The Plan

What follows is an achievable plan to significantly reduce greenhouse gas (GHG) emissions from the electricity sector in Alberta. The plan enables a **step change that will reduce emissions from Alberta's legacy coal plants by 80% by the year 2020 with complete retirement of these coal plants by 2025.** The plan can be executed in an economically cost-effective way without impacting electricity reliability for Albertans. The plan is to stop the operation of coal plants in 2020 after the existing coal PPAs expire but keep them available as a last stop emergency reliability safety net until they are dismantled in 2025.

Coal

In 2016, an immediate 20% reduction in coal emissions can be achieved until 2020 by extending the Specified Gas Emission Regulation (SGER). Under SEGR, coal-fired generation must reduce their emissions by 20% or pay a penalty of $30 per tonne starting in 2017.

Immediately, the Government will also negotiate new binding five-year contracts from 2020 to 2025 that **transfer control of when the coal plants operate, from coal plant owners to the Government of Alberta-sponsored Balancing Pool. To compensate the coal plant owners, the new contracts will pay an annual fixed payment that pays the remaining invested capital in each plant and other necessary fixed costs (labour etc.) to keep each plant available for the five-year period between 2020 and 2025.** New legislation would at the same time be required to definitively direct the Balancing Pool to **remove the coal plants from the generation fleet but keep them available only to operate under emergency reliability conditions between the years 2020 and 2025.** Legislation of this nature is needed to ensure the step change reduction in coal emissions is achieved starting in the year 2020 and sustained thereafter. A legislated deadline for coal plant retirement will in turn drive investment into and development of new renewable and natural gas projects to replace 80% of the legacy coal generation by 2020 and the dismantling of these plants in 2025.

Renewable Energy

New renewable generation projects can and should be built to replace the legacy coal generation to ensure a significant reduction in GHG emissions. While a price on carbon may improve the price competitiveness of renewable generation projects versus natural gas, it alone will not be sufficient to ensure the timely delivery of the volume of renewables needed in Alberta without detrimental cost impacts to ratepayers. A policy based on combining carbon prices with the current electricity market in Alberta will, in our view, face significant challenges in meeting the government's goals of attracting a significant amount of renewable energy generation in Alberta and lowering costs.

Directing the Balancing Pool to contract for the most economic renewables by way of a competitive procurement process is a better solution for ratepayers. However, to ensure consumers enjoy the lowest possible cost for new renewables, only a portion of a project's revenues should be provided via the contract procured and backed up by the Balancing Pool. The balance of the required revenues should be exposed to market forces by leaving the developer to secure them from Alberta's existing

competitive energy market. In other Canadian jurisdictions like Ontario, crown utilities have paid for 100% of the output from renewable projects often to the detriment of consumers. **Berkshire Hathaway Energy has successfully used hybrid contract structures in the U.S. and is prepared to immediately invest in a pilot renewable project with the Balancing Pool to prove up the hybrid concept (detailed example below).**

Natural Gas Generation

Natural gas, abundant in Alberta, will play a role as a 'bridge' fuel during the transition to a fully renewable energy future and provide a significant portion of the instantaneous firm generation needed to serve peak load in the province. Given the success of the current "energy-only" market structure in enabling large amounts of increasingly economic natural gas generation, little needs to be done by government to ensure the market will respond and deliver the needed bridge. With the coal retirement schedule laid out publicly and definitively, developers will have very strong signals to build the most competitive gas or cogeneration plants. The large number of generation players, the short development time requirements, flexibility in size and location, and low capital investments will ensure new gas generation is built in response to those signals.

Intermittency

Under this plan, while Alberta's new energy mix will achieve a step change reduction in emissions it will also be more dependent upon intermittent or 'non-firm' supply sources. Alberta's economy and its consumers will demand that a more intermittent generation mix is backed up by cost-effective reserves that will ensure a safe and reliable power supply. Several measures can be taken to secure cost-effective back-up reserves in the run up to full coal retirement in 2025 and beyond.

The best means of backing up renewables is to source reserve capacity on a broad system-wide basis, and not on a high-cost project-by-project basis. It is clear that **larger reserve sharing regions or power systems are key to making renewable energy as affordable as possible for consumers. In Iowa for example, Berkshire Hathaway Energy subsidiary MidAmerican Energy has achieved a large and low-cost transition to renewable energy (57% renewables by 2017) by way of a large regional reserve sharing agreement.** The agreement is a low-cost means by which to pool renewable back-up reserves across 16 U.S. states and one Canadian province (Manitoba). **In 2014, Berkshire Hathaway Energy subsidiary PacifiCorp and CaISO jointly implemented a multi-state energy-imbalance market across six U.S. states in the west including California.** This market has proven highly successful in reducing costs for customers. The same opportunity and resources exist in western Canada and Alberta should take the lead in establishing a resource sharing agreement across Manitoba, Saskatchewan, Alberta and British Columbia.

Technology also provides a viable means to support renewables. Electricity storage is a fast-developing element of the electricity infrastructure mix that provides localized firming of large-scale renewable generation. Given the imperative to increase renewable generation, policy should be developed to drive investment in storage in Alberta at the same time regional resource sharing is pursued.

As the solutions noted above are pursued, a percentage of Alberta's new natural gas 'bridging' generation can provide cost-effective back-up reserves. At the same time Alberta can, under this plan, rely on a safety net of last resort that will be provided by the existing coal plants that, now under the complete control of the government, can be relied upon to firm renewables but only when absolutely necessary.

Design and Implementation Details

A. Phasing out coal-fired generation

Outcomes

- Reduced output and emissions from coal-fired generation from 2016 – 2020
- Step-change (80%) reduction in output and emission from coal-fired generation by 2020
- Dismantling coal units by 2025

Specific Measure/Steps

1. Institutionalize the transfer of legacy coal plant control
   - Starting immediately, negotiate a PPA extension between government-controlled Balancing Pool (BP) and the legacy coal owners.
   - The new contracts would move 100% control of all coal plants to the BP in year 2020.
   - In return for coal owners giving up this control, the BP would pay the coal owners a fixed annual amount to recover their investment cost (un-depreciated investment) and annual operating costs, including salaries for employees, to keep the plants available.
   - The annual payment would not include any amount for potential lost future profits.
2. Establish rules for the use of coal capacity under the BP's control
   - Reliability assurance, providing a safety net for the system during the transition.
   - Reliability is the only criterion on which to run coal capacity. Cost/market price should not be the criteria governing the use of coal capacity.
   - If run, offer capacity at cost, which is current offer practice at the BP.
   - Codify the rules through legislation.

B. Grow renewable generation (from today's 5% output) with certainty and at low cost

Outcomes

- 10% of generation output (GWh) from renewable generation by 2020
- 20% of generation output (GWh) from renewable generation by 2025
- 30% of generation output (GWh) from renewable generation by 2030

Specific Measures/Steps

1. Conduct a pilot PPA project by 2016 to demonstrate the effectiveness of an innovative PPA design in achieving better risk allocation and lowering costs to customers. **Berkshire Hathaway Energy has used a unique structure to help many jurisdictions transition to a renewable energy future in a low-cost way. Berkshire Hathaway Energy Canada (BHEC) would be willing to immediately invest in a pilot project in Alberta to prove out the concept in this market.** This could then be a model for future rapid expansion of renewable energy in our province.

   The best way to describe the framework is by way of example. Assume a medium-size wind power project of 200 MW. The cost of such a project would be approximately $500M. Half of the money or $250M for the project could come from debt. That leaves $250M to be provided by the owners of the project. **Berkshire Hathaway Energy Canada (BHEC) would be willing to provide $200M to fund the pilot** while the Government of Alberta controlled Balancing Pool would provide $50M (the Balancing Pool currently has close to $1 billion in funds). The ownership of the project would then be 80% BHEC and 20% Balancing Pool.

   To pilot a low-cost renewable Power Purchase Agreement (PPA) contract, the Balancing Pool would provide a 10-year PPA contract to the project. The pilot project would use the funds from the PPA payment to pay labour costs, financing costs and depending on the size of contract some return of the equity invested. The rest of the funds for the project would be variable and would come from Alberta's competitive power market. **Unlike other Canadian provincial PPAs, any excess funds paid by the Balancing Pool or profits made in the competitive market would go to convert ownership from BHEC to the Balancing Pool, such that upon the expiry of the PPA at year 10, the Balancing Pool would be the majority owner** (a goal of 75% ownership is achievable). The Balancing Pool could then operate the project for another 10 to 20 years for the benefit of Albertans. BHEC offers to immediately invest this capital and help build the agreements in Alberta with the Balancing Pool and the debt providers, in hopes that it will be a model that could be offered broadly to kick start a low-cost transition to renewables.

2. Introduce a competitive procurement process for renewable generation with long-term contracts.
   - Amend Balancing Pool Act to provide the Balancing Pool the mandate to enter into long-term contracts with the developers selected through a competitive procurement process and recover the cost through a mechanism similar to what the Balancing Pool is using today.
   - Direct the Balancing Pool to put in place appropriate design of the procurement process and PPA contracts with the following key features:
     - Project proponents would be required to submit their bids for a fixed payment, in $/MWh basis, that is required to recover all-in cost, taking into account expected market revenues.

- The Balancing Pool will select the lowest-cost bidders first to meet the procurement target.
- Each bidder will receive a fixed payment from the BP and revenue from the competitive power pool for its generation output.
- Non-price factors such as high First Nations content could also be included in the criteria to drive progress on other government priorities.

• Amend the Electric Utilities Act to expand AESO's role to implement an integrated planning process to support the Balancing Pool's renewable procurement process, including:
- Forecast the size, type, location and timing of renewable generation to be procured by the Balancing Pool to meet the renewable development targets.
- Take into account the impact of demand management, energy efficiency and conservation on the need for new renewable generation.

3. Conduct first procurement by 2017 with new projects in service by 2020

C. Ensure sufficient firming resources for renewable generation

Outcome

• Sufficient resources in place to 'firm' intermittent renewable generation at lowest possible cost

Specific Measures and Steps

1. Mandate the Balancing Pool and/or the AESO to negotiate bilateral arrangements with BC Hydro, SaskPower and Manitoba Hydro to optimize the use of hydro and interties to firm up the intermittent renewable outputs across Western Canada; including:
   - Dedicate a portion of the existing intertie capacity to renewable firming
   - Provide the AESO options to call other utility's capacity
   - Provide the other utilities priority in using the dedicated intertie for commercial purposes
   - Provide the ability for Alberta to back-up secondary hydro in other provinces to support those provinces long-term firm sales into high value markets.
2. Direct the Alberta Electric System Operator (AESO) to utilize its expanded planning function to forecast the firming required from the existing and other markets.
   - Mandate the AESO to plan development to capture the value of large regional markets that offer geographic, resource and load diversities.
   - Take into account the **recent examples of successful resource sharing arrangements between Ontario and Quebec regarding their sharing agreement for 500 MW of capacity and between Manitoba Hydro and Saskatchewan regarding 500 MW of hydro-thermal firming.**

3. Mandate the Balancing Pool and the AESO to procure storage and other flexible assets to provide firming services through a central procurement program or a mechanism similar to Alberta's current ancillary services markets.
4. Allow the Balancing Pool and the AESO to run coal capacity under amended PPAs to support reliability under clearly defined reliability circumstances.

D. Investment in gas-fired generation and flexible assets

Outcomes

- Alberta's existing energy-only market continues to operate and provide price signals for investment in natural gas generation.

Specific Measures and Steps

1. Implement incentive measures to encourage cogeneration developments that deliver low-emission and low-cost electricity, and produce public benefits in creating jobs and improving the brand of Alberta's oil and gas industry.
2. Direct the AESO and the Alberta Utilities Commission to modify certain rules to make efficient use of storage assets for ancillary services to support renewable integration, intertie restoration, and grid optimization.