

# Cenovus Energy

## Discussion Paper on Alberta Climate Leadership

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### 1.0 Overview

Cenovus shares the public’s concern that climate change is one of the greatest global challenges of our times. Our product is part of the problem. We will be part of the solution.

As the jurisdiction with the world’s third largest oil resource, there is urgency for Albertans to address oil’s contribution to climate change. Oil is an affordable, reliable, transportable and abundantly available product. That’s why it provides 92% of the world’s transportation fuel today. Rather than dismiss oil as a transportation fuel because of the greenhouse gas (GHG) emissions created through its production and consumption, we must work together to find solutions that leverage existing infrastructure and address its carbon impact – not just from the wellhead but also from the tailpipe.

It will take collaboration with bright minds within Alberta and around the world and business, Government and the public all working together to find a solution. This will enable us to preserve oil’s economic benefits for Alberta and Canada while helping the world develop the technologies needed to aid the transition to a low carbon future.

Our company supports the Government of Alberta’s commitment to reduce the province’s GHG emissions and change the trajectory of emissions growth while maintaining the competitiveness of its industrial sectors, particularly energy.

Cenovus encourages the Government to implement policies that both combat the climate change threat and encourage further energy investment in the province. This will support a robust energy sector with the resources to focus on technological advancements. It will keep the knowledge and smart thinking here in Alberta rather than drive companies to other energy-rich jurisdictions, the

majority of which do not have the same focus on reducing carbon in the atmosphere. Additionally, this knowledge is another method to generate additional value from developing Alberta's resources.

Alberta is facing an increasingly competitive carbon-constrained future. If energy development is thought of as a race to meet global energy demand, Alberta's oil and gas sector will have to earn the right to be a leading energy supplier based on performance. To succeed, we must be able to produce energy that is both low-cost and low-carbon. The energy-producing jurisdiction that will succeed will:

- Implement policies which give companies the time and space to innovate;
- Produce its resource efficiently – lowering production costs while significantly reducing carbon emissions to the atmosphere; and,
- Create incentives to accelerate the development and deployment of clean technology to solve the emissions challenge throughout the energy value chain, including consumer consumption.

This paper outlines Cenovus's recommendations on an overarching structure and key elements of Alberta's future climate policy that will enable Alberta to be a leader in the responsible development of energy resources.

Cenovus's recommendations are:

1. The Government proceed with a Carbon Innovation Stimulus<sup>1</sup> approach, specifically an enhancement of the existing Alberta policy to reduce GHGs from large emitters. This policy incents innovation and collaboration and allows Alberta companies to remain competitive on a global scale. Revenues generated via Carbon Innovation Stimulus compliance payments should go to a technology fund utilized for research into step-change technology.
2. The Government establish an economy-wide carbon pricing system to complement the Carbon Innovation Stimulus approach to effect behaviour change among all emitters in the province not covered by the large emitter policy. A portion of the revenue from this mechanism could be recycled back to low-income households to mitigate the impact. The remaining funds should be dedicated to climate change mitigation, including developing technology to reduce, and eventually eliminate, GHG emissions from the end use of oil.
3. The Government ensure the continued availability of cogeneration credits as a compliance mechanism and not use the existing technology fund (CEMF) to pay for accelerated coal-fired electrical generation retirement.
4. The Government explore a system which will allow for interprovincial trading of GHG offset credits.
5. The Government adopt the CSA standards on methane, which are currently under development, as its methane reduction policy for upstream oil and gas.
6. The Government consider regulatory and financial framework changes to incent faster technology development and deployment.

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<sup>1</sup> The proposed Carbon Innovation Stimulus approach would build on the current Alberta policy that regulates emissions on a facility performance basis and incents technology development by putting a price on carbon.

There is an opportunity for Alberta to create a climate change policy that will position the province as a leader in the international climate dialogue. The Government and the energy sector have an opportunity to work together to demonstrate climate change action from a position of leadership and strength.

## 2.0 Carbon pricing architecture

As Alberta's climate change policy is developed, it is important to ensure that fiscal, regulatory and environmental policies are harmonized to provide the best platform for developing and deploying new, carbon-reducing technology. The province must maintain its competitiveness for investment and prevent carbon leakage, where investors move away from Albertan investments to other jurisdictions with little or no GHG emissions controls, thus potentially increasing global GHG emissions and disadvantaging the Alberta economy while shifting the burden of solving the global carbon challenge to other jurisdictions.

The structure of the carbon policy will need to address two key challenges:

1. The need for Alberta's large-scale, export-focused industries to innovate to maintain competitiveness in the global market on both cost and carbon; and,
2. The need to incent behaviour change to reduce carbon emissions among all other emitters in the province

To address the first challenge, Alberta's carbon policy must enable businesses to internalize the price on carbon so that they are able to make decisions on technology and act on those decisions while continuing to remain competitive. The three most commonly discussed policy architectures to help accomplish that are:

- Alberta's current regulation that regulates emissions on individual facility performance;
- An economy-wide carbon tax; and,
- A cap and trade model that places an absolute cap on emissions that declines over time.

Cenovus feels that the GHG reduction policy which best incents innovation, incents collaboration and allows Alberta companies to remain competitive on a global scale is an enhancement of the existing Alberta climate policy referred to herein as the Carbon Innovation Stimulus approach.

This approach:

- creates investment certainty;
- gives companies the time and space to innovate;
- incents technological development;
- creates an appropriate carbon price signal; and
- allows Alberta companies to remain competitive in global markets.

To maintain an attractive investment environment in Alberta, the cost of compliance must be offset through different mechanisms such as continuing royalty deductibility of the compliance costs, tax rebates, research and development credits, and other appropriate mechanisms. Carbon policy compliance revenues should be directed to a technology fund and invested in long-term, high impact technology solutions that will change Alberta's emissions trajectory. The Carbon Innovation Stimulus approach supports the development of technologies which will not only reduce carbon emissions, but can also be applied on a global scale. In this way, Alberta can have a far greater impact on a global scale than simply reducing the province's 0.2 percent of global emissions.

As a complement to this innovation-focused policy for large sources of emissions in the Province, an economy-wide carbon price should be established to enable the necessary behaviour change as we move towards a low-carbon future. To mitigate impact to low-income households, a portion of the funds can be recycled back to them, with the remainder of the funds allocated to climate change mitigation.

A successful policy architecture should consider the Alberta industrial landscape in order to leverage available opportunities rather than blindly align with other jurisdictions' emissions reduction policies. To that end, cogeneration credits and offsets are Alberta specific opportunities to reduce emissions, whereas there is limited opportunity in Alberta to further significantly reduce methane emissions in an economically competitive manner. These opportunities are discussed more fully below.

**Cenovus recommendation:** The Government proceed with a Carbon Innovation Stimulus approach, specifically an enhancement of the existing Alberta policy to reduce GHGs from large emitters. This policy incents innovation and collaboration and allows Alberta companies to remain competitive on a global scale. Revenues generated via Carbon Innovation Stimulus compliance payments should go to a technology fund utilized for research into step-change technology.

**Cenovus recommendation:** The Government establish an economy-wide carbon pricing system to complement the Carbon Innovation Stimulus approach to effect behaviour change among all emitters in the province not covered by the large emitter policy. A portion of the revenue from this mechanism could be recycled back to low-income households to mitigate the impact of the carbon pricing system. The remaining funds should be dedicated to climate change mitigation, including developing technology to reduce, and eventually eliminate, GHG emissions from the end use of oil.

## A. Cogeneration

Cenovus supports the availability of cogeneration credits as a compliance mechanism. Cogeneration represents an opportunity to support Alberta's need for new power generation, enabling an accelerated retirement of coal-fired power plants, while reducing the GHG intensity of Alberta's electricity grid.

Alberta's current cogeneration capacity benefits industry and Alberta with reliable, base load electricity at industrial load sites. Power supplied to the Alberta grid is a byproduct of the steam generated to produce bitumen. Adding this power to the grid currently reduces the average cost of power for all consumers. Combined heat and power generation from a single fuel source produces considerably lower GHG emissions than coal-fired electricity generation. Cogeneration can also provide the

flexibility to balance the intermittent production of renewables and is incrementally more energy efficient than natural gas combined cycle by way of producing electricity as a co-product, rather than a primary product.

However, installing new cogeneration units will not happen in the absence of an economically healthy oil sands sector. The choice to install cogeneration at industrial facilities is not business as usual because of infrastructure, cost, and transmission capacity considerations. Cogeneration requires higher capital investment and operating costs when compared to the use of traditional boilers and grid-supplied electricity at a production facility. This is especially relevant in Alberta's capital-constrained market. If cogeneration is to be sized to meet both on site steam and to export power, there must be an incentive for these investments.

Transmission capacity of the current Alberta grid is a key consideration for cogeneration installations. Current transmission capacity in the Northern region, where oil sands cogeneration plants operate, consists of four 240 kV transmission lines in the Fort McMurray cutplane and three 240 kV transmission lines in the Northwest cutplane. In 2014, the Alberta Electric System Operator reported that the existing transmission system in the Cold Lake area is inadequate to facilitate the forecast load and generation expected from cogeneration in the area.<sup>2</sup> Meanwhile, thermal loading and voltage violations have been observed in the Northern region from high generation scenarios that do not have adequate transmission capacity. If more cogeneration capacity is to be brought on stream, the Government will have a role to play in ensuring transmission capacity is in place to meet Alberta's electricity needs.

Credits made available to regulated industrial facilities that operate cogeneration based on current practices will help to offset some of the incremental costs of compliance, while directing the funds into improving existing and new operations.

Unlike transportation fuels, for which there are not readily available substitutions, coal-fired electricity generation can be replaced with fully-commercialized technologies such as cogeneration, natural gas combined cycle and renewable generation. Cogeneration can help meet the province's base load electricity demand at a low cost to consumers, and accelerate the shutdown of coal-fired power plants in advance of the federal regulatory requirement, or as mandated by the Clean Air Strategic Alliance Electricity Framework, resulting in a significant reduction to the province's GHG emissions.

While it is expected that the electricity sector will require some form of incentive to follow through with an accelerated retirement timeline, Cenovus does not support offsetting the cost of the stranded capital by using the Climate Change Emissions Management Fund (CCEMF) to pay for accelerated coal retirement.

**Cenovus recommendation:** The Government should ensure the continued availability of cogeneration credits as a compliance mechanism, and the Government should not use the existing technology fund (CCEMF) to pay for accelerated coal-fired electrical generation retirement.

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<sup>2</sup> [http://www.aeso.ca/downloads/AESO\\_2013\\_Long-termTransmissionPlan\\_Web.pdf](http://www.aeso.ca/downloads/AESO_2013_Long-termTransmissionPlan_Web.pdf)

## B. Offsets

Cenovus supports a robust and credible offsets system for Alberta while recognizing that maintaining compliance mechanism credibility is crucial for both policy reputation and to gain access to other carbon markets and sources of low-cost GHG abatement technologies.

There is an opportunity for advancing interprovincial alliances with provinces such as Ontario, Quebec and British Columbia to bolster Alberta's reputation and to allow carbon emission reduction credits to be freely traded across provincial borders. Cenovus is encouraging the expansion of the offset market to these other provinces as a means to expand the opportunity to offset overall carbon emissions and promote interprovincial harmonization of carbon markets.

This can be done through linking offsets markets inter-provincially, which will improve collective performance across Canada. The key advantage to having access to inter-provincial offsets is access to ingenuity and clean technology ideas nationwide, and the creation of incentives for investment.

We believe that a critical element of success of Alberta's future climate policy construct will be flexibility in compliance mechanisms. Maintaining the ability to use offsets for a portion of compliance is essential for risk mitigation and incenting economic emissions reductions from eligible climate mitigation activities. We recognize there are concerns around the quality and accurate measurement of offsets. This provides Alberta with an opportunity to introduce quality standards and strong protocols that can alleviate these concerns.

**Cenovus recommendation:** The Government explore a system which will allow for interprovincial trading of GHG offset credits.

## C. Methane

It is important that the different operating processes of the oil and gas sectors in the U.S. and in Alberta be a key consideration when comparing targets, policy architecture and expected outcomes of methane emissions reduction plans. Alberta has had methane regulations for a lengthy period, while the U.S. has not, so they are in the process of catching up.

Longstanding and robust provincial regulatory systems have enabled significant methane reductions in the province, particularly from the oil and gas sector. While Cenovus recognizes the political impetus to implement methane regulations that are aligned with the U.S. commitment to reduce methane from their upstream oil and gas sector by 40 percent, the current situation in Alberta differs greatly from that of the U.S.

The success of the existing provincial regulatory systems indicates that these regulations can continue to serve as a competitive model for methane performance in Alberta (and Canada). The existing provincial standards have a focus on outcome-based requirements that have resulted in efficient emissions reductions. These standards are flexible and foster innovative solutions that achieve operational efficiencies and emissions reductions. In 2014, the Alberta Energy Regulator (AER) reported that the venting conservation rate in the province, which is one of the primary sources of upstream methane emissions, was over 95 percent, the best of any North American jurisdiction.

There is currently an initiative underway (Canadian Standards Association - CSAZ620) that is looking at strengthening methane performance in the upstream oil and gas sector by increasing emissions reduction requirements from venting and fugitive emissions.<sup>3</sup> This draft standard has been in development over the last 18 months, with involvement from Alberta Environment and Parks, the federal government and industry members.

Given the volume of work that has gone into this draft standard, Cenovus proposes that the Government of Alberta review this draft as a suitable mechanism for regulating methane from the sector. If implemented, the CSA standard would establish best management practices for fugitive emissions as well as reduce venting in the province, above and beyond current standards.

**Cenovus recommendation:** The Government adopt the CSA standards on methane, which are currently under development, as its methane reduction policy for upstream oil and gas.

### 3.0. Low-carbon technology development

Oil and gas production is both capital and emissions intensive. Technology is the solution to the oil and gas sector's emissions challenge. In Alberta, we have the opportunity to develop technologies that solve both the cost and carbon challenges. Alberta can be a global hub for new, lower carbon technology and innovation, and become North America's largest clean technology market.

The technology challenge in the oil and gas sector is not only a deployment challenge, it is also a development challenge; exacerbated today by constrained capital and resources. New technology takes between seven and ten years to go from conceptual stages to first commercial implementation. Wider uptake of new technology will typically take an additional five to ten years following initial commercial implementation. There are currently not a large number of high-impact carbon reduction technology options available for immediate deployment. Cenovus believes that the solution to this challenge is a provincial technology fund created from revenues derived from the carbon pricing framework, such as the CCEMF, mandated to develop game-changing technologies that will definitively change the emissions trajectory of the sector in the next ten to fifteen years. In this development space, there is also the opportunity to collaborate with other business sectors, entrepreneurs and governments to identify impactful and lasting technology solutions.

#### *Technology Development*

Oil sands companies are working independently and collaboratively on technologies to improve the sector's GHG performance. Through Canada's Oil Sands Innovation Alliance (COSIA) companies have mobilized global solutions providers to develop ideas and resources to significantly reduce the sector's GHG emissions in the following areas:

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<sup>3</sup> This initiative includes sources such as reciprocating engines, compressor packing, depressurization of process equipment, glycol dehydrators, loading/unloading hydrocarbon liquids, pneumatic instruments, pneumatic pumps, storage tanks, solution gas capture, well completions, testing and well surface casing vents.

- Higher efficiency steam boilers – currently the sector is able to produce steam at 85 to 88 percent thermal efficiency using once through steam generators. The higher the thermal efficiency of steam production, the less fuel combusted, thus producing fewer GHG emissions.
- Higher value use of low-grade or waste heat – even though in situ oil sands facilities are designed as efficiently as possible, due to several points of heat transfer, lower-temperature water and/or steam is often underused. Using these low-grade heat sources more effectively in the process will displace some of the high-grade heat needs and subsequently reduce fuel consumption at the facilities.
- New heat exchanger technology– this increases the efficiency of the heat transfer process, which can have a significant impact given that much of the SAGD process relies heavily on the heat and mass balance.
- Downhole steam generation – reduces the heat losses that occur in transportation of the steam from the boilers to the wells. Additionally, downhole steam generation can be done at a lower temperature and thus, reduce fuel consumption and store a majority of the GHG emissions produced underground, instead of emitting them into the atmosphere.
- Enriched combustion air – by reducing the CO<sub>2</sub> and NO<sub>x</sub> components of the air input into fuel combustion, it is possible to reduce GHG emissions from combustion significantly.
- Natural gas decarbonization – this is similar to the above concept, only in this case, the carbon component of the fuel gas being combusted in the boilers is removed.

Any regulatory structure put in place to solve the carbon challenge should consider the following:

- The carbon price should incent companies to implement technology but also allow industry to remain economically competitive so it has the capital necessary to deploy that technology.
- The structure should not penalize decisions to implement new game-changing technology.
- Regulatory approval timelines and administrative systems should be designed to encourage innovation and allow for faster deployment of new technology.

Table 2, below, highlights some of the technologies currently being developed in the oil sands sector to reduce carbon emissions.

**Table 2 – Ongoing oil sands technology development initiatives by timeframe**

Timeframe	Technology initiatives	GHG reduction potential	Challenges
0 – 5 years	Solvent-aided injection technology to supplement the steam requirement and boost production without additional steam	15-25% (emissions intensity)	Not suitable for all reservoirs, and where suitable performance may not be comparable
	Energy efficiency improvements in heat exchanger design, piping layout, instrumentation and metering	1-5% (emissions intensity)	Actual performance gets lost in production economics
	Well design	10-15% (emissions intensity)	While administratively straightforward, the initiative has not been widely commercially tested to ascertain feasibility
5 – 10 years	Non-condensable gas injection for in situ combustion to replace steam generation on surface facility	>50% (emissions intensity)	Not suitable for all reservoirs; not tested enough to guarantee feasibility or results
	CO2 co-injection that insulates the reservoir and reduces steam (heat) required to reduce bitumen viscosity	>20% (emissions intensity)	Not suitable for all reservoirs; not tested enough to guarantee feasibility or results
	Molten Carbonate Fuel Cell as a carbon capture and co-product technology – production of electricity that can be used within the facility	90% (absolute emissions)	Early stages being developed for a pilot test; actual results not known
	Partial upgrading by removing asphaltenes	20-30% (absolute emissions)	Currently being developed as promising technology opportunities; identifying use for asphaltenes to minimize waste streams
>10 years	In situ recovery technologies to replace steam entirely – such as, electro-magnetic induction, electro-thermal dynamic stripping process, etc.	High impact potential	Challenges and opportunities currently unknown
	Sequestration of solid carbon in the form of coke	High impact potential	Challenges and opportunities currently unknown
	Alternative steam generation processes – bio heat, direct contact steam generation, electricity, etc.	High impact potential	Challenges and opportunities currently unknown

Note that traditional carbon capture and storage (CCS) is not listed in Table 2. This is because the process is not economically viable for in situ oil sands facilities at this time. CCS could be viable if the

captured CO<sub>2</sub> were utilized in other products or processes and consumed within a system, rather than stored. Alternatively, captured CO<sub>2</sub> can be utilized in enhanced oil recovery (EOR) such as at Cenovus's Weyburn operation in Saskatchewan where about 24 million tonnes of CO<sub>2</sub> have been safely stored as part of that EOR operation.

In addition to these initiatives, on September 29, 2015, the NRG COSIA Carbon XPrize was announced. The Carbon XPrize, sponsored by COSIA and NRG Energy, is a carbon technology competition that will award \$20 million to the teams that can convert the largest volume of CO<sub>2</sub> into usable products with the most value, including economic and environmental considerations. This is the second largest XPrize<sup>4</sup> ever awarded.

### *Technology Deployment*

Alberta's regulatory structure has been very successful at ensuring full environmental reviews are taken, consultation with affected parties is comprehensive and their concerns are heard. Where the regulatory structure could use some improvement is in its ability to quickly incorporate new technology.

Companies are hesitant to change an application, to use a better-suited piece of equipment for example, because it will cause delays in the regulatory process. Additionally, the existing regulatory process takes multiple years, delaying the demonstrated benefits of an investment in new technologies. Changing the regulatory structure to facilitate incorporation of new technologies or replacement of equipment would facilitate faster deployment of developing and commercially proven technologies. We would encourage the Government to support the Alberta Energy Regulator as it investigates opportunities to drive additional efficiencies into the regulatory process, while maintaining the rigor of the system.

**Cenovus recommendation:** The Government consider changes to the regulatory and financial framework to incent faster technology development and deployment as part of the Carbon Innovation Stimulus approach.

## **4.0 Conclusion**

Oil remains a valuable source of energy due to its transportability, its high energy density and its flexibility in application. It is used for everything from transportation fuels to building blocks for hospital equipment, synthetic drugs and smart phones. This globally available resource will continue to play an important role in the global economy and in raising and maintaining the standard of living around the world for the foreseeable future.

Rather than dismissing oil, we need to address the carbon impacts of using oil as a transportation fuel so we can preserve the economic benefits of oil for Albertans and for Canadians. The Alberta oil and gas industry has a history of technological innovation and risk taking. Building on that strength,

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<sup>4</sup> The XPrize Foundation is an educational nonprofit organization that facilitates technological breakthroughs and innovation for the benefit of humanity through competitions. Some examples of areas of innovation currently underway are bionics, cancer treatment, asteroid deflection, and many more areas.

working with Government and using partnerships both inside and outside the province, a technological solution to the carbon challenge will be found. It is why it is critical that the province's GHG reduction strategy leave companies with the space, and time, to innovate.

Cenovus's six policy recommendations, recapped below, will allow for collaboration amongst government, academia, industry and entrepreneurs here in Alberta, across Canada and around the globe.

Cenovus's recommendations are:

1. The Government proceed with a Carbon Innovation Stimulus approach, specifically an enhancement of the existing Alberta policy to reduce GHGs from large emitters. This policy incents innovation and collaboration and allows Alberta companies to remain competitive on a global scale. The Government should direct revenues generated via Carbon Innovation Stimulus compliance payments to a technology fund utilized for research into step-change technology.
2. The Government establish an economy-wide carbon pricing system to complement the Carbon Innovation Stimulus approach to effect behaviour change among all emitters in the province not covered by the large emitter policy. A portion of the revenue from this mechanism could be recycled back to low-income households to mitigate the impact. The remaining funds should be dedicated to climate change mitigation, including developing technology to reduce, and eventually eliminate, GHG emissions from the end use of oil.
3. The Government ensure the continued availability of cogeneration credits as a compliance mechanism and not use the existing technology fund (CCEMF) to pay for accelerated coal-fired electrical generation retirement.
4. The Government explore a system which will allow for interprovincial trading of GHG offset credits.
5. The Government adopt the CSA standards on methane, which are currently under development, as its methane reduction policy for upstream oil and gas.
6. The Government consider regulatory and financial framework changes to incent faster technology development and deployment as part of the Carbon Innovation Stimulus approach.

We urge the panel to recommend to the Government of Alberta the above suite of policy options in order to take advantage of Alberta's unique strengths and overcome our carbon challenge.

Through collaboration we can build a cleaner energy future for Alberta and Canada, with emissions-free oil a real possibility and an important and valued part of our energy future.