA contracts. For the youngest two (merchant, non-PPA) units, the more stringent dates account for the unreasonable expectation that the most recent new unit investments could be made without being subject to additional greenhouse gas requirements during their lives, given that they were made well after the United Nations Framework Convention on Climate Change, to which Canada is a party, that made clear the imperative for changes in law to the treatment of high-emissions fossil fuels.

In the near and medium term, the accelerated phase-out schedule is not dissimilar to the Brattle Report coal retirement scenario, which determined that coal retirement is the most cost-effective emissions abatement opportunity available in the electricity sector, as well as the largest GHG reduction option.[22] In later years, with more time to line up replacement low- or non-emitting supply, the accelerated schedule leads to substantial additional reductions.

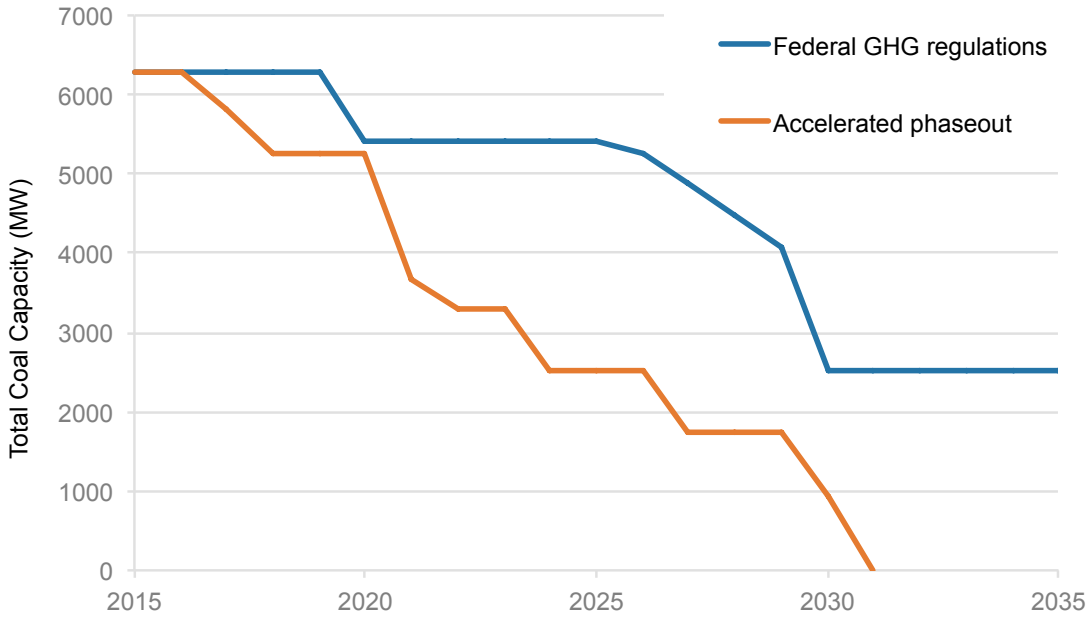

Figure 1: Rate of transition from unmitigated coal capacity under different scenarios

Separating the coal reductions from the rest of reductions in the electricity sector (by assuming that coal generation is replaced with BAU 400 t/GWh combined cycle natural gas generation) leads to nearly 100 Mt of cumulative GHG reductions by 2030 (in-year reductions of 1 Mt, 13 Mt and 7 Mt in 2020, 2025 and 2030 respectively, relative to business as usual, over and above the immediate reductions from hourly capacity cap). Compared to other more complex approaches to emission reduction obligations, this accelerated coal phase-out is a meaningful and clearly articulable approach to securing physical GHG and pollution emission reductions for the province.

- **Confirm that BATEA at end of design life for existing coal-fired units applies to primary PM.** A fundamental principle of the consensus, multi-stakeholder Clean Air Strategic Alliance Electricity Framework is that coal-fired units be allowed a maximum economic life of forty

[22] Judy W. Change, Johannes P. Pfeifenberger, Matthew Davis, Lauren Regan and Nicole Irwin, *Policy Options and Considerations for Reducing Greenhouse Gas Emissions and Encouraging Renewable Generation Development in Alberta* (Brattle Group, 2014).

years[23] in exchange for a requirement that such units would then upgrade to perform like new plants — by meeting the pollution control standards "of the day," also described as "best available technology economically achievable" (BATEA) — or shut down. During the most recent five-year review of the framework, while trying to develop a primary particulate matter (PPM) management framework for existing coal-fired units, some members of industry denied that the framework obligated such units to comply with the PPM BATEA limit[24] at the end of their design life. Although there is no principled basis under the framework for this position, this stance by some industry blocked the collective CASA stakeholders' ability to advance consensus on PM management and necessitates Government of Alberta direction on this matter.[25]

The issue of PPM BATEA for coal-fired units is not simply esoteric. Recent reports demonstrate growing human health risks associated with worsening PM and ozone regional air quality across Central Alberta. The CASA five-year review itself identified that emissions of PPM have exceeded, and are poised to dramatically exceed, the framework's 15% environmental threshold, requiring that issue be specifically addressed. Confirmation by the province that a PPM BATEA is required would lend further impetus to the hourly capacity cap and accelerated shutdown of coal-fired units. The combination of these policy directions would present an effective means to achieve the PPM reductions anticipated under the CASA framework while also advancing GHG reduction goals.

- **Assess a reasonable royalty on coal resources.** Coal-fired power benefits from a number of subsidies, including how its costs are externalized to society through GHG and health-impacting emissions. These environmental subsidies can be addressed with adequate carbon pricing and mitigated with pollution controls. Another subsidy to coal power is the aberrantly low royalties charged for the coal itself. At present, the royalty for sub-bituminous coal in Alberta is set at $0.55 per tonne — a rate that has not changed since 1992 when electricity generation was regulated — so the interference of subsidies in competition was not relevant. A cursory analysis of other jurisdictions indicates that a more typical royalty for coal would be in the $3 to $3.75 per tonne range[26] — around six times the current royalty rate in Alberta. The original intention, as suggested in the 1992 legislation, was to transition the royalty from $0.55 per tonne to $2 per tonne over a few years. Inexplicably, however, this transition never took place. An initial analysis indicates that at present coal production rates, an immediate change to $2 per tonne would provide at least $20 million in additional royalty revenue per year, with further increases possible thereafter. Setting a fair price for royalties would also repair an existing subsidy that gives coal an unfair competitive advantage in the market. Logistically, this is a simple regulatory change, as the Minister of Energy is empowered to set the royalty rate.
- **Implement a renewable portfolio standard for all electricity generators.** Renewable portfolio standards (RPS) are widely and successfully used in 29 states in the U.S. and three Canadian provinces (as shown in Figure 2), including Texas, which has a deregulated energy-only electricity market. In simple form, they require a set proportion of electric energy to be derived from eligible renewable energy sources. An RPS could resolve the central barrier to renewable energy development in Alberta, which is the absence of long-term off-take agreements for

[23] Or, the later of 40 years or end of their power purchase agreement for units that existed prior to deregulation.

[24] PPM BATEA standard is 6.4 ng/J of heat input, approximately 0.066 kg/MWh.

[25] PM Management System Task Group of the CASA Electricity Framework Review Project Team, *PM Management System: Recommendations to the Electricity Framework Review Project Team for their Consideration*, (CASA, 2015). http://casahome.org/Portals/0/documents/Electricity%20Framework%20Review%202013/Associated%20Documents/PMManagament_FinalReport_PDF.pdf?timestamp=1435859779772

[26] Both Saskatchewan and Montana have a royalty based on 15% of the fair market value of the coal. An analysis would need to be undertaken to determine the fair market value of Alberta's thermal coal, but it's likely in the range of $20 to $25 per tonne.

renewable power. An RPS would incent a market for these agreements, enabling renewable energy providers to obtain affordable financing for their projects and thus decreasing the cost of renewables in the market.

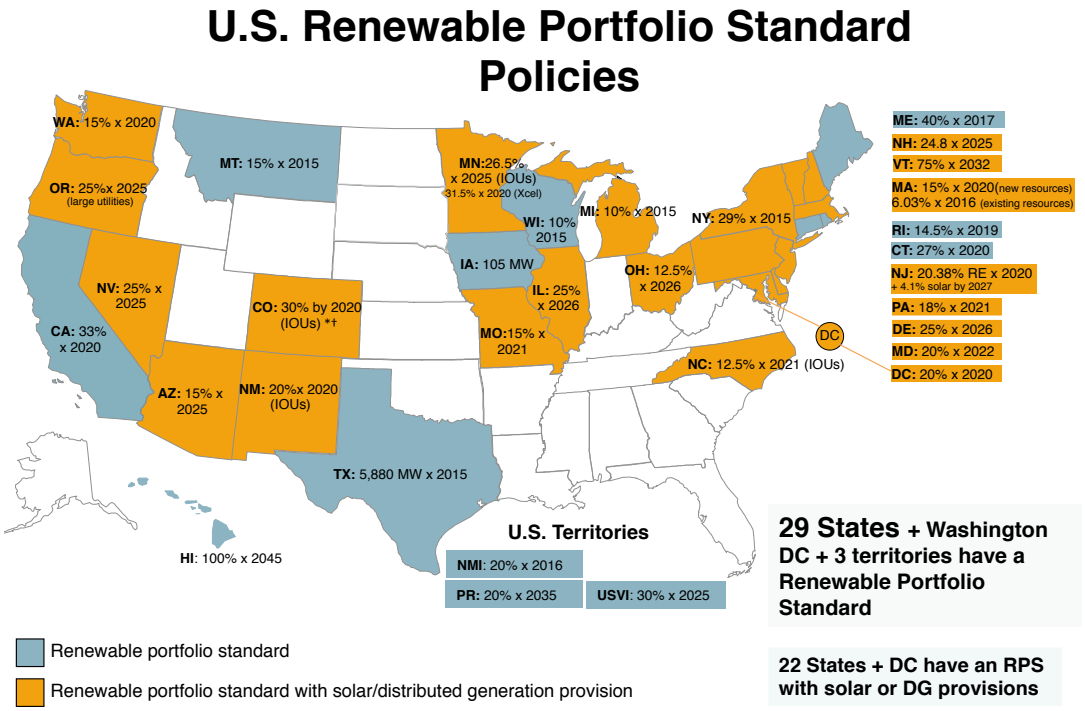

Figure 2: Renewable portfolio standard policies in the United States

An RPS does not require direct government expenditure. It is well-suited to merchant power markets like Alberta's. Over the medium-to-long run, energy prices would not be expected to rise because renewable energy is independent of fuel costs, and the necessary contract rates for renewable energy will be less than electricity market price trends over the lives of the renewable energy projects.[27] Moreover, renewable energy development has a relatively low abatement cost, often under $40 per tonne, even in jurisdictions with lower grid emissions intensities than Alberta's.[28] However, because carbon prices alone fail to overcome the financing barriers to capital-intensive renewable energy development, carbon pricing often must be much higher than the carbon abatement cost to meaningfully accelerate the deployment of renewables.[29]

A policy approach to advancing renewable energy deployment that would generate significant GHG reductions — particularly in the 2025-2030 timeframe — would target 20% renewable energy by 2020 (2 Mt of GHG reductions), 40% by 2025 (9 Mt) and 50% by 2030 (14 Mt), which

[27] Glave and Thibault, *Power to Change*, 18.

[28] Duncan Callaway, Meredith Fowlie and Gavin McCormick, *Location, location, location: The variable value of renewable energy and demand-side efficiency resources*, Energy Institute at Haas Working Paper WP-264 (2015), 46. https://ei.haas.berkeley.edu/research/papers/WP264.pdf

[29] For instance, there is analysis that indicates that renewable deployment is advanced under SGER only if it reaches a 50/50 level of stringency (50%) and price ($50 per tonne), which essentially creates a $75 per tonne incentive for renewables ($50 per tonne offsets and a $25 per tonne uplift in market price). Chang et al., *Policy Options and Considerations for Reducing Greenhouse Gas Emissions and Encouraging Renewable Generation Development in Alberta*, 7.

would include the micro-generation and community-owned renewables discussed in sections below. Cumulatively, this represents 6 Mt, 39 Mt and 96 Mt of reductions by 2020, 2025 and 2030 respectively.

The result of this investment in renewable energy would also provide considerable employment — particularly in construction and in operations and maintenance — with jobs spread diversely across Alberta.

- **Enhance micro-generation programs.** Due to the way that micro-generation systems are compensated in Alberta, consumer-owned solar photovoltaic (PV) generation systems do not receive a fair rate that reflects the value of the energy they provide to the grid.[30] This rate is also insufficient to drive PV uptake. Alberta's approximately 8 MW of installed PV capacity is barely 1% of Canada's total, despite Alberta's nation-leading solar resource. The result is that Albertans are not yet able to participate directly in the ownership of distributed energy production to the same extent as residents of other jurisdictions.

  The Pembina Institute has worked with several municipalities in Alberta to develop incentive programs for distributed solar PV. The best way to drive uptake is to provide long-term generation contracts to successful applicants through a standard offer program. The rate should be set at a level that drives uptake in the first year of implementation, up to a program cap, and then automatically degrades to a lower level of support. With the right contract rate, residents and small business owners would be able to make their systems economic and more easily obtain financing. This would open generation ownership to a broader swath of society. Planned rate decreases help avoid over-incenting, control program costs and transition the sector to grid parity.

  Other necessary enhancements to the Micro-generation Regulation or an additional distributed generation provision include:

  - Increasing the capacity of eligible systems
  - Removing the requirement that systems be no larger than is necessary to meet the annual energy needs of the consumer
  - Enabling community-owned and co-operative micro-generation systems through meter aggregation

- **Facilitate and support community energy systems.** To facilitate broader ownership of our energy production systems, Alberta should support equity involvement by community entities in renewable energy and local cogeneration or combined heat and power projects. The program would be available to a minimum equity ownership of eligible community groups, including local co-operative associations and Aboriginal communities, which would permit collaboration with experienced renewable energy developers. The Community Economic Development Investment Fund (CEDIF) in Nova Scotia is one model that could be built upon. The CCEMF could allocate funds directly towards support of renewable energy project development and energy efficiency retrofits in First Nations and Métis communities in Alberta. The government should facilitate successful uptake by establishing a clearinghouse to support community projects with professional services from concept to construction. In addition to facilitating additional clean energy projects, the program could target economic diversification, economic resiliency, rural employment and community capacity-building.
- **Require cogeneration of equal or greater efficiency than natural gas combined-cycle electricity for all new industrial projects.** Cogeneration is more efficient than generating steam and power separately. The process is well understood and deployed extensively in Alberta's industrial sector. Currently, industrial cogeneration is provided special treatment under Alberta's Specified Gas Emitters Regulation, and the credits afforded are being used to comply with around

[30] Benjamin Thibault, *How solar and wind lower your power bill: Understanding renewable energy prices in Alberta* (Pembina Institute, 2014). http://www.pembina.org/pub/how-solar-and-wind-lower-Alberta-power-bills

25% of all required GHG reductions from all covered emissions. The effectiveness of this special treatment at motivating cogeneration is unclear; cogeneration deployment in Alberta has grown steadily since the late 1990s and was not accelerated due to the treatment provided under the regulation. Other factors such as the availability and price of grid electricity, the need for reliable power at the facility, current and future natural gas prices, and the expertise of the company in operating cogeneration are all considered when evaluating using these systems.

In addition, while cogeneration is more efficient than coal-fired or simple-cycle natural gas electricity facilities, the efficiency benefit is less pronounced compared to state-of-the-art natural gas combined-cycle generation. Depending on facility location, transmission losses may reduce the benefit ever further — and the benefit is negligible compared to renewable forms of electricity.

Since the efficiency gains of cogeneration depend heavily on the specific arrangement of each cogeneration facility, there is a need to review and confirm that these systems are providing an efficiency gain when compared to other forms of electricity. The U.S. Environmental Protection Agency has identified general steps undertaken to designing effective cogeneration policies, and lessons learned in the U.S. should be evaluated for use in Alberta.[31]

Our recommendations on how best to increase the amount of cogeneration in the province are:

- Remove the special treatment that is provided to cogeneration under the Specified Gas Emitters Regulation, and treat both cogeneration and natural gas combined-cycle fairly based on their specific efficiency gains.
- Create regulatory requirements to perform a project-specific evaluation of cogeneration in all industrial project applications, and require its deployment where it is deemed to be equal or more efficient than a natural gas combined cycle facility.

Due to the expected efficiency gains of these systems, setting an effective carbon price will provide the necessary incentive to develop and deploy the most efficient cogeneration systems.

4. Energy Efficiency

Energy efficiency is a cornerstone of climate policies globally. Energy efficiency provides the opportunity to reduce GHG emissions while also saving money, creating jobs and economic growth and increasing Alberta's resiliency. Energy efficiency opportunities are available in all sectors including buildings, industrial facilities and transportation.

The two main approaches to increasing energy efficiency that have been used historically are regulations and programs.

Energy efficiency regulations

Regulations have been successfully used for decades to increase the efficiency of energy using products such as appliances, vehicles, motors, heating and cooling equipment, lighting and even buildings. Energy efficiency regulations typically involve a cost-benefit test to ensure they create net cost savings and economic benefits when implemented.

In North America, higher energy efficiency regulations for a product are often first introduced by California, which is then typically followed with regulation in other states as well as U.S. federal regulations. Canadian federal regulations have historically been put in place after U.S. federal regulations. However, some provinces are now advancing energy efficiency regulations in their own jurisdictions so

[31] Environmental Protection Agency, "Policy Considerations for Combined Heat and Power" in *Energy and Environment Guide to Action: State Policies and Best Practices for Advancing Energy Efficiency, Renewable Energy, and Combined Heat and Power,* (2015) Chapter 6, 17-19.

they can achieve even greater levels of energy efficiency. This is a result of multiple factors: Canadian federal regulations can be slow to be implemented or delayed indefinitely; gaps exist in federal regulations for some product categories; and federal regulations do not apply to products that are produced and sold within the same province.

Energy efficiency programs

With Alberta as the only jurisdiction in North America without energy efficiency programs, launching a new program is an opportunity to demonstrate short-term action on a number of priorities including reducing emissions, creating jobs and lowering energy bills.

The most successful energy efficiency programs in North America rely on a strong framework that defines an energy efficiency target, outlines responsibilities for reaching the target, identifies oversight mechanisms and determines how energy efficiency programs will be funded. Once a framework such as this is in place, the parties responsible for reaching the energy efficiency target are then enabled to build energy efficiency programs that achieve a variety goals including emission reductions, cost savings and job creation. Oversight of energy efficiency programs typically involves energy regulators to ensure funds are used well.

Energy efficiency programs typically include a variety of approaches including: consumer outreach; training and capacity building; financing; incentives; regulations; information collection, analysis and reporting; partnerships with municipalities, industry and civil society; and integration into job creation and economic development initiatives. The government can also take leadership by advancing energy efficiency within their own operations. This leadership can be combined with other energy efficiency initiatives as a way to help motivate others to take action.

Our recommendations for the panel are:

- **Set targets for improved energy efficiency.** Achievable targets would be to reduce expected electricity use by 20% by 2030 and expected natural gas use in buildings by 15% by 2030.
- **Commit to set a target for increased energy efficiency in industrial operations.** This should be done following further research.
- **Fund energy efficiency programs from the CCEMF.** The program should provide $70 million of quick start funding for energy efficiency programs in 2016, with funding levels increased to best-in-class over three years.
- **Direct the Alberta Utilities Commission to pursue all economic demand side management programs.**
- **Advance energy efficiency codes and standards that are in place or in development in other provinces.** Alberta should undertake a scan of energy efficiency regulations in place or under development in other provinces and in the U.S., and prioritize a list of regulations that could be adopted in the province. Focusing on regulations in place or in development in other jurisdictions, but not yet in place in Alberta, increases the ease of implementation inherent in the new regulation.
- **Advance energy efficiency in First Nations communities.** The province should partner with First Nations communities and agencies already working with First Nations.

5. Transportation

Transportation is a notable and growing source of GHG emissions in Alberta. Measures to address emissions from transportation is a standard plank of most jurisdictions' GHG plans and should be a component of Alberta's efforts as well.

GHG emissions from transportation come from two major sources: personal transportation and freight transportation. For both sectors, there are four main ways to reduction emissions:

1. Reduce demand
2. Shift to other transportation modes
3. Increase the energy efficiency of the current mode
4. Switch to lower carbon fuels

A combination of these four approaches is also possible.

A significant area of focus for reducing demand and driving mode shift for personal transportation has to do with the way we design our communities. Working with Alberta's major population centres and the regions that surround them can have a significant impact on their ability to reduce transportation-related GHG emissions through land use and transportation planning that reduces the need for travel, and through funding for suitable alternative transportation options such as transit.

Reducing demand and driving mode shift for freight transportation is also possible, but brings its own set of challenges. Work in this area is being advanced most significantly in other Canadian jurisdictions, as well as with the federal government. Alberta should engage with those working across the country and even in the U.S. on these opportunities to leverage work that is already underway.

Energy efficiency of all vehicles can be enhanced through the approaches outlined in the Energy Efficiency section, and generally include the exploration of opportunities to include vehicle efficiency within energy efficiency regulatory and program opportunities. It should be noted that with freight transportation, increases in energy efficiency can be accomplished both with the base vehicles as well as add-ons, such as aerodynamic panels and auxiliary power units, that reduce the need for idling of long-distance trucks.

Switching to lower-carbon fuels is a GHG reduction opportunity that has been pursued for many years for both environmental and cost reasons. Alberta should continue work in these areas as there are fuel-switching opportunities that can provide both cost and GHG benefits. These opportunities should continually be compared with other GHG reduction opportunities, as some fuel switching provides better GHG benefits than others from a full life cycle perspective.

Conclusion

The Pembina Institute supports the Government of Alberta's intent to design and implement a globally credible climate change plan that supports the province's transition to a lower-carbon future. By implementing the broad suite of programs and policies outlined in this submission, Alberta will be able to reduce emissions, drive necessary innovation in the energy sector, create jobs and protect Albertans' health. For further information, questions or comments, please contact Ed Whittingham, Executive Director, at edw@pembina.org.