Role of Policy in Climate Change Adaptation

An analysis of policy drivers and barriers in the Alberta Oil and Gas Sector.

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Executive Summary

Growing global demand for oil and gas is expected to result in the continued expansion of fossil fuel production in Canada over the next two decades.[1] The oil and gas sector, while often identified as a contributor to climate change due to its emissions of greenhouse gases, will also experience disruptions over the coming decades due increasing weather and climate variability.

The Oil and Gas Sector and Risks

Climate change will present risks for the upstream oil and gas sector in Canada at all stages: exploration, extraction, processing, transportation, as well as remediation and reclamation – and opportunities for those actors able to manage those risks appropriately. Globally, the oil and gas sector is considered a leader in understanding and incorporating risk into their decision making. However, it is unclear if operators within the sector are responding adequately to the changing nature of risk in a changing climate.

The Role of Policies

Policy can play a role in creating environments that can enable or drive adaptation; it also has the ability to impede it. By examining governing policies to identify where and to what extent they influence adaptation, this study aims to provide additional guidance to policymakers and industry experts working at the intersection of climate risk and adaptation in the oil and gas sector and in other natural resources sectors.

The project team worked with a cross-disciplinary advisory committee, and consulted oil and gas sector experts in Alberta, to identify relevant policies to be evaluated, review the findings and provide additional context to the recommendations and discussion.

Five policies are evaluated and discussed in this report. The primary findings related to those policies are presented in the table below.

Table E1: Summary of policy findings and recommendations

Summary of findings
Environmental Assessment Regulation
While not explicitly required, considerations for climate change risks to operations are encouraged in a guidance document and included in almost all Environmental Impact Assessments (EIA) with varying levels of details.
Two primary features of the policy can enable adaptation: (i) it ensures open access to all information contained in EIAs and (ii) it promotes public and expert engagement in shaping the content and scope of EIAs.

[1] See, for example, "'Canada's Energy Future 2013 – Energy Supply and Demand Projections to 2035', National Energy Board, November 2013" and "'International Energy Outlook 2014', U.S. Energy Information Administration, September 2014"

Other aspects of the policy are found to hinder adaptation and could be improved:
- EIA outputs could explicitly require consideration of climate change risks and adaptation;
- Guidance documents could be strengthened to ensure consistency across EIAs and promote integration of climate adaptation beyond risks to operations;
- Narrowing eligible participants to those 'directly affected' limits the scope of evaluation.

Responsible Energy Development Act (REDA)

As an 'umbrella' policy, REDA's influence on adaptation depends on the various enactments (Public Lands Act, Water Acts, etc.) that transfer powers to the Alberta Energy Regulator over all aspects of energy sector projects.

Several elements within REDA are found to offer opportunities for adaptation by: (i) providing flexibility within policy design and implementation, (ii) facilitating alignment with other policies and referencing other acts, or (iii) promoting open information and public engagement.

Other aspects of the policy can hinder adaptation and could be strengthened:
- REDA could include clear references and guidance to climate impacts and adaptation;
- Modifying limitations on eligibility in review processes could strengthen adaptation.

Oil and Gas Disclosure Regulation

Although mandatory environmental reporting offers opportunities for climate change impacts to be considered, the proportion of companies reporting on climate risks remains low. Other voluntary avenues addressing climate change impacts are not widely used.

Elements of the policy favorable to adaptation include: (i) discussion of uncertainty and risk management terminology, and (ii) references to the Canadian Oil and Gas Evaluation (COGE) Handbook as guidance document.

Actions are identified to improve some elements of the policy that hinder adaptation:
- Updating guidance documents (COGE) to include climate change as a factor of risks and costs;
- Supporting Alberta Securities Commission's review of disclosure regulations to provide investors with information on climate risks and risk management.

Alberta Wetland Policy (AWP)

The recently adopted AWP is relevant to a large number of energy projects that operate in regions where wetlands have been highly impacted.

Many principles of adaptive policy incorporated in the AWP (adaptive management, continuous learning and review, integration of scientific knowledge on hydrology and ecosystems, etc.) can be leveraged to advance climate change adaptation. They also create expectations for planning comprehensive and long-term resilience measures.

Incorporating projections related to climate change and hydrology and anticipated wetland impacts would further promote considerations for climate change adaptation in the industry.

Lower Athabasca Land Use Plan (LARP)

Explicit inclusion of climate change in the LARP is an important step for adaptation at the regional level since the LARP lays strategic directions for the implementation of other policies (such as REDA).

Many principles of adaptive policy incorporated in the LARP (long-term planning, scenario planning tools, etc.) can be leveraged to advance climate change adaptation. Specific drivers of adaptation include references to risk management and stated expectations for

future environmental outcomes.

The policy's effect on adaptation could be strengthened by including considerations for climate changes in various areas: monitoring, infrastructure discussion, scenario planning, and discussions on long-term projections of various bioclimate profiles.

Conclusions

This review reveals that there is space within policy to enable the oil and gas sector and its stakeholders to be proactive in responding to climate change risks. Within the limited set of policies reviewed we identified no explicit barriers to adaptation, although some aspects of these policies could be improved. On the other hand, the policies evaluated included a few specific drivers of adaptation and many aspects favorable to the integration of adaptation practices. The analysis demonstrates that there are opportunities to strengthen adaptation by leveraging principles of adaptive management already incorporated in policies.

Generally, the degree to which adaptation is enabled or driven in the oil and gas sector will depend on the implementation of the overall policy framework through the relevant agencies.

Recommendations for Strengthening Adaptation

The report highlights seven key areas of opportunity to strengthen the consideration of climate change impacts and the integration of adaptation measures in the oil and gas sector. These findings from the Alberta oil and gas sector are also transferrable to policy and decision-makers in other regions and other natural resources sectors.

Further research and analysis should be provided to stakeholders of the oil and gas sector on local and regional climate impacts and risks based on relevant and up-to-date information.

Guidance documents should be developed or strengthened to ensure widespread integration of climate change risks consideration and improve consistency and quality of monitoring and reporting within the oil and gas sector.

Collaboration between government, operators, industry associations, consultants and other stakeholders would allow for a greater understanding of sector best practices and efficient information dissemination.

Consultation processes can be strengthened by encouraging experts or stakeholders with information relevant to climate change science, climate impacts and climate adaptation to participate.

Policies that include indicators, monitoring, evaluation and review processes can be strengthened by adding climate-related indicators and/or through providing information on the relationship between the selected indicators and climate change where relevant.

When the objectives and desired outcomes of policy are dependent on climate change, an explicit recognition and discussion of this relationship is required. A reliance on tools and processes for long term management of natural resources that do not incorporate climate change increases the risk that policy objectives will not be achieved.

An alignment of timeframes should allow for the easy integration of climate risks when necessary. Climate change projections and impacts align with planning timeframes and should be included in scenarios of future growth, resource and land use.

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Introduction

Background

Growing global demand for oil and gas is expected to result in the continued expansion of fossil fuel production in Canada over the next two decades. Projections from the National Energy Board estimate, that even in a sustained low crude-oil price scenario, over 4.4 million barrels per day of oil will be produced by 2035– approximately 1.5 times the production in 2010. Similarly, natural gas production, especially from shale and tight formations, is projected to increase depending on future prices and demand for exports (National Energy Board 2013).

Globally, the oil and gas sector is considered a leader in understanding and incorporating risk into decision making processes. However, it is unclear whether individual operators within the sector are considering risks similarly, or whether they are adequately able to deal with the changing 'risk landscape' which is exacerbated by a changing climate (Acclimatise 2009).

While significant uncertainties and knowledge gaps exist in planning for climate change across sectors, changes to local mean temperatures, precipitation levels, climate variability and extreme weather patterns will have impacts in the short and long term on poorly-planned assets and/or operations associated with major infrastructure projects (Arent et al. 2014). Corporate or sector-led adaptive management approaches that respond to these changes are an important element in reducing risk (or in pursuing opportunity) and ensuring that projects and infrastructure are resilient to possible environmental changes. Given the high capital and operating costs, relatively long lifespans, and geographically dispersed nature of Canadian oil and gas production, it is equally important to ensure long term risks are appropriately considered at the planning and design stage of specific projects or in specific development areas.

Corporate or sector-led efforts to prepare the oil and gas sector for the impacts of a changing climate will be influenced by existing policy regimes. It is important, therefore to better understand the policies that govern both exploration and production of oil and gas activities in Canada. These policies, whether internal to the industry or those developed by provincial or federal governments, which mandate specific actions or suggest guidance, may be promoting or hindering the ability for the sector to adapt effectively.

Purpose and Objectives

Climate change will present risks and opportunities for the upstream oil and gas sector in Canada at all stages: exploration, extraction, processing, transportation, as well as remediation and reclamation. However, little documentation exists publicly to understand or evaluate the processes or actions undertaken by those in the sector to adapt to climate risks (Lemmen et al., 2014).

While policy can play a role in creating environments that can enable or drive adaptation, it also has the ability to impede it. An enabling policy environment can make adapting to climate change easier, more cost-effective or more efficient, while policy barriers can (intentionally or unintentionally) block or hinder adaptation or competitively disadvantage the proponent

seeking to reduce climate related risk. More so, policy can be *perceived* to be hindering or driving adaptation, even though it may not be. For example, in a recent survey of Canadian energy sector leaders (upstream and transmission companies), while about half of respondents indicated that climate change impacts would have an effect on their ability to meet regulations, 37% believed existing government policies made it difficult to modify management practices in order to adapt to those impacts (A.M. Wiensczyk, et al. 2014).

By examining governing policies to identify where, and to what extent, they enable/hinder adaptation, this study aims to provide additional context to policymakers and industry experts working at the intersection of climate risk and adaptation in the Canadian oil and gas sector. The assessment focused on policies governing exploration and production activities in Alberta for two reasons: 1) the majority of future fossil fuel production growth – and new infrastructure development - is expected from Alberta, and 2) Alberta has a long history of fossil fuel extraction and production, and a commensurate well-developed policy environment.

While the analysis does not provide an exhaustive overview of all policies that effect oil and gas production, it aims to provide a general understanding. Supplemented by discussions with sector and policy experts to provide additional perspective to the analysis, this assessment will hopefully enable broader discussion of policy's role in shaping industry resilience to climate and weather in the short and long term, and will advance climate change adaptation in the natural resources sectors.

Report Structure

The first section of the report reviews climate change impacts and adaptation relevant to the oil and gas sector broadly. A discussion on current risk management approaches to climate change as well as risk management in the sector is provided next. The subsequent section provides a brief background on policy as well as the scope and evaluation framework used in the assessment.

Following that, background and analysis of the five identified policies are presented:

1. Environmental Assessment Regulation
2. Responsible Energy Development Act
3. Oil and Gas Disclosure Regulation
4. Alberta Wetland Policy
5. Lower Athabasca Land Use Plan

Lastly, a discussion of findings and recommendations presents high level lessons applicable to policy-makers and decision-makers in the natural resources sector.

Climate impacts, adaptation and risk management

Climate Impacts

In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) reported that global temperatures are projected to rise 2.6 to 4.8°C above present temperatures by the end of century, accompanied by sea level rise of 0.45 to 0.82m, an increase in the number and severity of storms and extreme weather, and changing precipitation patterns (World Energy Council and University of Cambridge 2014).

The energy sector, while often identified as a contributor to climate change due to its emissions of greenhouse gases during resource production, is also a sector that will experience disruptions over the coming decades due increasing weather and climate variability. The sector is faced with multiple pressures, both social and technical: to meet growing demand for energy worldwide safely and in the face of political and competitive pressures; to reduce its emissions and (it has been widely argued) to transition to lower or low carbon energy sources; and, to ensure that the complete energy supply chain – from production to consumer - is robust and resilient to all types of risk – including those from a changing climate.

Most research and deliberate action on climate adaptation in the energy sector has been in the electricity industry, and hydroelectric generation in particular, which faces acute risks associated with the changing hydrological cycle (Lemmen et al. 2014). The oil and gas sector, by comparison, has seen relatively little public analysis on potential climate impacts and risks.

For the oil and gas sector, climate change is not expected to impact physical reserves directly, but is likely to have impacts throughout the value chain, including during access, development, and transportation (Policy Research Initiative 2009; IPIECA 2013; World Energy Council & University of Cambridge 2014). Upstream and midstream oil and gas sector activities in Canada can be impacted by changes in their operating environments. For example, many oil and gas production activities are water intensive and primarily consumptive (Lemmen et al. 2014), making them vulnerable to changes in the hydrologic cycle and extreme events such as drought. Additionally, energy intensive production methods, such as in situ oilsands development, could experience higher fuel costs at higher ambient temperatures given changes to thermal power generation efficiency and shifting demand patterns (Atern et al. 2014; World Energy Council & University of Cambridge 2014; U.S. Department of Energy 2013).

Similarly, upstream oil and gas activities could be impacted by other types of environmental changes, such as changes in water quality, precipitation levels, changes in freeze-thaw cycles, etc. – all of which could result in additional operating and maintenance costs. The direct, physical impacts of climate change can have immediate and evident costs, such as repair and replacement costs, or lost efficiency of equipment. Civil engineering infrastructure is susceptible

to climate impacts, including extraction and upgrading facilities, pipelines, refineries, and coastal infrastructure (Nissan et al. 2012). Climate change can also affect business continuity, increase operational complexity, and over the long term, particularly in the absence of disclosure and evidence of risk mitigation, affect access to capital or add complication and complexity to business decisions such as new capital investments or mergers and acquisitions (Canadian Performance Reporting Board n.d.).

Further details on potential climate-related impacts to the Canadian oil and gas infrastructure and operations are provided in Table 1 below.

Table 1: Climate related changes and associated impacts to infrastructure and operation

Potential change	Potential impact to the sector
Water (availability)	- Water withdrawal restrictions due to low flow or drought (cooling water, transportation, support systems, refining, process, construction, well completion) (Coburn et al. 2012), (Schaeffer et al. 2012), (Dell 2012)
Water (temperature)	- Cooling efficiency decreased - Limits on discharges (cooling water return to rivers) due to water temperature and ecosystem thresholds
Flooding, water levels	- Damage or failure to bridges or infrastructure at water crossings - Reduced shipping in lakes and rivers (due to low water levels) - Increased flooding of assets(Dell 2012; World Energy Council & University of Cambridge 2014) - Slope and bank instability along watercourses; infrastructure washouts
Precipitation extremes	- Infrastructure damage and failure - Storm, waste, tailings management capacity exceeded - Slope and embankment instability (landslides) (World Energy Council & University of Cambridge 2014) - Reduced structural integrity from chemical, mechanical, biological degradation
Precipitation changes (long term)	- Deterioration of building materials: increased corrosion on metals, increased deterioration on concrete - Constraints on extraction and refining, disruption of transport and support systems from erratic precipitation(Coburn et al. 2012)
Temperature increases	- Cooling efficiency reduced in warm temperatures - Shortened life expectancy of infrastructure - Increased length of construction season
Heat wave extremes	- Labour productivity and health risks - Air quality impacts exacerbated at higher temperatures - Cooling efficiency decreased; loss of peak cooling capacity(Dell 2012) - Electricity availability - Impacts on transportation, pavement and site infrastructure (roads, ramps, bridges, buildings);(Boyle, Cunningham, and Dekens 2013) - Pavement softening, rutting, bleeding - Thermal expansion of materials, including railways.
Fire hazard	- Labour health and safety; - Infrastructure damage or failure
Wind	- Increased wind damage; - Degradation of infrastructure, including increased corrosion
Freeze-thaw cycles	- Degradation of infrastructure and increased corrosion; impacts on transportation and site infrastructure including roads, ramps, bridges,

Potential change	Potential impact to the sector
	pavement, buildings - Decreased damage in regions where freeze-thaw cycles decrease
Ice and snow	- Seasonal changes for exploration/production, lost or reduced access in areas dependent on ice roads, increased access in arctic due to ice loss, decreased travel on tundra and ice roads(Dell 2012) - Degradation, damage or failure of infrastructure - Transportation and supply chain changes or disruptions
Permafrost melting	- Damage or degradation of infrastructure from heaving, thawing, sinkholes, potholes and settlement; - Constraints on extraction and refining, disruption of transport, distribution, support systems(Coburn, Gardiner, and Grossman 2012) - Infrastructure damage from thaw subsidence and frost heaves(Dell 2012) - Decreased travel on tundra and ice roads(Dell 2012)
Ice storm, hailstorm	- Infrastructure damage
Hurricane and storm	- Increased incidence, duration of shipment disruptions(Dell 2012), related to downing of refineries (particularly in Gulf coast) (Coburn, Gardiner, and Grossman 2012),(Schaeffer et al. 2012), and impacts to offshore facilities (Schaeffer et al. 2012)

Climate change risk identification and evaluation often focuses on the direct, physical impacts to operations, infrastructure and assets. However, indirect impacts are recognized in the oil and gas sector, though these are less frequently reported by oil and gas companies in disclosures. For instance, changes in weather patterns (e.g. warmer winters) impacts demand for industry product (Coburn et al. 2012; World Energy Council & University of Cambridge 2014). Other potential indirect impacts on upstream oil and gas activities in Canada could include:

- Impacts on supply or value chain that would have impacts on upstream companies (e.g. impacts on pipelines or refineries including coastal refineries exposed to hurricanes and extreme weather).
- Impacts on associated infrastructure upon which these facilities rely for operation (electricity generation, transportation, communications).
- Impacts on the local environment (watershed, ecosystems). Climate change may necessitate changes to environmental management regimes, including water or wildlife strategies to maintain minimum ecosystem functions. Changes in species migration and conservation planning (requiring changes in operations and management)(Dell 2012)
- Impacts on occupational health and safety (forest fire hazard, heat stress, safety)
- Impacts on market and price (international)
- Changes in political stability associated with socioeconomic impacts in climate, (e.g. prolonged drought, shifting growing seasons, migration or die-off of economically-important species, etc.) (CNA Military Advisory Board 2014; U.S. Department of Defense 2014)

Impacts in urban areas, where cascading system failures are possible, can threaten local economies and disrupt fuel use for extended periods of time. The linkages from upstream production to urban downstream consumption through national infrastructure and supply chain ties mean that impacts or events that are geographically distant (e.g. refineries on east or gulf

coast, major urban centres in North America) can nevertheless have consequences for assets and operations in the western Canadian oil and gas production region.

Age, composition and design are three important non-climate factors that contribute to the degree of vulnerability of infrastructure. Older infrastructure is generally more vulnerable to negative impacts of climate change as it has experienced (due to age) greater levels of stress and deterioration and could possibly be derated (Lemmen et al. 2014). Older infrastructure was built under design premises that may be invalidated by shifting frequency and magnitude of weather-related events.

Adaptation and Risk Management

Risk management is a common and well-developed practice in the energy sector; adaptation to climate change in the oil and gas sector is often discussed in these terms. However it is not clear whether a comprehensive and systemic framework for the analysis of climate risks is available or in use in the sector (Cruz and Krausmann 2013), or if the current approach is sufficient. A general process has previously been identified by the sector to include (a) the identification and evaluation of risk, (b) the development of risk management and risk mitigation strategies, and finally (c) the implementation of those strategies towards adaptation (IPIECA 2013).

The identification and evaluation of risk

Oil and gas resource development and planning is dependent on good risk management including physical, technical, political, policy, and market risks (Policy Research Initiative 2009). Risk management practices are well developed in the oil and gas sector, and are essential in business decision-making (IPIECA 2013).

Oil and gas companies typically have detailed risk management plans and practices that extend from on-the-ground risk management practices, such as probable hazard analysis (PHA), to high level company-wide risk management reporting strategies, such as enterprise risk management or operational excellence approaches (Pinheiro, Cranor, and Anderson 2011).

Risk evaluation can identify areas of risk and consequences, as well as receptors of risk. The sector regularly evaluates risk related to commodity price, operational outages, major environmental or safety incidents, access to reserves, and operation cost management. These risks can have impacts on health and safety, reputation, environment, or can result in regulatory delays or penalties.

One important risk for large investments in long-term infrastructure is that industry effectively 'locks- in' processes and infrastructure that actually reduce business flexibility and ability to adapt as operating/climate conditions change. Designing and building a system/process with a 40 year project lifecycle, for example, that depends on a requisite volume of water, ambient air temperature or some other climate factor – and can't easily be adapted to changing conditions—could result in significant future costs. Climate impacts over the lifespan of the project (water availability, equipment degradation or derating, lost efficiency) may materially affect economic performance if not appropriately considered.

Increasingly, risk in the sector is managed by a balance of internal and external processes (Zeghal and Lajili 2005). Institutional investors are interested in a company's perception and response to risk as it pertains to business strategy, risks (physical, reputational, regulatory, litigation), financial impacts and governance (Canadian Performance Reporting Board). Risks can and are disclosed in a variety of formats and venues, including securities filings, annual reports, sustainability reports, corporate websites, or responses to questionnaires (Canadian Performance Reporting Board). Reporting occurs through both required and voluntary mechanisms.[2]

Risk management in the oil and gas sector is most commonly framed around *probability* x *consequence* matrices, where many events are often rated "low probability / high consequence". While generally accepted as an appropriate methodology for the sector, this approach has been described as problematic as it can label events as rare or low *probability* when they could be more appropriately described as low *frequency* (Leveson 2011). In other words, events that in fact relatively likely to occur at some point, even if there are long time periods between or before a particular incident. The probability/consequence matrix can also mask that incidences of a similar nature can have very different real consequences, depending on any number of factors (including environment, weather, or luck) over which operators have little control (Leveson 2011). In the context of climate change, the categorization of low frequency events such as major storms and flooding (e.g. 1 in 100 year floods) as low probability may warrant reconsideration.

The integration of climate risk in existing risk management approaches and practices facilitates the comparison of climate risks with other business risks, enabling prioritization and coordination of actions in risk management (IPIECA 2013). Guidance, tools and case studies that support the risk management approach to climate change in engineering and decision-making are available (e.g. IPIECA 2013) (U.S. Department of Energy 2013)[3], though may not be in widespread use.

The mainstreaming of climate risk evaluation across the sector may be hampered by a lack of relevant information, effective stakeholder engagement, or an enabling policy environment (U.S. Department of Energy 2013). For example, the most recent study providing comprehensive information about specific climate related impacts in Alberta was produced in 2005, based on climate models from the IPCC's Third Assessment Report (Barrow and Yu 2005). While more recent modelling is available[4], it is not in a similar format to the previous report and it is unclear whether it is being used by industry and/or government for the purpose of identifying and evaluating potential risks to the oil and gas sector. Sector experts believe that updated modelling results (specific to the local and regional context) are key in assisting industry with operational and management decision making with respect to assessing climate risks (A.M. Wiensczyk, et al. 2014). As such, it is important to ensure these results are disseminated effectively.

[2] See Appendix A for more details on risk disclosure for the oil and gas sector.
[3] Additional adaptation resources for a variety of sectors and audiences are available at : AdaptationLibrary.ca
[4] For example, the Pacific Impacts Climate Consortium provides statistically downscaled climate scenarios for all of Canada, based on climate models from the IPCC's Fifth Assessment Report: http://www.pacificclimate.org/data/statistically-downscaled-climate-scenarios

The development of risk management and risk mitigation strategies

While improved access to and quality of climate-related information will likely allow for better identification and evaluation of risks, design and operations decisions should be made based on a wide-range of scenarios. Although climate modeling is improving, there is greater understanding of the complexity of climate processes and continuing uncertainty in emissions scenarios that together could result in estimates of climate change impacts that are "less, rather than more, certain" (Maslin and Austin 2013). The adoption or implementation of flexible, robust designs that are adaptable to uncertain climatic futures is considered an ideal adaptation strategy. Instead of seeking an 'optimal' solution, design should focus on adapting based on future potential climate, and building resilience to uncertainty (IPIECA 2013) (Wilby & Dessai 2010).

ADAPTATION AND RESILIENCE

ADAPTATION IS DEFINED AS THE PROCESS OF ADJUSTMENT TO ACTUAL OR EXPECTED CLIMATE AND ITS EFFECTS. THE GOAL CAN BE TO AVOID OR MODERATE HARM OR DISRUPTIONS TO ENERGY SYSTEMS, OR TO IDENTIFY BENEFICIAL OPPORTUNITIES.

RESILIENCE IS THE CAPACITY OF A SYSTEM TO COPE WITH A HAZARDOUS EVENT, TREND OR DISTURBANCE, TO RESPOND IN WAYS THAT MAINTAIN THE ESSENTIAL FUNCTION OF THE SYSTEM.

Addressing risks is generally associated with higher capital and operating costs – particularly when operating in new regions of exploration and development. However, failure to address risk can have consequences. Compared with smaller, regional companies, large international companies may have an advantage in responding to climate risks through the experience and lessons learned from operating under a wider range of conditions, including climate conditions (Policy Research Initiative 2009).

Few specific examples of adaptation or risk management strategies that explicitly and holistically consider climate risk in the oil and gas sector were found during this assessment. However, guidance documents that might be adapted appropriately are available. For example, the Climate Change Adaptation Framework Manual as developed for Alberta Sustainable Resource Development, is "an evidence-based decision support tool that provides a consistent yet flexible approach to understanding where an organization may be vulnerable to climate change impacts, analyze the risks to achieving objectives and identifying options to adapt and building organizational capacity to respond" (Alberta Sustainable Resource Development 2010). Similarly, the Government of Nova Scotia provides guidance on how project developers can incorporate climate change adaptation into their projects using a risk management approach (Nova Scotia Environment 2011).

Certain oil and gas companies do consider climate risks explicitly in their risk management strategy. For example, in the case of BP:

"Projects implementing BP's environmental and social practices are required to assess the potential impacts to the project from the changing climate and manage any identified significant potential impacts. Where climate change impacts are identified as a risk for a project, BP engineers seek to address them in the project design like any other physical and ecological hazard. BP periodically reviews and adjusts existing design criteria and engineering technology practices. For example, a regional climate model was used in 2012 to inform decisions on the depth of cover required for river crossings for the South Caucasus Pipeline and to review any risks associated with landslides." (Center for Climate and Energy Solutions 2015)

Along with partnerships to develop specific climate models relevant to their operations, BP also has internal guidance documents on how to assess potential climate risks and incorporate them into planning, design and operations.

The implementation of risk strategies towards adaptation

It is unclear whether the oil and gas sector as a whole has relevant, up-to-date information regarding climate risks. It is also unclear the extent (i.e. across companies) or magnitude (i.e. within companies) of climate risk mainstreaming in the sector. However, these gaps in knowledge should not be considered evidence of a lack of either adaptation activities or the implementation of climate-focused risk strategies in the sector.

Evidence of actions and processes to incorporate climate risks into corporate risk strategies exist for individual operators, and it is clear that the consideration of climate variability is taken into account to some extent when implementing risk strategies during design and operation of their facilities. Examples of sector-led adaptation efforts for certain climate impacts are provided in Table 2.

Table 2: Climate impacts and example adaptation strategies

Potential impact	Identified operator	Identified adaptation action or strategy
Changes in temperature	Cenovus Energy Inc. (Cenovus)	As identified in their Environmental Assessment application for the Pelican Lake – Grand Rapids project, Cenovus considered design for operations under possible operating temperatures ranging from -40 to +35°C, which they believe is adequate given the project's life.
Changes in precipitation levels	Suncor Energy Inc. (Suncor)	Suncor has indicated in their 2014 Carbon Disclosure Project Water submission that they are developing water basin management tools to assess both groundwater and surface water under different climate change scenarios. This information will presumably aid in adapting to changes in precipitation levels (and subsequent flows).
Regional changes in	Encana Corporation	Encana (along with other operators)

Potential impact	Identified operator	Identified adaptation action or strategy
ice/snow/permafrost	(Encana)	identified an adaptation action involving the use of wooden access mats that have allowed producers to drill during warmer temperatures that typically relied on frozen ground. (Acclimatise 2009)
Reduced water availability	Shell Canada Ltd. (Shell)	Shell's Groundbirch project, operating near Dawson Creek, B.C., requires large amounts of water for drilling new wells. Due to potential water scarcity in the area, Shell partnered with the city of Dawson Creek to build a reclaimed water facility that provides both water for Shell's operations and treated water for the city.

While not an exhaustive list of all activities, it appears that operators within the Canadian oil and gas sector are considering both 'hard' (design or structural methods) and 'soft' (operating procedures or adaptive management) measures as a result of climate change impacts to their operations (Atern et al. 2014).

Rationale and Methodology

Policy as a Driver or Barrier to Adaptation

The oil and gas sector may be well placed to develop adaptation solutions or risk mitigation strategies in order to protect its assets and bottom line from climate change but is unable to act effectively on its own. Government (and policy) must play a role in adaptation activities for interdependent infrastructure, in land use planning, in climate and engineering research, and in the communication of risk and strategies. It is especially important for industry and government to evaluate and mitigate climate risks to the sector's stakeholders as well others whose adaptive capacity may be affected by the sector's activities. As noted in a policy forum on adaptation, policies and public sector policies can be instrumental in pushing companies outside their "comfort zone" of traditional risk assessment and towards implementation of adaptation actions (OECD 2012).

Climate change adaptation has become an agenda item for all levels of government, leading to multiple assessments, studies, tools and strategies developed for various sectors in recent years, many of which recommend addressing institutional barriers, including legislation (Wellstead and Stedman 2014). Significant attention has therefore been directed at how to develop the 'right' policies (Wellstead and Stedman 2014). As adaptation activities often involve many different governance frameworks, it is critical that engagement with higher levels of governance (provincial/territorial, federal) is completed in order to enable successful local, regional or private sector adaptation (Klein et al. 2014).

Governments can play a positive role in adaptation by: 1) creating an enabling environment for actions and solutions identified at the local and regional level, and 2) by supporting efficient adaptation within and across sectors (Mullan and Cimato 2010). Policy can equally be applied to enable adaptation, by ensuring appropriate information (including climate information) is available, supporting coordination at appropriate scales, developing frameworks, and by directly supporting adaptation through financing mechanisms (Mullan and Cimato 2010).

Policy tools can drive adaptation action, to ensure that action taken will effectively address climate change in a fair and progressive manner. There are several ways that tools can effect such change, including adoption of adaptive policy features. A backgrounder on the policy cycle and adaptive policy features is provided in Appendix B. Policy instruments can mandate change or enforce standards, requiring a response from proponents. Policy tools can contribute to the creation of an adaptive environment within a company or market. In particular, they can create opportunities for action by effecting change politically, economically, legally, socially or operationally.

When policies are not designed properly, several factors can contribute to a loss of efficiency in adaptation, including (Mullan and Cimato 2010):

- Market failures (e.g. incorrect or distorted incentives, poor information);
- Conflicting institutional objectives (i.e. when non-climate policies guide decision-making);

- Behavioural barriers (e.g. the tendency for inertia or short-term prioritization in decisions); and,
- A lack of capacity (e.g. financial, knowledge).

Uncertainty, information deficiencies and the long time frames for adaptation are consistently cited barriers (OECD 2012).

Policy tools can also act as a barrier to climate-sensitive adaptive management. In some cases they can block or hinder (either intentionally or unintentionally) adaptive behavior within companies. Removing perverse incentives for not adapting is critical (OECD 2012). In addition, some policy tools can promote maladaptation within industry sectors. Finally, policy tools may contribute to the creation of an environment where taking adaptive action unfairly hampers competitiveness.

Scope of Analysis

The project team worked with a cross-disciplinary advisory committee, and consulted oil and gas sector experts in Alberta through a survey, to establish the policies that would be reviewed. An initial list of 30 provincial, federal jurisdiction and private sector policies (e.g. operating guidelines, safety practices, etc.) that govern the exploration and production of oil and gas resources in Alberta were determined based on the criteria presented in Table 3 below. The first two criteria ('Link to climate change' and 'Materiality to industry') were considered top-level criteria that must be fulfilled[5], while the three 'Diversity' criteria were subsequently considered, if applicable.

Table 3: Policy selection criteria

Criteria	Description
Link to climate change	Do the policies have a direct link to climate-related variables or areas of expected climate impacts (e.g. water)?
Materiality to oil and gas sector	Are the policies 'material' in sector decision-making?
Diversity of policy type	Ensuring there is representation of type (Act, Regulation, Guidelines, Framework) Ensuring there is representation from 'hard' policies (enforced) and 'soft' (incentives, targets, best practice)
Diversity of subject matter	Ensure policies represent diversity of subsectors (exploration, extraction, processing, remediation, reclamation)
Diversity of jurisdiction	Ensuring there is diversity of jurisdiction (Federal, Provincial, Industry)

The process of selecting the final list of policies included direct engagement with the advisory committee (to create a 'short-list') and a survey of sector experts[6] to identify the final five

[5] Note that certain policies may not have a direct or self-evident link to climate, but may still be barriers or drivers of adaptation and were not necessarily excluded on this basis alone if an indirect link was determined.

[6] Experts across disciplines (e.g. law, policy, biodiversity, risk), both internal and external (e.g. academia, non-profit) to the oil and gas sector provided input into this ranking.

selections. While not a comprehensive analysis of all oil and gas policies, it is expected that these five policies (provided in Table 4 below) are a reflective sample of those that govern the sector. It is intended that general themes from the analysis can provide information as to whether policy (in general or through specific policy elements) can act as a barrier or enabler to climate change adaptation.

Table 4: List of policies chosen for assessment

Policy	Jurisdiction	Lead	Year	Notes
Environmental Assessment Regulation	Alberta	Province of Alberta	1993. Amendments up to and including 89/2013	Governs oil, gas and coal projects in the energy sector.
Responsible Energy Development Act	Alberta	Province of Alberta	2013	Establishes the Alberta Energy Regulator, a single Regulator for all oil, gas and coal projects in the province.
National Instrument 51-101: Standards of disclosure for oil and gas activities	Alberta	Alberta Securities Commission	2010, 2015 [amendments]	Outlines disclosure requirements for the oil and gas sector.
Alberta Wetland Policy	Alberta	Province of Alberta	2014	Provides strategic direction and tools to make informed management decisions in the long term interest of Albertans.
Lower Athabasca Regional Plan (LARP)	Alberta	Province of Alberta	2012	The LARP applies to Crown, Decision-makers, local governments and all other persons in the region. It informs long term regional planning by establishing 10 year strategic plans.

Scoring of Drivers and Barriers

An evaluation system was used to generate an overall picture of the policy and its influence on adaptation. The system differentiates between policy tools that have an immediate, direct or explicit impact on adaptation (either as a driver or a barrier) and those elements of policy that indirectly create opportunities or hindrances with respect to adaptation. A policy that requires public consultation by a project proponent does not directly support adaptation, but does create an environment where climate impacts and adaptation can be addressed.

Table 5: Scoring of policy drivers and barriers

Level of support	Description
A = Driver	Directly or strongly supportive of climate change consideration in planning OR climate change adaptation action.

B = Enabler	Enables adaptation but does not directly encourage or require it. Indirect or weak support of climate change consideration in planning OR insinuation that climate change is a challenge.
C = No Effect	This policy element has no effect on how climate change impacts are considered OR policy element is not thematically relevant to the driver/barrier criteria in question.
D = Hinders	Indirect or weak hindrance of climate change consideration or adaptation.
F = Barrier	Strong or direct barrier to climate change adaptation action.

Each significant element or clause of a policy was evaluated for its potential role as a driver or barrier against the evaluation criteria (see Appendix C), and provided a grade according to the table above. The ranking system provides a high level representation of whether the policy drives, enables or hinders adaptation to climate change.

Results of Analysis

An evaluation framework to assess the effect of specific policies on the capacity of various stakeholders to adapt to climate change was developed and is described further in Appendix C. The policies identified above were evaluated with this framework to determine whether, and to what extent, they either enabled or hindered adaptation in the oil and gas sector. The following sections provide an overview of each policy, a summary of the policy analysis, and recommendations for policy improvement.

ENVIRONMENTAL ASSESSMENT REGULATION

JURISDICTION: ALBERTA REGULATION 112/1993

LEAD: GOVERNMENT OF ALBERTA

RELATED POLICIES: ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT (ALBERTA), CANADA-ALBERTA AGREEMENT FOR ENVIRONMENTAL ASSESSMENT COOPERATION (ALBERTA/CANADA), RESPONSIBLE ENERGY DEVELOPMENT ACT (ALBERTA).

YEAR: 1993. AMENDMENTS UP TO AND INCLUDING 89/2013

SECTOR: PUBLIC.

NOTES: FOR OIL, GAS AND COAL PROJECTS IN THE ENERGY SECTOR, THE ALBERTA ENERGY REGULATOR (SEE POLICY ASSESSMENT OF THE RESPONSIBLE ENERGY DEVELOPMENT ACT) WOULD CARRY OUT THE DUTIES UNDER THIS REGULATION.

Policy 1: Environmental Assessment Regulation

Introduction to the Environmental Assessment Regulation

An Environmental Impact Statement (EIA) is required under the *Environmental Assessment Regulation* where the complexity and scale of a proposed project, technology, resource allocation, or siting considerations create uncertainty about the exact nature of environmental effects, or result in a potential for significant adverse environmental effects.

The Environmental Assessment (EA) process, including the EIA, allows companies and government decision makers to examine the effects that a proposed project may have on the environment. The information gathered during the process helps the appropriate Regulatory Board determine if the project is in the public interest.

As of October 1, 2014, the Alberta Energy Regulator is responsible for environmental assessments related to energy resources activity, including upstream oil, oil sands, natural gas, and coal development in the province (Alberta Environment and Sustainable Resource Development 2014). Previously, the authority to direct environmental assessments rested with Alberta's Environment and Sustainable Resource Development (ESRD) department.

The Canada-Alberta agreement on Environmental Assessment Cooperation outlines respective provincial and federal responsibilities and communication throughout the EA process (development of a Terms of Reference (TOR), review, public involvement, decisions, etc.). The agreement reduces duplication across the jurisdictions, and ensures communication between parties. The agreement is part of the EA policy framework, including the *Environmental Protection and Enhancement Act* (Alberta) and the *Canadian Environmental Assessment Act* (Federal)(Canadian Environmental Assessment Agency 2014).

The EA and the *Environmental Assessment Regulation* are part of a larger policy framework. Two key provincial Acts in that framework are the *Environmental Protection and Enhancement Act (EPEA)* and the *Water Act*. Together,

these Acts regulate industry activities for the purpose of environmental protection and human health.

The purpose of the EA is to (i) gather sufficient information to inform the public and government about the proponent's understanding of project consequences, (ii) provide an opportunity for public involvement, particularly for those affected by proposed activity, and (iii) to support sustainable development in the context of overall provincial plan for environment and economy.

The Environmental Assessment process is the first of four main regulatory steps required by the operator of an industrial activity:

1. Environmental Assessment. Examine project to determine potential environmental, social, economic and health implications for expected operating scenarios.
2. Public interest decision. Minister or board decides if it is in public interest for project to proceed.
3. Approval with conditions. The AER gives formal approval under various pieces of legislation which set specific operating conditions for the project[7].
4. Compliance. Ensure operations are within specified approval conditions.

In cases where the province is the lead agency, the Environmental Assessment (EA) Director first determines if an EIA for the proponent's project is mandatory, exempted or discretionary. If an EIA is required, the proponent prepares a Proposed Terms of Reference (TOR), among other requirements. The EA director issues the final TOR following a review period that allows for government and public input.

EIA reports typically include:

- Detailed project description
- Location and environmental setting for project, baseline environmental, social and culture information
- Potential positive and negative environmental, health, social, economic and cultural effects
- Plans to mitigate adverse effects and to respond to emergencies
- Information on public and First Nations consultation
- Assessment of cumulative effects

An interdisciplinary team of provincial experts reviews an EIA (this can also include federal agencies). The purpose of the review is to identify project-related uncertainties or risk and determine if the information provided meets the requirements of the TOR. The review team may request supplemental information through Supplemental Information Requests (SIRs) until they are satisfied with the proponent's description of their proposed activity, potential impacts and recommended mitigation options.

[7] Currently, the AER regulates fossil fuel projects such as oil and gas wells, pipelines and oil sands projects in Alberta. This was previously completed by the Energy Resources Conservation Board (ERCB).

The review team then makes a final recommendation to the EA Director before the project becomes part of the Public Interest Decision, through the Minister or the AER. For large energy projects, the EIA report generally forms part of the integrated application submitted to the applicable board.

Analysis of drivers and barriers

The focus of this analysis is the *Environmental Assessment Regulation (Alberta Regulation 112/1993)*, one part of the overall policy framework.

Table of Contents Environmental Assessment Regulation

1. Definition
2. Register of environmental assessment information
3. Notice of further assessment
4. Screening report
5. Notice of decision re EIA report
6. Notice of proposed terms of reference
7. Notice of final terms of reference
8. Notice of EIA report
9. Coming into force

The elements examined in the review of the EAR correspond to the sections outlined in the table of contents (see text box), with the exception of Section 1 – Definitions.

The regulation contains several elements that can be leveraged for adaptation; in this case the elements. The regulation promotes and provides opportunity for public and expert engagement in the EA process at various stages, creating openings to address climate risks and adaptation at the planning stage. Additionally, the Director has discretion to shape the TOR and the EIA through review, responses, reports or directives. The Directors discretion in particular creates opportunities to align the EIA with, for example, climate change mitigation and adaptation frameworks or objectives in the region.

The analysis shows that most clauses of the regulation have little or no effect on climate adaptation (most sections described as having no effect or not applicable). Several elements received multiple 'B' score - they do not explicitly encourage adaptation although they do create opportunities for climate impacts and adaptation to be considered or addressed. In several cases, elements support development of adaptive capacity by requiring public consultation and public access to information.

Table 6: Grading distribution for Environmental Assessment Regulation

Environmental Assessment Regulation				
Total number of elements reviewed				8
Number of elements with one or more grades assigned				8
	A – Drive	B – Enable	D – Hinder	F – Barrier
Distribution of grades assigned	-	17	8	-

For example, in Section 2, the regulation outlines requirements for the Director to allow access to a register of information on the project, with key information and all statements of concern, all comments received, and any associated reports or submissions. Public access to information and the opportunities to comment on new projects can enable adaptation by creating venues where new information or questions can be raised and addressed.

An example of a driver element of the legislation is actually found *outside* the specific regulation. A guidance document prepared for proponents developing environmental impacts statements outlines how a proponent should describe the impact of climate change on project activities and infrastructure. The text of the guidance document focuses on the impacts of climate change and risks to project activities and operations, and might therefore be considered to be a driver for adaptation within the operational environment (Province of Alberta 2013). Similarly, the Canadian Environmental Assessment Agency includes climate impacts in its policy guidance (Canadian Environmental Assessment Agency 2003), though these are no longer required to be used at the federal level.

In practice, although the consideration of climate change risks to a facility are not required by the regulation explicitly, the EA Director does include a requirement for the proponent to consider climate effects on the project in the majority of cases. From a review of 44 oil sands (mining and in situ projects) EAs in Alberta between 2005 and 2014, the Director required an assessment of climate risks in all but 3 instances. A typical clause in the final TOR for a new project might include:

Identify stages or elements of the Project that are sensitive to changes or variability in climate parameters, including frequency and severity of extreme weather events and discuss the potential impacts over the life of the Project.

However, although the vast majority of new projects were required to consider climate-related risks in their EAs, the quality and level of detail provided across reports was found to be inconsistent. While a comprehensive review of all EAs was not conducted, a cursory review of EAs submitted in 2011 showed some proponents discussing potential climate impacts quantitatively (using the work from Barrow and Yu 2005), and referring to changes in mean temperatures, precipitation, and moisture levels, while others only provided operating temperature ranges for key equipment, without a discussion of predicted changes. Similar 'boiler-plate' responses in multiple EAs (from different proponents) indicate that it is often the engineering consulting company tasked with assembling the EA that conducts this assessment. In all cases reviewed, the proponent believed that climate risks were either not material to their design, that their design already incorporated climate risks, or that corporate-level adaptive management processes would allow them to manage risks appropriately.

Few direct barriers to adaptation exist within the regulation. Adaptation actions taken by a project proponent are not blocked or hindered. And because the regulation is not prescriptive, is does not promote mal-adaptation directly.

However, the regulation could in different ways lead to exclusion of important considerations with regard to climate impacts and adaptation, both for the proponent and for the surrounding environment and communities. The few elements that create barriers to adaption ('D' ratings) were found to block, hinder or discourage adaptation, do so by limiting or reducing the scope of the EIA or access to the EA process by potential stakeholders.

For example, Section 4(1) itemizes the contents of required screening reports prepared by the Director. Climate impacts and adaptation are not included in this short list. It should be noted however that the Director would have the discretion to add or require additional sections.

At a system-level, neither the guidance documents nor the regulation reference any potential consequences the project may have on the resilience or adaptive capacity of other systems. Section 3(1) notes that anyone who is "directly affected by the proposed activity" may submit a written statement of concern. "Directly" is not defined in the provincial regulation, but how it is interpreted is the subject of debate, including recent court challenges (Collier 2012).[8] (Note that the Responsible Energy Development Act (see following chapter), uses the phrase "directly and adversely affected" in its test for eligibility.) In the context of climate change and climate impacts and adaptation, the definition may limit the scope of analysis and create barriers to appropriate or efficient adaptation by the proponent, or by stakeholders from a more integrated assessment perspective. The potential exclusion of consideration of the system-level implications for adaptation could lead to constraints on adaptation planning for wildlife planners (if the project restricts movement of caribou, for example) or for the agriculture or forestry sector (if the water use of land use associated with the project removes potential avenues for adaptation).

Similarly, narrowing eligible participants to those "directly affected" may limit the evaluation of adaptation at different scales: the project scale, the regional scale, the watershed scale, or the provincial scale. The opportunity to evaluate the interrelationship between adaptation actions and opportunities at different scales could be missed, resulting in constraints or limiting effects for stakeholders outside the 'directly affected' scope.

Findings and recommendations

This regulation outlines the process and mechanisms for the development of environmental impact assessments, including access to information and reports, notification procedures, development of terms of reference, and public comment. The policy encourages informed discussion and response to the combined impact of the proponent's activities *and* climate change, by creating a policy space wherein experts or stakeholders can comment.

While the requirement to include impacts and adaptation is not included explicitly within the regulation itself, it is usually made a requirement of the application by the Director – although the consistency and level of detail across reports is questionable.

The regulation has two primary features that enable adaptation. These are:

- The regulation ensures open access to information and data that can inform consideration of climate impacts and adaptation.
- The regulation promotes public and expert engagement without directly restricting scope of comments or submissions. The content and scope of the final EIA can be shaped throughout the process, by both public comment and by discretion of Director, which ensures opportunities to integrate new information and to address evolving policy frameworks and priorities.

[8] The AER is authorized to oversee the EA process under the Responsible Development Act, SA 2012, c R-17.3 (REDA). This policy limits those able to file a statement of concern to those that might be "directly and adversely" affected by the project – which could limit participation even further.

While the regulation does create space for adaptation, primarily by opening doors to consider evolving risks and environmental challenges, it will not necessarily drive adaptation within the sector. There are some elements of the policy that in some circumstances may lead to barriers to adaptation. Here, there are opportunities to strengthen the policy.

- Outputs, such as screening report (S4.1) or summary report (S 8.2), could explicitly require reporting on understood potential climate risks and impacts and measures being taken to reduce vulnerability and engage in adaptation.
- Establish guidance documents on how proponents can incorporate climate change adaptation in their EA report to ensure consistency and quality across proponents.[9]
- Establish guidance documents or operating rules clearly indicating a project's impact on the resilience and adaptive capacity of others, to be included within the test of "directly" or "directly and adversely" affected.

[9] For example, Nova Scotia Environment provides a guide to proponents on how to climate change into their EA applications: http://www.novascotia.ca/nse/ea/docs/EA.Climate.Change.Guide.pdf

RESPONSIBLE ENERGY DEVELOPMENT ACT

JURISDICTION: ALBERTA

LEAD: PROVINCE OF ALBERTA

RELATED POLICIES: *ALBERTA ENERGY REGULATOR ADMINISTRATION FEES RULES; ALBERTA ENERGY REGULATOR RULES OF PRACTICE; ENFORCEMENT OF PRIVATE SURFACE AGREEMENT RULES; RESPONSIBLE ENERGY DEVELOPMENT ACT GENERAL; SECURITY MANAGEMENT FOR CRITICAL UPSTREAM PETROLEUM AND COAL INFRASTRUCTURE; ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT; WATER ACT; PUBLIC LANDS ACT; COAL CONSERVATION ACT; OIL SANDS CONSERVATION ACT; OIL AND GAS CONSERVATION ACT; LAND TITLES ACT; SURFACE RIGHTS ACT.*

YEAR: 2013

SECTOR: PUBLIC

NOTES: ESTABLISHES THE ALBERTA ENERGY REGULATOR, A SINGLE REGULATOR FOR ALL OIL, GAS AND COAL PROJECTS IN THE PROVINCE.

Policy 2: Responsible Energy Development Act

Introduction to REDA

The *Responsible Energy Development Act* (REDA) established in 2012, the Alberta Energy Regulator (the Regulator), a single regulator for upstream oil, gas, oil sands and coal in the province. REDA outlines the Regulator's mandate, powers and functions. The goals of REDA, include streamlining processes, reducing complexity and increasing economic competitiveness (Vlavianos 2012).

The Regulator is responsible for all aspects of energy resource development "from application and exploration, to construction and development, to abandonment, reclamation and remediation."(Alberta Energy Regulator 2014a). The Regulator is also responsible for public communications, as well as associated hearings and appeals associated with applications.

REDA is an overarching act that provides the Regulator with jurisdiction and mandate for all energy resource activities. It transfers powers and duties to the Regulator associated with other specified enactments (e.g. *Environmental Protection and Enhancement Act, Public Lands Act, Water Act, Mines and Minerals Act, Mine Financial Security Program*) as they apply to energy resource projects (Alberta Energy Regulator 2014b). The Regulator has necessary monitoring and enforcement tools under each of these enactments.

An important element of the REDA is the recognition of the Alberta Regional planning process under the *Alberta Land Stewardship Act* (ALSA). The ALSA is the legal basis under which land-use decision makers and provincial government coordinate regional planning. Regional planning is the framework for ensuring provincial input and economic, environmental and social objectives are represented with respect to land-use, resource development, human settlement, and environment (including species). The ALSA is also the legislation that takes into account cumulative effects of regional development activities.

The Regulator is one part of the overall management framework for resources development in Alberta, which includes government (setting policy), the Alberta Environmental Monitoring, Evaluation and Reporting Agency

(for data and information),the

Aboriginal Consultation Office, and the Policy Management Office (liaison between government and Regulator) (Alberta Energy Regulator 2014b).

The Regulator's chair and board establish general direction, the CEO is accountable for day-to-day operations (decisions on application, monitoring, investigations for compliance, reclamation, remediation), and separate hearing commissioners conduct all hearings and appeals (Alberta Energy Regulator 2014b).

Structure of REDA

Interpretation
Mandate of Regulator

Part 1 – Alberta Energy Regulator (5 Divisions)

Part 2 – Applications, Hearings, Regulatory Appeals and Other Proceedings (7 Divisions)

Part 3 – Enforcement of Private Surface Agreements

Part 4 – Ministerial Direction of Regulator

Part 5 – Enforcement (3 Divisions)

Part 6 – General Regulations

Part 7 – Dissolution and Transitional Provisions, Consequential and Related Amendments, Repeal and Coming into Force

Analysis of drivers and barriers

REDA is structured in seven parts, many containing multiple divisions (see text box). Within each part or division there are multiple numbered sections that were considered in this analysis.

The majority of elements within REDA have little or no direct effect on adaptation, while many provide opportunities for consideration of adaptation. The results of the analysis are re-grouped thematically below according to support understanding of how REDA influences adaptation.

The elements that provide opportunities for adaptation (enable adaptation) can, in general, be categorized as (i) providing flexibility within policy design and implementation, (ii) facilitating alignment of REDA with other government policies and objectives or by referencing other acts (for example, the Regulator assuming the mandate and responsibilities outlined in *Water Act*, or through Ministerial directives), or (iii) providing open and public information and engagement. The number of instances of 'B – enable' rankings demonstrate the potential for the policy to support adaptation.

Table 7: Grading distribution for REDA

REDA				
Total number of elements reviewed				93
Number of elements with one or more grades assigned				37
	A – Drive	B – Enable	D – Hinder	F – Barrier
Distribution of grades	-	47	20	-

While REDA enables adaptation in a variety of ways, there are some potential challenges for adaptation within the Act, including constraints and limitations on participation by experts and or landowners rights groups in other fora (Thibault 2013; Wilson 2013; Gorrie 2013; Vlavianos 2012).

REDA is overarching in nature, providing the mandate and powers to a single energy sector Regulator in the province. It is not prescriptive with respect to operations within the energy sector. As such, the barriers to adaptation that are present are not direct: REDA does not block certain actions, restrict technology, create unequal requirements for adaptation, or result directly in mal-adaptation. The regulation does potentially create some barriers to adaptation by limiting the scope of eligibility for statements of concern and hearings to those who are "directly and adversely" affected (This concern is raised elsewhere by Wilson (2013); Vlavianos (2012); and Gorrie (2013)).

Further discussion of barriers and drivers, grouped thematically, can be found in the following sections.

Terminology of climate and risk

Climate change and risk management terminology are not found explicitly in the text of the REDA. REDA's mandate (Section 2.1) includes "protection of environment" and "conservation and management of water, including the wise allocation and use of water". Here, "environment" references air, land, water and all layers of the atmosphere (Section 1.k) without specifically including "climate" or "climate change". The absence of climate change references or terminology, within the mandate itself and throughout the Act, can be considered a barrier to adaptation and resiliency if it is not adequately covered by other policies that REDA enacts.

REDA one part of overall framework

Under REDA, the Regulator assumes the duties and responsibilities laid out in other related legislation for energy resource activities (e.g. *Environmental Protection and Enhancement Act, Public Lands Act, Water Act, Mines and Minerals Act, Mine Financial Security Program*). The Alberta Regulator must also consider directives from the Minister and government. For these reasons, REDA's actual influence on adaptation in the energy sector is strongly influenced by the contents provided by these acts and directives (for e.g. see discussion of the incorporation of adaptation in EAs above). Likewise, the inclusion of climate impacts and adaptation within REDA could have trickle-down impacts within the larger policy framework.

Similarly, the Regulator, in its authority and powers carrying out other enactments as they relate to energy projects, "shall act in accordance with the specified enactment". Again, the Regulator and REDA would incorporate climate impacts and adaptation only to the extent that it is included in the related enactments.

An important example is the Regulator's role with regard to Alberta Regional Land-use Planning. Clause 20(1) of REDA states that: "... the Regulator shall act in accordance with any applicable ALSA regional plan." To the extent that the ALSA plans ensure regional resilience or address climate impacts, any planned adaptation responses should be reflected in Regulator decisions.

For example, the Lower Athabasca Regional Plan (LARP) references the Alberta *Climate Change and Emissions Management Act* (an Act that addresses emissions and not impacts and adaptation) but does not include further references to climate change impacts and adaptation. In comparison, the South Saskatchewan Regional Plan (2014-2024) includes reference to climate

change adaptation in the context of water supply, including preparedness for both flood and drought.

Notwithstanding the example above, the consistency with which ALSA plans address and respond to climate impacts and adaptation is not evaluated in detail here. However, this function of REDA should be understood as an important tool in ensuring not only resiliency for the energy sector activities, but ensuring that energy sector activities have a positive (or at least not negative) impact on overall adaptation in each region. The Regulator has the authority to mandate and enforce adaptive action in its approvals to ensure compliance with ALSA provisions. There is also the opportunity to ensure climate risks and adaptation are considered in future land-use plans and revisions to current plans through the provision of timely and relevant information.

One of the main strengths of REDA then, is the requirement to respect Alberta Land Stewardship Act (ALSA) regional land-use plans, as well as other enactments. To the extent that these are inclusive of climate change impacts and adaptation considerations, or include plans for resiliency and adaptation, REDA is flexible and can reflect that. However, REDA on its own does not presently compel the Regulator to compensate for the absence of effective adaptation plans or its absence in other enactments: REDA's reliance on numerous other enactments or policies to address climate impacts could be a limitation.

Engagement and input

REDA includes many avenues and requirements for information dissemination and public, expert and stakeholder input. Access to information is an important element in climate change impacts and adaptation, as it contributes to adaptive capacity among the sector and stakeholders. Section 32 (Statement of concern), for example, promotes adaptation and consideration of vulnerability and risk by providing an official avenue for filing statements of concern. All Regulator decisions regarding statements of concern, or decisions on applications and hearing, must be published, allowing opportunities for critical evaluation and official responses. Unlike previous legislation, the REDA no longer guarantees a hearing process; rather, it allows the regulator to decide in which situations to proceed with hearings (Vlavianos 2012).

The described limitations on eligibility to file statement of concern, namely those "directly and adversely affected" may unnecessarily restrict participation and hence REDA's potential role as a driver for adaptation. Potential stakeholders wishing to discuss climate-related risks as well as possible or desirable adaptation actions, may have difficulty demonstrating how they are directly and adversely affected by a project. Stakeholders who are concerned, for example, that a company has not accounted for impacts of climate change, thus creating enhanced levels of risk, may find themselves without a venue to have these concerns addressed.

The regional planning process required under the ALSA also requires public and stakeholder advice, indirectly strengthening REDAs potential utility for adaptation purposes at the regional or system level.

The Regulator's predecessor, the Alberta Energy Resource Conservation Board, applied a test of "public interest" to new developments. This public interest test was not maintained under REDA, raising flags among experts about the absence of decision-making guidance for the Regulator

(Vlavianos 2012; Wilson 2013; Ecojustice 2012). Persons with "relevant knowledge and expertise" are also not necessarily eligible to participate under REDA, though they would be under language in the federal CEAA and the National Energy Board (Vlavianos 2012; Gorrie 2013). In the context of climate change impacts and adaptation, a provision of this nature would allow experts in climate change science, or experts who understand climate impacts on infrastructure, ecosystems, or watersheds to ensure that any change in risk, whether to the oil and gas operations and assets, or to the regional environment resulting from oil and gas operations, is addressed. Through expert participation, REDA would support adaptation.

Flexibility

In general, REDA demonstrates ability to be adaptable and flexible by (i) being responsive to changes in related enactments and planning processes, (ii) being responsive to Ministerial directives to ensure policy alignment, (iii) enabling development of new rules and regulations to carry out its mandate, (iv) integrating or commissioning new research or information to support its work, and (v) securing sufficient resources through administration fees and provincial budgets to address all applications. In effect, the Regulator can either by directive or on its own initiative make adjustments to address issues related to climate impacts and adaptation (although there is not presently any requirement that this flexibility be leveraged to support climate impacts and adaptation).

As evidence of this flexibility,

- The regulator has the necessary powers to undertake on its own, or by direction from the Lieutenant Governor in Council, studies 'on any matter' leading to recommendations it considers necessary or advisable.
- The Regulator may also "in its sole discretion, reconsider a decision". This demonstrates some flexibility with the Act, which is a characteristic of adaptive policy.
- The Regulator (in Section 61) is given ability to make regulations or rules respecting the form and content of notices of application, statements of concern, and appeals.
- Division 5, Section 28 of REDA outlines the funding of the Regulator, providing flexibility to meet the Regulators needs through a combination of money provided through the legislature and through the imposition and collection of administration fees collected with respect to any project.

Since REDA aims to reflect policy direction provided from regional planning, the degree of adaptation in REDA is dependent on the degree to which adaptation and climate impacts are considered in regional land use policies. The development and renewal of ALSA regional plans are long processes (up to five years in development, for plans that are to be in place for 10 years), suggesting that the content of the ALSA plan must itself reflect potential climate change and be adaptive (since the official review process is long). How this 'trickles down' into practice for the REDA is not yet known.

The absence of explicit guidance on decision-making could be viewed as a barrier. The purpose of REDA is not laid out in a preamble to the act, as is common practice for legislation (Vlavianos

2012), leaving the Regulator and decision-makers without guidance on how to address key issues, including climate impacts and adaptation.

Duty of care

In carrying out the mandate of the Regulator, the duty of care for directors and staff require that diligence and skill reflective of a 'reasonably prudent' person is required. If it is accepted that consideration of climate change risks is reasonably prudent, then this could be a driver for climate impacts and adaptation. Here again REDA's influence as an adaptation driver can better be described as having potential than as having concrete, positive and direct influence.

However, Division 5 also protects the regulator from legal actions or proceedings, and this regulation was recently upheld in a case of private citizen alleging breaches by the board (Marion and Massicotte 2014). While the perception or legal liability associated with negligence is increasingly a driver for adaptation in other sectors, including municipal planning and stormwater/sewer design (Zizzo 2104), this driver for adaptation is at least in part partially mediated by this clause.

One application, one process

Part 2, Division 1 of REDA allows the combination of applications under any energy resources enactments for any single project. Potential risks associated with the combination of applications (e.g. that specific issues are not addressed in sufficient detail), are offset if a single application process can address vulnerabilities, risk and adaptation systemically and not within siloed issue areas.

Section 67 outlines the government Minister's authority to provide priorities and guidelines for the Regulator in carrying out their powers. This feature allows political action that can promote adaptation in the sector, ensuring the Regulator's actions are consistent with the broader framework of government policies, programs and priorities. This is an important mechanism for political engagement in adaptation. It is not clear if REDA and the Regulator respond to directives from only one Minister (e.g. Minister of Energy) or if the Regulator would respond to directives from other relevant ministries (Vlavianos 2012).

REDA creates a political environment that can be levered to support adaptation at both the project and regional level.

Findings and recommendations

In practice, the extent to which the REDA is a driver for adaptation depends in a very real way on the extent to which the entire framework of supporting policy and legislation recognizes and addresses adaptation. Though there is sufficient flexibility within the Act to address climate impacts and adaptation at both the project and system level, REDA's role as a driver for adaptation would best be described as 'having potential'.

REDA does embody the flexibility necessary to be a driver of adaptation in the energy sector at both the project and regional level. The Regulator can incorporate new external policy, can create new rules and regulations, and can address evolving information and resources requirements as needed to effectively carry out its mandate. The concerns outlined by legal and environmental experts (Vlavianos 2012; Gorrie 2013; Thibault 2013) with regard to eligibility

for standing, lack of guidance for decision-making, are relevant in the context of climate impacts and adaptation as well.

Opportunities to strengthen the policy or its implantation to better manage climate risks in the oil and gas sector include:

- The inclusion of climate change, climate impacts, and climate adaptation terminology within REDA (if not accounted for elsewhere) to strengthen REDA's role in adaptation and potentially address any limitations or the absence of adaptation in other enactments. Where the mandate in Section 2 is focused on "efficient, safe, orderly and environmentally responsible" energy development, and to "regulate the protection of the environment", the explicit inclusion of climate impacts and adaptation text could improve REDA's role as a driver of provincial resiliency and risk management. The use of the Regulator's powers for monitoring and enforcement for the purpose of impacts and adaptation would be strengthened by its inclusion in the definition.
- Removing the limitations on eligibility ("directly and adversely affected") could create new opportunities for public or expert engagement leading to increased consideration of climate impacts and adaptation.
- Alternatively, establishing a public interest test, and allowing eligibility to individuals with "relevant knowledge and expertise" to participate in hearings (Vlavianos 2012), would also serve to improve REDAs utility as a driver for adaptation. Under current language it is unclear if experts in regional climate impacts, risks and adaptation would be approved for participating in the process.
- Commissioning research or working groups to provide access to relevant and up-to-date materials on climate risks to the sector and its stakeholders, for use in either project level (e.g. EAs) or regional level assessments (e.g. land use planning).

While it is important to ensure that adaptation is included with REDA, it could be argued that REDA as designed provides sufficient flexibility and a legal and political environment that supports adaptation. Because of its nature as an overarching Act tying together dozens of policies and regulations where they intersect with energy development, REDA cannot be expected to address important risks and adaptation issues at the operational level.

Provisions within REDA that ensure the Regulator follows the contents of regional planning initiative can help ensure that system-level barriers to adaptation or resiliency, outside the scope of individual energy projects, are accounted for and that energy sector actions that impinge on the resiliency of other regional systems (ecosystems, communities, First Nations) are avoided.

NATIONAL INSTRUMENT 51-101 STANDARDS OF DISCLOSURE FOR OIL AND GAS ACTIVITIES

JURISDICTION: ALBERTA

LEAD: ALBERTA SECURITIES COMMISSION

RELATED POLICIES AND DOCUMENTS: SECURITIES ACT (ALBERTA) COMPANION POLICY 51-101CP STANDARDS OF DISCLOSURE FOR OIL AND GAS ACTIVITIES; CANADIAN OIL AND GAS EVALUATION HANDBOOK; NATIONAL INSTRUMENT 51-102 CONTINUOUS DISCLOSURE OBLIGATIONS

YEAR: 2010 [CONSOLIDATION], 2015 [AMENDMENTS]

SECTOR: OIL AND GAS

NOTE: OUTLINES DISCLOSURE REQUIREMENTS FOR THE OIL AND GAS SECTOR.

Policy 3: Standards of Disclosure

Introduction to disclosure in Alberta and Canada

In Canada, as in the U.S., oil and gas companies are required to disclose to securities regulators (including Alberta Securities Regulator) material risks to stakeholders, investors, shareholders or analysts (Zeghal and Lajili 2005).

The Alberta Securities Regulator is the principle regulator for 353 reporting issuers in the province, representing nearly three quarters of the Alberta based issuers listed on the Toronto Stock Exchange (Alberta Securities Commission 2014). The Securities Act (Alberta) provides legislative authority for the Alberta Securities Commission (ASC). The ASC requires that issuers provide "balanced, authentic, relevant and reliable disclosure" that assists investors in decision-making (Alberta Securities Commission 2013).

Specific regulation and guidance is provided by the *National Instrument Standards of Disclosure for Oil and Gas Activities* (NI 51-101), and the accompanying *Companion Policy 51-101 Standards of Disclosure for Oil and Gas Activities*. Both documents reference the *Canadian Oil and Gas Evaluation Handbook (COGE Handbook),* a three-volume handbook providing guidelines for the preparation of oil and gas reservoir evaluation in Canada which is produced, published and updated by the Society of Petroleum Engineers and the Petroleum Society of Canada (Society of Petroleum Engineers 2015). The ASC also requires continuous or ongoing disclosure, including Management Discussion and Analysis, the requirements of which are outlined in *NI 51-102 Continuous Disclosure Obligations*.

Current securities disclosure in Canada

The 2013 Alberta Securities Commission *Oil and Gas Review Report,* an annual report on disclosures to the ASC, found that in most cases, disclosure is compliant with requirements. It noted however, that the extent and quality of disclosures is variable. In the 2013 and 2014 reports, the ASC observed inappropriate disclosure of significant factors and uncertainties including 'boilerplate' disclosures (Alberta Securities Commission 2013), and documented a number of deficiencies including inadequate discussion of

risks and uncertainties associated with recovery of resources, and losses in foreign jurisdictions (Alberta Securities Commission 2014).

Disclosure of climate risk

Climate change is an additional risk that the oil and gas sector is addressing and integrating within a well established risk management framework (Lemmen et al. 2014). Although there is sufficient evidence to be confident the oil and gas industry routinely addresses risks related to climate and weather, the risks and the responses are not systematically documented in publicly available sources (Lemmen et al. 2014), and where they have been reviewed, the proportion of companies reporting on climate risk remains low(see Figure 1 below)(Zeghal & Lajili 2005).[10]

In addition to securities filings required through NI 51-101 and NI 51-102, there are other voluntary avenues that focus in greater detail on climate, including the Global Reporting Initiative and the Carbon Disclosure Project. The focus of most climate and environment risk disclosure continues to be (i) risk of climate change mitigation regulations (e.g. carbon pricing), and (ii) risks to surrounding environment (e.g. spills). Nevertheless, attention to climate and weather-related physical risks to operations, assets, supply and distribution chains is increasing. Recent guidance provided by Canadian Securities Administrators (CSA) on environmental reporting does discuss physical impacts that can arise as a result of "changing weather patterns and water availability" (Canadian Securities Administrators 2010b).

See Appendix A for further examples of guidance on physical risk disclosure provided by U.S. Securities and Exchange Commission, the CSA, and the Global Climate Disclosure Framework.

Structure of Standards of Disclosure

Part 1 – Application and Terminology (4 sections)

Part 2 – Annual Filing Requirements (4 sections)

Part 3 – Responsibilities of Reporting Issuers and Directors (6 sections)

Part 4 – Measurement (6 sections)

Part 5 – Requirement Applicable to All Disclosure (17 sections)

Part 6 – Material Change Disclosure (1 section)

Part 7 – Other Information (1 section)

Part 8 – Exemptions (1 section)

Part 9 – Instrument in Force (1 section)

Analysis of drivers and barriers

NI 51-101 is structured in nine parts, most containing multiple sections (see text box). Within Part 5, there are sections 5.1 through 5.17, many of which have numbered subsections (e.g. 5.9 (1)(a).) A total of 38 of these sections or subsections were considered in this analysis.

The Standards of Disclosure (NI 51-101) are one avenue for disclosure of risk in Alberta and is the focus of this analysis. The requirement that oil and gas companies evaluate and disclose risk is itself enabling of adaptation, as risk and vulnerability assessments are a central component in the development of adaptation responses to climate change impacts.

[10] A 2005 University of Ottawa review of 300 companies on the Toronto Stock Exchange found that while 87% of oil and gas firms disclosed risk (generally focusing on financial, currency, interest rate, commodity and market risks), only 4% of companies discussed weather related risk. References to "severe climate", "unusual or unexpected weather conditions" and "unfavourable weather conditions" were found with probabilities and consequences described as 'likely to possible', and 'moderate to major', respectively.

Oil and gas disclosures must be filed with the securities regulator, and are available to investors and the public providing information on risk evaluation and management within companies and across the sector. Publicly available information allows for critical evaluation of a company's approach to managing climate related risks. The information can also provide communities and other stakeholders with information on anticipated development; information they can use to inform their land use and adaptation planning.

Most elements examined within NI 51-101 have no direct effect on climate change adaptation. Of those elements found to have a potential role in considering climate-related risks, there were opportunities for companies to consider climate change (companies are 'enabled' by the element), and a small number of potential barriers. Elements that enable adaptation include discussions of uncertainty, risk (risk management terminology), and references to guidance documents (including the COGE handbook) that are updated as needed.

Table 8: Grading distribution for Standards of Disclosure

Standards of Disclosure				
Total number of elements reviewed				38
Number of elements with one or more grades assigned				14
	A – Drive	B – Enable	D – Hinder	F – Barrier
Distribution of grades	-	12	5	-

A further discussion of barriers and drivers, grouped thematically, can be found in the following sections.

COGE Handbook

The relationship between NI 51-101, its companion policy and the COGE handbook is an opportunity to strengthen climate risk management. NI 51-101 defines the COGE handbook as a living document, one that is "amended from time to time" (Canadian Securities Administrators 2010c), in response to the "dynamic oil and gas industry" (Alberta Securities Commission 2014). The reference to an updatable guidance document promotes flexibility and responsiveness within the policy.

Forecast costs, net revenue, reserves

Issuers, companies that are required to comply with NI 51-101 – are to include forecast prices and costs that would be generally accepted as reasonable estimates. Issuers are able to determine these costs independently, and could include any change to operational costs associated with changes in climate related variables or hazards. This enables adaptation but is not a driver.

Section 5.15 of NI 51-101 outlines disclosure of *Finding and Development Costs*. The methodology for calculating development costs based on costs in the most recent year, as well as the change during the most recent year in estimated future development costs is described. The methodology encourages issuers to consistently incorporate new information in planning and disclosure. Presumably, this new information could include – as an example - reports by government agencies on most recent climate projections, trends and regional impacts and their potential bearing on their exploration, development and production costs.

In the most recent proposed amendments, to come into effect in July 2015, a new definition of "future new revenue" is included, defined as:

> "*… a forecast of revenue, estimated using forecast prices and costs or constant prices and costs, arising from the anticipated development and production of resources, net of the associated royalties, operating costs, development costs, and abandonment and reclamation costs.*" (Canadian Securities Administrators 2014)

And from the COGE handbook:

> "*economic viability is a prerequisite for defining reserves*" (pg. 23 in Canadian Securities Administrators, 2010a), and
>
> "*uncertainty is used to describe the range of possible outcomes*" (pg. 23 in Canadian Securities Administrators, 2010a).

The relevance of these descriptions to climate adaptation is perceptible if the evaluation (or valuation) of resources, economic viability or development scenario is altered by the inclusion of a range of climate scenarios.

Climate change impacts and adaptation responses will factor into these costs – operating, development, abandonment and reclamation – directly and indirectly. For example, a decline in water supply could be reasonably anticipated to shift operating costs, including the need for additional capital or new technology, particular over the long life of infrastructure. Likewise, changes in accessibility to remote locations and prospective resources could impact project revenue. Impacts and risks within supply and distribution chains are also documented (SEC 2010).

The 2014 Oil and Gas report highlights the absence of or inadequate discussion of risks and uncertainties with the recovery of resources. In addition to more commonly cited and reported risks, direct and indirect climate and weather impacts, if material, should be discussed and included as part of 'forecast prices and costs'. An explicit requirement or expectation to disclose on these risks, supported by both 51-101 as well as the companion guide and COGE handbook, would strengthen the role of disclosure in adaptation and sector resilience

MATERIALITY

REFERS TO A RISK IN WHICH THERE IS A SUBSTANTIAL LIKELIHOOD THAT IT WOULD BE VIEWED BY A REASONABLE INVESTOR AS HAVING SIGNIFICANTLY ALTERED THE TOTAL MIX OF INFORMATION MADE AVAILABLE (COBURN ET AL. 2012)

US SECURITIES REVIEW FINDINGS

A REVIEW OF 60 SEPARATE CLIMATE RELATED DISCLOSURES TO THE US SECURITIES AND EXCHANGE COMMISSION (SEC), FROM 10 MAJOR OIL AND GAS CORPORATIONS, FOUND THAT ONLY 5 DISCLOSURES WERE DEEMED TO BE OF 'GOOD' QUALITY, 50% WERE FOUND TO BE 'POOR' OR HAVE 'NO DISCLOSURE'. NONE WERE RATED EXCELLENT.

SIX (OF 10) COMPANIES PROVIDED NO DISCLOSURE ON CLIMATE IMPACTS TO ASSETS OR OPERATIONS. ONE COMPANY PROVIDED DESCRIPTION OF ITS PLANS TO RESPOND TO PHYSICAL IMPACTS OF CLIMATE CHANGE (INCLUDING RESEARCH, ANALYSIS FOR NEW PROJECTS, OR RISK MITIGATION STRATEGIES). THREE DISCLOSURES PROVIDED SOME RECOGNITION OF IMPACTS, BUT WITH FEW DETAILS OR INSIGHT INTO HOW THEY WOULD AFFECT THE COMPANY (COBURN, J. 2012).

Findings and recommendations

The combination of local (e.g. water restrictions in Alberta) and global impacts (e.g. extreme weather in Gulf Coast) with oil and gas issuers that operate in this highly interconnected industry, suggests that climate impacts will be increasingly relevant in forward-looking risk assessments and disclosure.

Environmental reporting occurs in a number of formats. This includes continuous disclosure under NI 51-102 that is accompanied by CSA guidance. However, opportunities exist to integrate climate change impacts considerations within the specific disclosure requirements for the oil and gas sector under NI 51-101.

The Ontario Security Commission documented a number of stakeholder concerns related to environmental disclosure in 2009, including (i) that material information contained in voluntary filings was not reflected in mandatory securities filings, (ii) environmental disclosures were incomplete or not reliable, (iii) material disclosures provided in voluntary reporting is not timely (prescribed timelines aren't present for voluntary disclosures), and (iv) that environmental risks were not integrated in financial reporting (Canadian Securities Administrators 2010a).

Important elements that are disclosed and discussed as part of reporting under NI 51-101, including uncertainty, economic viability of potential resources, and operating costs, will likely be influenced by climate change and weather.

Opportunities to strengthen the policy or its implementation include:

- Working with the authors of the COGE Handbook (the Society of Petroleum Evaluation Engineers and the Canadian Institute of Mining, Metallurgy & Petroleum) to determine how best to incorporate known climate risks into their documentation[11].

[11] Recommended areas of focus include understanding climate-related risks to assets, operations, business continuity (interruption of supply or distribution chains, damage to physical assets), capital costs, abandonment, and reclamation costs. Other specific areas might include exploration costs and economic viability of resources particularly in frontier regions of areas with

- Working with the ASC, to draw attention to existing disclosures related to physical risk highlighting best practices and addressing areas of deficiencies, either in its annual oil and gas disclosure reports (or separately in a specific analysis).
- Ensuring relevant and up-to-date information on key climate and weather indicators for incorporation into oil and gas analysis are available and disseminated effectively.

permafrost or other frontier conditions, and assets or operations dependent on water that are operating in water stressed areas.

ALBERTA WETLAND POLICY

JURISDICTION: ALBERTA

LEAD: PROVINCE OF ALBERTA

RELATED POLICIES: *WATER ACT, WATER FOR LIFE: ALBERTA'S STRATEGY FOR SUSTAINABILITY; ALBERTA LAND USE FRAMEWORK,*

YEAR: 2014

SECTOR: PUBLIC

NOTES: PROVIDES STRATEGIC DIRECTION AND TOOLS TO MAKE INFORMED MANAGEMENT DECISIONS IN THE LONG TERM INTEREST OF ALBERTANS.

Policy 4: Alberta Wetland Policy

Introduction to the Alberta Wetland Policy

The Alberta Wetland Policy (AWP) has recently come into effect, its implementation in 2014 and 2015 replacing the 1993 interim policy *Wetland Management in the Settled Areas of Alberta*. The AWP aligns with the Water for Life provincial strategy and supports the objectives of the regional planning process of the *Land-Use Framework* (Government of Alberta 2013). The provincial Water Act provides the legislative basis for the AWP.

The purpose of the policy is to provide a strategic framework for conserving, restoring, protecting and managing Alberta's wetlands (Government of Alberta 2013). The policy identifies four target outcomes: 1) highest value wetlands are protected for the long term benefit of all Albertans; 2) wetlands and their benefits are conserved and restored in areas where losses have been high; 3) wetlands are managed by avoiding, minimizing, and replacing lost value; and 4) wetland management considers a regional context (Government of Alberta 2013).

The central approach of the policy is to create a standardized valuation of wetlands, based on five key indicator categories, and a hierarchy of protection based on relative value beginning with avoidance and minimization as the preferred courses of action. The valuation is a central characteristic of the policy, as it establishes a relative value to wetlands ("not all wetlands are created equal" (Government of Alberta 2013)) and enables decision-makers to assess wetland stewardship decisions. The policy also sets out numerous provincial tools and databases to facilitate decision-making, to provide information to companies and consultants, and to enable policy evaluation, monitoring and improvement.

Oil and gas activities have significant impacts on wetlands in the areas they operate. Up to 300,000 hectares of wetlands are covered by existing oil sands leases and could be affected by surface mining, with the number climbing to 460,000 if in-situ mining is added (The Pembina Institute 2013). The AWP is not specifically targeted to the oil and gas sector; it is relevant to any project proponent where

there are anticipated impacts to wetlands. The principle application for the oil and gas industry will be related to

costs of, and public perception related to, environmental stewardship and performance. The policy establishes expectations in cases of planned wetland disturbance during exploration, extraction, processing or restoration and reclamation phases.

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Alberta Wetland Policy

Analysis of drivers and barriers

The AWP is structured in eleven sections (see text box). The elements identified represent contextual as well as action-oriented text in the policy.

The AWP creates a number of opportunities for climate related risks to be considered in provincial wetland management, and drives adaptation to climate change in a limited fashion.

Many of the principles of adaptive management are reflected in the policy, which can enable adaptation if the opportunities are taken advantage of by policy makers or project proponents. A single policy element was identified as a driver of adaptation, though adaptation was not directly referenced. Namely, that "minimization measures should remain functional as long as the project has reasonable potential for adverse effects on the wetland". An expectation is created here that project proponent's measures are resilient throughout the life of the project (failure to do so could lead to liability).

A small number of potential barriers to climate change adaptation arise related to the information and data tools that are provided, and in references to "current abundance / density and historical loss" (Government of Alberta 2013) that focus explicitly on present state and implicitly exclude projections related to changes in hydrology and climate.

Table 9: Grading distribution for Alberta Wetland Policy

Alberta Wetland Policy				
Total number of elements reviewed				72
Number of elements with one or more grades assigned				28
	A – Drive	B – Enable	D – Hinder	F – Barrier
Distribution of grades	2	34	5	-

Further discussion of barriers and drivers, grouped thematically, can be found in the following sections.

Adaptive management

Multiple references to adaptive management, and the presence of a number of principles associated with adaptive policies (see Appendix B), including flexibility, continuous learning, decentralization of decision-making, and review are strongly emphasized. On their own, these characteristics create space for (or enable) adaptation driven by local or regional actors (for example, through the land-use planning process). There are no stated references to climate change in the policy, nor are there requirements to integrate climate data or consider projections of climate impacts. The inclusion of these elements in the policy, supported by tools, databases and inventories that themselves consider climate impacts in their development, could strengthen the AWP's role as a climate change adaption driver.

Water for Life principles

The principles of Water for Life, as reflected in the AWP, present an opportunity to strengthen the AWP's role in driving adaptation. Examples of where climate change could be integrated are provided in the table below.

Table 10: Water for Life principals (from Alberta Wetland Policy) with opportunities for inclusion of climate change

Water for Life principle	AWP is designed to	Opportunity to drive adaptation
Citizens, communities, industry, and government must share responsibility for water management in Alberta, and work together to improve conditions in their local watershed.	Ensure affected stakeholders and knowledgeable experts have been consulted.	Integrate experts with knowledge of climate change impacts and adaptation, role of wetlands in adaptation climate impacts, understanding of stressors to wetlands resulting from changing climate and water supply.
Knowledge of Alberta's water supply and quality is the foundation for effective decision-making.	Incorporate the best available knowledge and science.	Include climate projections and associated research.
Healthy aquatic ecosystems are vital to a high quality of life for Albertans and must be preserved.	Consider both short-term and long-term effects on society and the environment, including cumulative effects and environmental net effects. Recognize the critical benefits that wetlands provide for Albertans	Addition of climate change could help ensure the long term sustainability and suitability of actions taken to protect or restore wetlands. Recognize the role and benefits wetlands have with respect to climate change impacts and adaptation, including flood and drought mitigation.
Knowledge of Alberta's water supply and quality is the foundation for effective decision-making.	Enable the continuous development of knowledge tools around the state of wetlands in Alberta and wetland science, in general.	Support research and development of tools related to climate change and wetlands.

Adapted from (Government of Alberta 2013)

Strategic directions

The three strategic directions outlined by the AWP are to: 1) enable flexible wetland management; 2) build effective tools, knowledge and capacity; and 3) encourage conservation of wetlands and voluntary stewardship.

Successful adaptation planning and solutions are frequently local in nature or engage local participation within an overarching framework. The first strategic direction enables adaptation by decentralizing decision-making and encouraging participation in planning.

The second strategic direction – tools, knowledge and capacity – as described can enable adaptation by providing industry and the public sector with consolidated knowledge and tools to inform wetland assessment and management. These tools include a wetland inventory, value assessment tool, wetland database, and inventory of wetland restoration opportunities. Together, and as individual tools, the extent to which climate change is integrated is unknown.

Lastly, encouraging conservation of wetlands and voluntary stewardship of wetlands – the third strategic direction – engages citizens in actions such as wetland protection that can reduce the impacts of climate change hazards (drought, flood). This has little direct relationship to the oil and gas sector, although stronger wetland conservation supports maintenance of water quantity and quality, two areas that are stressed by oil and gas development.

Text and time frames

While the AWP discusses the need to "support the province's wetland management needs into the future" (Government of Alberta 2013, p5), and to provide "strategic direction and tools required to make informed management decisions in the long-term interest" (Government of Alberta 2013, p2) there are no references to climate change within the policy. In discussing the need for the new provincial policy (the AWP replaces interim policies), the government cited the pressure and cumulative effects of both rapid population and economic growth. Projections and analysis from the academic community cite the combined impacts of development and climate change on water, and express concerns of "far reaching implications" (Schindler & Donahue 2006).

Wetland Management System and Relative Wetland Value

A hierarchy is established by the policy for wetland management: damage should be avoided first, minimized second and if necessary, replaced. This use of the "avoid / minimize / replace" hierarchy is informed by an evaluation of relative wetland value.

Relative wetland value

RELATIVE WETLAND VALUE

"ALBERTA'S WETLANDS ARE HIGHLY DIVERSE IN FORM, FUNCTION, USE, AND DISTRIBUTION ACROSS THE PROVINCE; THEY ARE NOT ALL OF EQUAL VALUE. THE ALBERTA WETLAND POLICY ADDRESSES THIS DIVERSITY THROUGH THE CONCEPT OF 'RELATIVE WETLAND VALUE', WHICH ACKNOWLEDGES THE RELATIVE CONTRIBUTION OF AN INDIVIDUAL WETLAND TO WATER QUALITY IMPROVEMENT, HYDROLOGY, BIODIVERSITY, AND VARIOUS HUMAN USES." (GOVERNMENT OF ALBERTA, 2013. ALBERTA WETLAND POLICY)

The policy acknowledges that wetlands are not all of equal value (Government of Alberta 2013). The relative values of wetlands are established based on five functions: biodiversity and ecological health, water quality improvement, hydrologic function, human uses, and relative abundance.

These wetlands functions – and hence their relative value as applied in the policy and management of provincial wetlands - are intimately connected with climate change. The relative value of an individual wetland or type of wetland may change over time as the need for the core function changes. For example, projections of increased flooding associated with climate change would increase the demand for the core function of flood mitigation provided by wetlands. Similarly, certain wetland types (e.g. peatlands) with high value core functions, will be disproportionately impacted by projected development, resulting in possible imbalances of relative wetland value. Establishing the relative value of wetlands, and making management decisions based on those values, should consider (i) their ability to perform that function efficiently over time, and (ii) how the need for that function changes over time.

The policy creates space for consideration of climate change, without stating specifically that it should.

> "*[the AWP relative wetland value] will consider a wetland within a broader context, including the landscape upon which the wetland is found, the environmental functions it performs, and social and non-consumptive economic benefits associated with the wetland. This will allow the importance of individual wetlands to be acknowledged, their contribution to the ecosystem to be better understood, and informed wetland management decisions to be made.*" (Government of Alberta 2013)

Here is an opportunity to integrate climate change impacts directly into the policy. The AWP could be reworded to specify climate change (e.g. The AWP 'consider a wetland within a broader context, including the landscape upon which the wetland is found, the environmental functions it performs, *the impacts of climate change on wetlands*, and social and non-consumptive economic benefits associated with the wetland *including its role in reducing impacts of climate change related hazards such as flood and drought*').

Drivers and barriers within the Guiding Principles

Guiding principles of wetland mitigation

The policy instructs that where achievable, wetlands should be replaced type-for-type. This is a potential barrier to adaptation to climate change, as it limits flexibility to consider changes to hydrology, species, biodiversity requirements that could point to a wetland type that has greater resiliency within range of projected climate conditions and can provide greater function across one or more of the core function areas.

Ten principles provide a guide to wetland mitigation, many of which enable adaptation by creating a socially adaptive environment through actions such as:

- including planning, education and awareness in planning;
- supporting cumulative effects management through land-use and regional planning; and,

- making the mitigation system publicly accessible.

The guiding principles listed in the policy reflect the principles of adaptive management discussed elsewhere. Adaptive management principles are evident in the provisions for monitoring and evaluation, and in encouragement for integration and use of new information including wetland science. However, there are no specific references or drivers for adaptation, only opportunities. The policy opens up opportunities for adaptation, but requires that it be brought forward by other actors.

Guiding principles of wetland avoidance

> *"To ensure feasibility and practicality, avoidance must be enabled at an early stage in the planning process. The Alberta Wetland Policy will facilitate this through provision of a relative wetland value map, which establishes the relative value of all wetlands in the province."* (Government of Alberta 2013)

The provision of a decision-support tool, in this case the relative wetland value map, that does not integrate climate change introduces a risk that decisions and actions based on information in that tool will not be appropriate at a future point in time.

Furthermore, the guiding principles for wetland avoidance state that wetlands of higher value require stronger evidence of effort towards avoidance of impacts. Again, the creation of a wetland value system focused on present state evaluation could underestimate the value of a particular site for flood mitigation under various climate change scenarios.

Guiding principles of wetland impact minimization

The guiding principles for wetland impact minimization listed in the policy can be described as enabling climate change adaptation. The principles create an adaptive operational environment – including for oil and gas companies – where minimization of impacts is continuously sought. Examples include that minimization is based on "best available science" and "continuous improvement, using iterative or adaptive approach" (Government of Alberta 2013).

Two drivers of adaptation found in the policy are (i) "that minimization measures should remain functional as long as the project has reasonable potential for adverse effects", and (ii) "efforts to minimize adverse effects do not relieve the proponent of replacement requirements, in the event of permanent wetland loss" (Government of Alberta 2013). The policy appears to transfer long term responsibility and liability to a project proponent – including oil and gas developments – to ensure they perform due diligence with respect to risks over the life of the project. Minimization measures that fail due to change in intensity or frequency of climate hazards, could result in additional requirement for wetland restoration and replacement. The avoidance of these impacts could drive oil and gas companies to ensure their management practices and plans are robust under all climate scenarios.

Replacement

Two categories of replacement are outlined in the policy – restorative and non-restorative. Restorative replacement includes restoration, enhancement or construction of wetlands. Non-restorative replacement refers to a suite of alternatives, including research into wetland restoration, contributions to data or inventory, or other actions that support wetland science.

Replacement can be further divided in two subcategories of in-lieu fee payment or permittee-responsible replacement. In-lieu payment requires that a proponent pay restitution for wetland loss with funds allocated for restorative or non-restorative measures. For permittee-responsible replacement, restorative replacement is undertaken by a proponent in accordance with guidelines.

The amount of replacement required, restorative or non-restorative, is based on replacement ratios informed by the relative wetland valuation. This is described in the policy as:

> *"Replacement requirements will be established on the basis of replacement ratios. The suite of replacement ratios developed by the Government of Alberta is established around a midpoint of 3:1. It is based on three key considerations: (1) a restored wetland is unlikely to achieve the same level of function as the natural wetland it replaces, (2) a significant time lag is expected to occur, between the moment a wetland is lost and the point a restored wetland achieves a reasonable level of function, and (3) some proportion of restored wetlands is expected to fail over time."* (Government of Alberta 2013)

Climate change and associated changes to temperature and hydrology can be expected to have an impact on each of these three considerations: the level of function ultimately achieved by a restored wetland could be less than anticipated, the time required to achieve a reasonable level or function, and the proportion of wetlands that fail could change under different climate change scenarios over time. The integration of climate change within the wetland assessment database could help address some of these risks, ensuring the policy's overall objectives remain achievable.

The provision that 'replacement' could include actions such as education and public outreach that are not replacement in the most literal interpretation has been found problematic by others (Kwasniak 2013). With the absence of explicit consideration of the additional stress caused to wetlands by climate change, as well as wetlands role in supporting adaptation to climate change (species resiliency, flood mitigation), contingencies for non-replacement raise additional concerns. Wetlands' contribution to climate change adaptation (e.g. for species-at-risk, for flood mitigation) could be lost before they are even considered.

Knowledge and information systems

The information, tools and databases (see text box below) required for the implementation of the AWP can enable adaptation to climate change if they are leveraged towards that objective. However, if these tools do not give sufficient consideration to climate change, there is a risk they could become barriers to adaptation.

TOOLS AND INFORMATION IN THE ALBERTA WETLAND POLICY

THE FOLLOWING PRODUCTS ARE REQUIRED TO SUPPORT THE AWP (GOVERNMENT OF ALBERTA 2013)

- *PROVINCIAL WETLAND INVENTORY*
- *PROVINCIAL WETLAND VALUE ASSESSMENT SYSTEM*
- *WETLAND VALUE ASSESSMENT TOOL*
- *WETLAND DATABASE AND REPORTING TOOL*
- *INVENTORY OF WETLAND RESTORATION OPPORTUNITIES*
- *CERTIFICATION SYSTEMS*
- *REPOSITORY OF RESEARCH PRIORITIES AND NEEDS*
- *EDUCATION AND OUTREACH PROGRAM*

In the description of the wetland value assessment tool, for instance, the policy indicates that it is expected that "proponents and/or consultants" would be the primary users. While these users may be the target group for the information, the information should also be accessible in a format useful to the general public to ensure due diligence or innovation around climate impacts.

In another example, the provincial wetland value assessment system – described as a GIS-level tool that is still under development – will provide a valuation system that forms the basis of decision-making and land use planning activities. If this tool provides singular 'point-in-time' assessments of wetland status and value, there is a risk that inaccurate information will be used for planning decisions as the climate continues to change.

Findings and recommendations

The structure of the Alberta Wetland Policy can enable adaptation. Specifically, the elements of the policy that encourage innovation, the continuous integration of new knowledge, the flexibility to incorporate local planning, and the potential to support required research on climate change and wetlands, could contribute to wetland and wetland management that is resilient and adapts to the changing climate.

However, if climate change is not sufficiently incorporated, some elements of the policy could become barriers to adaptation. Examples here include the knowledge systems and tools upon which decision-makers, land-use planners, consultants and project proponents will base their decisions. If these tools do not themselves incorporate climate change, the performance of wetland restoration efforts may fall short of expectation, and targeted outcomes may not be achieved.

A key point of interest and risk for the oil and gas sector is the possibility that wetland management at a provincial scale does not perform as well as expected, and core function areas – human uses, water quality, biodiversity, and flood protection - are diminished. The social license to operate in the province depends to some extent on the sector stewardship of the

environment. Negative public perception resulting from poor environmental performance is an area of risk that requires attention.

Additionally, as wetland restoration efforts are expected to remain functional over the life of a project, and as wetland mitigation efforts that fail are the responsibility of the proponent, expectations that proponent activities are robust as the climate changes are already implicitly embedded.

The following recommendations could strengthen the AWP's role in driving adaptation to climate change in the province.

- Explicitly recognize the relationship between climate change, wetland health, and the core functions that establish the value of provincial wetlands.
- Ensure that compliance mechanisms focus not just on the present state of wetlands, but also include projected impacts on wetlands.
- Recognize the changing value and need for core functions of wetlands over time (e.g. increasing value of wetlands as flood risks increase)
- Require that research undertaken as part of compliance with the policy incorporate climate change considerations where appropriate, thus contributing to a continuously growing body of knowledge that can inform best practice and wetland management.
- The tools outlined under the AWP should, in their conception and (re)development consider and incorporate climate change risks where feasible.

LOWER ATHABASCA REGIONAL PLAN

JURISDICTION: ALBERTA

LEAD: PROVINCE OF ALBERTA

RELATED POLICIES: *ALBERTA LAND USE FRAMEWORK; WATER ACT, PUBLIC LANDS ACT, FORESTS ACT, WILDLIFE ACT, ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT*

YEAR: 2012

SECTOR: PUBLIC

NOTES: THE LARP APPLIES TO CROWN, DECISION-MAKERS, LOCAL GOVERNMENTS AND ALL OTHER PERSONS IN THE REGION. IT INFORMS LONG TERM REGIONAL PLANNING BY ESTABLISHING 10 YEAR STRATEGIC PLANS.

Policy 5: Lower Athabasca Regional Plan

Introduction to the Lower Athabasca Regional Plan

The Lower Athabasca is one of seven land-use regions established in the 2008 Alberta Land Use Framework. Each region establishes a land-use plan for long term economic, environmental and social objectives. The strategies, objectives and plans within the Lower Athabasca Region Plan (LARP) are to be implemented within existing decision-making processes. The LARP applies to "(a) the Crown, (b) decision-makers, (c) local government bodies, and (d) subject to section 15.1 of the Act, all other persons" (Government of Alberta 2012).

Because the LARP is to be implemented through existing processes, it is an important document for a large number of local and provincial policies, including but not limited to the *Water Act, Public Lands Act, Forests Act, Wildlife Act, Environmental Protection and Enhancement Act*. In addition to higher level Acts, sub-regional plans and strategies including sector-specific plans (e.g. forestry) are part of the LARP policy framework.

The LARP has three key components: strategic plan, implementation plan, and regulatory details plan. The regulatory details cover conservation areas, conserved land, air quality, surface water quality, groundwater, recreation and tourism, and monitoring and reporting.

The development of the LARP was completed in consultation with the Lower Athabasca advisory council, communities, First Nations and other stakeholders.

Analysis of drivers and barriers

The LARP has three primary sections: introduction, a strategic plan, and an implementation plan. The strategic plan provides information on the region's economy and ecosystem, describes the plan's vision, and outlines strategic directions. The implementation plan lays out the strategies and outcomes to achieve that vision, and provides regulatory details. (See text box next page.)

The LARP explicitly incorporates adaptive policy principles in its design, which accounts for many of the policy

elements that were identified as enabling adaptation.

Specific drivers of adaptation include references to risk management and stated expectations that outcomes, water quality for example, are to be maintained in the present and for future generations.

Table 11: Grading distribution for LARP

Lower Athabasca Regional Plan				
Total number of elements reviewed				131
Number of elements with one or more grades assigned				35
	A – Drive	B – Enable	D – Hinder	F – Barrier
Distribution of grades	9	29	3	-

Further discussion of barriers and drivers, grouped thematically, can be found in the following Sections.

Long term planning

The LARP outlines strategies and directions for a 10 year period, with 50 year vision and growth in mind. The plan can be updated every 5 years.

A policy that explicitly looks ahead 50 years is making planning decisions within a timeframe where many climate impacts are expected to become apparent (if not already). There are however, no mentions of climate change impacts or adaptation with the LARP.

The use of scenario planning is one tool within the LARP that could support climate change adaptation. Scenario planning is identified in the implementation plan as a tool for landscape management. The development scenarios in this exercise are generated based on development trajectories and technology, the LARP vision, and the application of possible policy and management tools.

In the Regulatory Details Plan (Part 1 General, Sections 4 and 5), while not legally binding, it is indicated the provisions of the LARP are intended to inform decision-makers, local government, the Crown, and other individuals for the management of activities to "meet the reasonably foreseeable needs of current and future generations of

Summarized Table of Contents LARP

1. Introduction
    a. Background
    b. Purpose
    c. Land-use Planning in Alberta
    d. Informing Land-use Decisions
    e. Plan Structure
    f. Regulatory Details Plan Part I General
2. Strategic Plan
    a. The Region Today
    b. Economic Development
    c. Ecosystems and Environment
    d. Human Development
    e. The Future of the Region (including Regional Vision)
    f. Strategic Directions for the Region (Seven strategic directions)
3. Implementation Plan
    a. Strategies and Outcomes
    b. Outcomes 1 through 7 (Outcomes with Regulatory Details Plan)
4. Table 1 and 2. Summary of outcomes, indicators and strategies.
5. Schedule A-G. Management Framework, limits and triggers for management.

Albertans, including Aboriginal peoples". In another example from the implementation plan, the surface water quality objective ("managed so current and future uses are protected" (Government of Alberta 2012)), creates an expectation that water quality will be protected regardless of scenario. The expectation that planners incorporate climate change in decision-making is increasingly common (and in some cases liability has been assigned for failure to do so (Environmental Commissioner of Ontario, 2014)). These references to ensure achievement of objectives, given the body of established and available literature on climate change and climate impacts, should be viewed and interpreted as driving adaptation.

The theme of timeframe returns again in the strategies plan, which in consecutives sections 'the Region Today', 'Economic Development', and 'Ecosystems and Environment' a reasonably thorough description of the present state is described, as well as growth projections (in the case of Economic Development). However, projections or discussion of climate change, or climate impacts such as decline in surface water availability or forest fire hazard, are not included. Projections for water stress or decreasing water availability in the Lower Athabasca are absent from the discussion of oil sands operations and their current use of water, and their absence is a potential barrier to climate change adaptation. Readers and policy-makers are presented with information upon which to base decisions, and this information is incomplete without climate change impacts information.

Adaptive policy

Within the LARP, several principles of adaptive policy can be identified: planned review and continuous learning, multi-stakeholder deliberation, integrated and forward looking analysis. The LARP is endeavoring to "set the stage" for 50 years of growth and healthy environment in the region, and integrates multiple sectors (forestry, oil sands, mining), communities, and First Nations within the planning process (as well as processes for sub-regional plans and strategies). Each of these stakeholders is engaged in the development of the plan. The cumulative effects approach espoused by the LARP – one that is knowledge and place based, as well as adaptive – also provides some degree of decentralization of decision-making.

As discussed earlier, a policy that is adaptive can enable consideration of climate change but does not necessarily encourage, promote or drive it. The presence of many of these characteristics account for a large number of the 'B – enabler' scores that were assigned to policy elements during the review.

Indicators, monitoring, evaluation, and triggers

Air, water, land and biodiversity are monitored in the region, with various groups undertaking activities and reporting, including provincial government, the Wood Buffalo Environmental Association, the Lakeland Industry and Community Association, and Alberta Biodiversity Monitoring Institute. Monitoring and evaluation is a central component of the plan, necessary to establish overall plan performance and achievement of objectives. The LARP is described as "outcome based" and adaptive in that the "system can adapt to change when performance results are not achieving outcomes or there is a risks of not achieving outcomes" (Government of Alberta 2012).

While the provision of data and information can enable adaptation, one element of the monitoring framework described in the LARP that is a driver for climate change adaptation is found in the Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring. The initiative establishes a set of five objectives, including: "to improve analysis of existing monitoring and data to develop a better understanding of historical baselines and changes" (Government of Alberta 2012). Establishing both historical baselines and change – or trends – for a set of indicators could help decision-makers understand the relationship of that trend to the climate (where one could exist). Leveraging this information could allow decision-makers to anticipate when potential thresholds or triggers would be crossed, and plan adaptive action. The Canada-Alberta Oil Sands Environmental Monitoring Information Portal (jointoilsandsmonitoring.ca) provides this information publicly, further enabling adaptation.

The implementation plan of the LARP outlines indicators for each desired regional outcome (see text box). These cover a variety of components, including social, economic and environmental. However, within the suite of indicators identified in the LARP, there are no specific climate indicators that would provide accessible information on regional climate trends that could inform adaptation.

REGIONAL OUTCOMES OF THE LARP

THE FOLLOWING OUTCOMES ARE DESCRIBED IN THE LARP

1. *THE ECONOMIC POTENTIAL OF THE OIL SANDS RESOURCE IS OPTIMIZED;*
2. *THE REGION'S ECONOMY IS DIVERSIFIED;*
3. *LANDSCAPES ARE MANAGED TO MAINTAIN ECOSYSTEM FUNCTION AND BIODIVERSITY;*
4. *AIR AND WATER ARE MANAGED TO SUPPORT HUMAN AND ECOSYSTEM NEEDS;*
5. *INFRASTRUCTURE DEVELOPMENT SUPPORTS ECONOMIC AND POPULATION GROWTH;*
6. *THE QUALITY OF LIFE OF RESIDENTS IS ENHANCED THROUGH INCREASED OPPORTUNITIES FOR RECREATION AND ACTIVE LIVING; AND*
7. *INCLUSION OF ABORIGINAL PEOPLES IN LAND-USE PLANNING*

(GOVERNMENT OF ALBERTA, 2012)

The LARP identifies and references threshold triggers in a number of areas, exceedances of which lead to remedial action. Standards for ambient concentrations of pollutants are typically based on health assessments, though they also recognize ecosystem health. An opportunity exists to re-visit standards, and to possibly include the effects of observed or anticipated climate trends, through

a multi-stakeholder process led by Alberta ESRD (Alberta Government 2012). As changes to these indicators and thresholds will be affected by the changing climate (e.g. ambient air quality is influenced by temperature and local weather conditions) which could affect future oil and gas sector growth in the region, it is important to consider possible changes well in advance. Neglecting these changing conditions could result in restrictions on specific emissions or more stringent regulations ahead of expectations, thereby increasing operator cost (Alberta Government 2012).

Risk

The LARP approach is one of cumulative effects management (Government of Alberta 2012) that evaluates and manages multiple stresses and assesses risk. References to risk management are found related to cumulative effects management (pg 3), wildfire (pg 39), biodiversity management (pg 45), and water quality management (pg 51). A risk management approach can incorporate climate change impacts and risks, and can point to potential areas requiring adaptation. The extent to which climate change impacts are incorporated within risk-management exercises will depend on the groups or individuals involved and/or the guidance documentation provided to support risk management. It should be noted that while LARP focuses on cumulative effects management, it does not explicitly consider the impact of development on the adaptive capacity, or on the available options for adaptation, of relevant stakeholders. For example, the recently enacted Surface Water Quantity Management Framework (under LARP) does not include an ecosystem-based flow for the Athabasca River which would halt water withdrawals under certain low-flow conditions. While oil and gas sector operators do believe that water withdrawals should cease during extreme low flow situations, they also believe that further monitoring and study is required (Suncor Energy Inc., 2014). If the absence of ecosystem-based minimum flow reduced the health and resiliency of a river ecosystem that downstream communities rely on, it could reduce that community's adaptive capacity or limit the adaptation options available to them.

Regional planning

A regional plan is an opportunity to identify potential synergies and trade-offs in decision-making. This benefit is identified within the agriculture implementation strategy of the plan, where municipalities are encourage to "minimize conflict between agriculture operations and incompatible land uses" (Government of Alberta 2012). At a system and regional scale, the LARP is an opportunity to identify and address risks associated with climate change in an efficient manner, avoiding actions that are maladaptive or restrict flexibility for some while addressing risks for a limited group.

Infrastructure

The LARP outcome "infrastructure development supports economic and population growth" would be strengthened through a discussion of climate impacts. The objective, of facilitating efficient use of infrastructure and land for economic and population growth, should address long term climate change impacts in the region. Infrastructure often have planned service lives of 25, 50 or more years, warranting consideration of climate change trends and impacts. The sections on Infrastructure do not reference climate or risk explicitly, and there is no discussion of ensuring infrastructure is 'robust' or 'resilient', terms often associated with climate change

impacts and adaptation. The addition of risk or climate change terminology in the plan could create expectation that infrastructure perform as expected throughout their service life.

However, the Athabasca Comprehensive Regional Infrastructure Sustainability Plan (CRISP) that is cited in the LARP does identify "maintaining future opportunities" as a strategy for ensuring the regional economy remains innovative and competitive. Maintaining opportunities and flexibility can enable adaptation however, and this element of policy could be used to ensure infrastructure decisions can be adjusted as the climate changes.

Findings and recommendations

The LARP can enable adaptation within the region. The policy is designed to be adaptive, it is able to incorporate changes in conditions and respond if outcomes are not achieved. The five year review cycles within the 10 year plans provide opportunities to enhance to role of the LARP in driving adaptation. The following opportunities were identified to strengthen the LARP's role in driving adaptation in the region:

- Add climate change indicators to the monitoring and evaluation suite. Stakeholders could identify key vulnerabilities in the region and determine the indicators required to identify and address risks, including infrastructure risks and risks related to environmental performance of the oil and gas sector.
- Strengthen the infrastructure discussion by adding risk and climate terminology, including 'robust' or 'resilient' infrastructure. Long term infrastructure planning should require consideration for future climate conditions.
- Make available climate change projections and information on impacts during the planning and consultation process, as well as plan reviews.
- Incorporate climate change scenarios into scenario planning exercises used in regional, sub-regional plan development, and in assessing impacts to various monitoring thresholds.
- Address outstanding gaps and actions items, including the completion of a tailings management framework, the groundwater management framework for the region, and ensure integration of climate change impacts and adaptation.
- Include climate change projections and impacts in the text of the introduction and strategies plan. Discussion on long term projections for development should be paired with best available information on projections of climate and associated impacts in the planning region.

Discussion and Opportunities

This review reveals that there is space within policy to enable the oil and gas sector and its stakeholders to be proactive in responding to climate change risks and opportunities. Within the limited set of policies reviewed we identified no explicit barriers, and only found few specific drivers of adaptation.

Generally, the degree to which adaptation is enabled or driven in the oil and gas sector (and other sectors) will depend on the implementation of the complete policy framework. For example, the Alberta Energy Regulator, under REDA, in its role as regulator for the oil and gas industry assumes responsibility for the objectives and implementation various policies when they apply to oil and gas projects. The securities regulation (NI 51-101) contains multiple references of an updateable guidance document. The vision and objectives contained within the Lower Athabasca Regional Plan must be carried out and implemented by decision-makers in other departments. Climate change adaptation, and the management of climate risks within the natural resources sector, will require integration of climate change adaptation not only within specific policies, but throughout the policy framework.

Fortunately, the analysis demonstrates that there are opportunities to strengthen adaptation both using principles of adaptive management and through the discretion of the relevant implementing agency.

Further research and analysis should be provided to the oil and gas sector and its stakeholders on local and regional climate impacts and risks based on relevant and up-to-date information. This information should be framed or packaged in a way that can easily be used by actors governed by specific policies (e.g. projected temperature and precipitation data for use in an EA).

Guidance documents should be developed or strengthened to ensure consistency and quality of climate mainstreaming within the oil and gas sector. While it is evident that the oil and gas sector already considers climate risks to some extent in planning and operating decisions, policy can enable broader uptake through targeted information and structured guidance.

Collaboration between government, operators, industry associations, consultants and other stakeholders would allow for a greater understanding of sector best practices and an efficient means of information dissemination.

Consultation processes can be strengthened by allowing and encouraging experts or stakeholders with information relevant to climate change science, climate impacts and climate adaptation to participate. In the case of the Responsible Energy Development Act, this may require opening up eligibility for comment and participation in the process. For the Lower Athabasca Regional Plan, this could result in the incorporation of climate model results (provided with relevant expertise) in scenario planning exercises.

Policies that include indicators, monitoring, evaluation and review processes can be strengthened by the addition of climate-related indicators and/or through providing information

on the relationship between the selected indicators and climate change where relevant. The evaluation and review processes are opportunities for continuous learning and improvement, and present opportunities for integration of new and evolving information on climate impacts.

When the objectives and desired outcomes of policy are dependent on climate change, an explicit recognition and discussion of this relationship is required. In the Alberta Wetland Policy for example, wetland functions central to the valuation process are intimately connected with climate change. A reliance on tools and processes for long term management of natural resources that do not incorporate climate change increases the risk that policy objectives will not be achieved. Policies that oversee management of natural resources, including watersheds and wetlands, directly affected by changes in climate should incorporate climate change explicitly.

An alignment of timeframes should allow for the easy integration of climate risks when necessary. The timeframes of climate change impacts are often coincident with the management timeframes associated with policies or policy instruments. The LARP for example, aims to establish a trajectory for sustainable growth over multiple decades; climate change impacts are and will increasingly be relevant for planning in a similar timeframe. In fact, the LARP outlines a scenario planning process for development and growth, an exercise that would be strengthened by incorporating climate change. Simply stated, climate change projections and impacts align with planning timeframes, thus should be included in scenarios of future growth, resources and land use.

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Glossary

Drivers	Refers to elements of policies or policy instruments that support, or 'drive', climate change adaptation action.
Barriers	Refers to elements of policies or policy instruments that hinder, or act as a barrier to, climate change adaptation action.
Policy	A high-level statement of intent in response to defined conditions and in order to guide present and future decisions.
Policy instrument	Techniques that governments or organizations have to implement policy objectives, or increase uptake.
Policy framework	The broad set of policies that govern actions of groups and organizations within a certain area of bound.
Adaptation	The process of adjustment to actual or expected climate and its effects. Adaptation moderates harm or exploits opportunities, and can be anticipatory, autonomous or planned.
Maladaptation	Any changes in natural or human systems that inadvertently increase *vulnerability* to climatic *stimuli*; an *adaptation* that does not succeed in reducing vulnerability but increases it instead. Can also arise from deliberate decisions that that place greater emphasis on short term outcomes ahead of longer term threats, or that fail to consider the full range of interactions arising from planned actions.
Adaptive capacity	The ability of a system (including human systems, individuals or communities) to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.
Impacts	The effects on natural and human systems of extreme weather and climate events and of climate change.
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

Appendix A: Risk and Disclosure

To support the increased demand for disclosure from investors and shareholders, a variety of guidance documents have been published to support disclosure related to climate risk. Guidance and information related to physical climate risks are shown in the Table 12 below.

The guidance documents outline expectations and best practices with regard to a number of climate related risks, including: emissions disclosure, regulatory risks (e.g. constraints of greenhouse gas emissions), and physical risks (UNEPFI 2006).

Table 12: Examples from Climate Risk Disclosure guidance

Source	Section	Notes
SEC (SEC 2010)	Background	In addition to legislative, regulatory, business and market impacts related to climate change, there may be significant physical effects of climate change that have the potential to have a material effect on a registrant's business and operations. These effects can impact a registrant's personnel, physical assets, supply chain and distribution chain. They can include the impact of changes in weather patterns, such as increases in storm intensity, (…) temperature extremes, on facilities and operations. Changes in the availability or quality of water, or other natural resources on which the company depends, or damage to facilities or decreased efficiency of equipment can have material effects on companies. Possible consequences of severe weather could include: property damage and disruptions to operations, including manufacturing operations or the transport of manufactured products; Indirect financial and operational impacts from disruptions to the operations of major customers or suppliers from severe weather, such as hurricanes or floods; Increased insurance claims and liabilities for insurance and reinsurance companies; Increased insurance premiums and deductibles, or a decrease in the availability of coverage, for registrants with plants or operations in areas subject to severe weather.
	Physical impacts of climate change	Significant physical effects of climate change, such as effects on the severity of weather (for example, floods or hurricanes), sea levels, the arability of farmland, and water availability and quality, have the potential to affect a registrant's operations and results. For example, severe weather can cause catastrophic harm to physical plants and facilities and can disrupt manufacturing and distribution processes.
Global Climate Disclosure	Investment Strategy	Change the company has seen in the importance of climate-related performance
	Adaptation to	Provides information and descriptions on the impacts climate

Source	Section	Notes
Framework for O&G Companies (Pfeifer, Logan, and Fabian)	physical effects of climate change	change is likely to have on operations, including: Risks of long-lived changes in weather patterns posed to operations, with specific reference to the regions of current or future operation considered to be most exposed. Investment areas that may be created through the physical effects of climate change. Value of assets and quantify of reserves located in areas exposed to extreme weather events, and methodology used for the integration of extreme weather into company strategy, investment decisions and risk management
	Adaptation to physical effects of climate change	Value of net asset exposure to extreme weather events (by region or country)
Using the Global Framework for Climate Risk Disclosure	Physical risk	To help investors analyze these risks, investors encourage companies to analyze and disclose material, physical effects that climate change may have on the company's business and its operations, including their supply chain. These effects may include the impact of changed weather patterns, such as increased number and intensity of storms; sea-level rise; water availability and other hydrological effects; changes in temperature; and impacts of health effects, such as heat-related illness or disease, on their workforce. After identifying these risk exposures, companies should describe how they could adapt to the physical risks of climate change and estimate the potential costs of adaptation.
Canadian Securities Administrators(Canadian Securities Administrators 2010a)	Physical Risk	Describes recognition among issuers of current and potential impacts on performance and operations (both positive and negative) from interrupted operations, unplanned material costs, matters affecting license to operate, altered cost of capital, affordability and availability of insurance. Issuers are encouraged to consider and respond to risk such as impacts of changing weather patterns and water availability, including property damage, health and safety (employees and public), disrupted operations for customers and suppliers, increased insurance claims and liabilities, increased insurance premiums and deductibles, or decrease in availability or loss of coverage.

Appendix B: Policy Background

Defining Policy

Policy is often associated with government legislation and regulation, but can encompass a wide variety of activities, including broad statements of purpose and process for addressing a particular social, economic or environmental issue. Policies can be public, corporate or organizational. A policy is defined in this project as a high-level statement of intent selected from alternatives in response to defined conditions and in order to guide present and future decisions (Merriam-Webster).

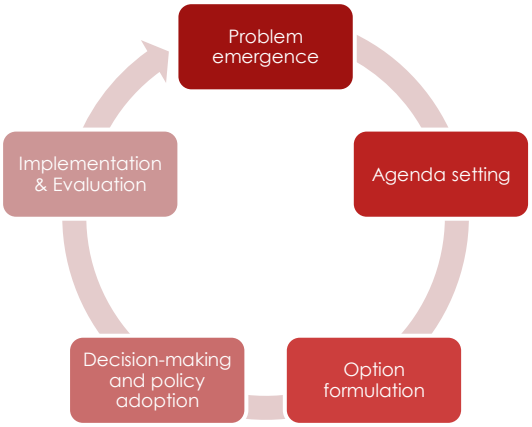

Figure 1: Policy cycle (Mackay and Shaxton)

Most often, policies address a range of clustered, interrelated and long-term problems or challenges (Mackay and Shaxton). Public policy, simply, is what the government chooses to do, or not to do, and can guide a range of related actions in a given field (Mackay and Shaxton). Corporate or organizational policies can include human resources, purchasing, safety or operating guidelines, privacy and reporting policies among others.

A policy framework is the broad set of policies that govern actions of groups and organizations within a certain area. For instance, the web of policies that govern all aspects of the extraction of natural resources in a geographical area would constitute the policy framework within which oil and gas companies must operate. Within a policy framework, each policy affects other policies as well as new policy amendments or emerging policy development (Mackay and Shaxton).

The intent of policy is implemented through policy instruments (IISD and TERI 2006). Policy instruments are the techniques that governments or organizations have to achieve policy objectives. Policy instruments can be 'hard' (prescriptive and enforced – including permits, codes, regulations) or 'soft' (not enforced - including incentives, guidelines, frameworks). See Table 2 for examples of policy instruments.

The movement of policy from inception to implementation is represented by a policy cycle (Figure 1). Policies cycles have: problem emergence and definition, goals to be achieved or agenda setting, formulation of options and selection of policy instruments if required, policy adoption, and implementation and evaluation (Mackay and Shaxton; Howlett and Ramesh 2003). Design comprises developing an understanding of the issue, setting of objectives, instrument selection. Policy implementation includes staff training, operation and monitoring and evaluation. Design and implementation are iterative (IISD and TERI 2006).

Table 13: Typology and examples of policy instruments

Instrument type	Examples of instruments
• Economic – directly influence the price of a product or service. • Direct expenditure – money is used as direct instrument through grants, contributions. • Doing nothing – the decision not to intervene • Regulatory – create change via legal avenues; defining norms and standards; enforced. • Institutional – affect workings of government, including • Direct action – providing a direct service • Information – knowledge transfer, communication, moral persuasion. • Setting standards for industry • Co-regulation – allow for industry autonomy under clearly defined parameters (allows flexibility) • Voluntary codes of conduct – businesses voluntarily agree to uphold specific standards (can include sanctions such as fines) • Negotiated agreements – organizations follow agreements (as distinct from co-regulation?) • Information- disclosure obligations • Process obligations (such as e.g. disclosure of pollution prevention efforts under the NPRI, as a way of forcing creation of an internal process	• Expenditures • Regulations • Legislation • Partnerships • User fees • Tradeable permits • Exchange of information • Taxation • Direction provision of services • Subsidies • Liability • Licensing • Contracts

Adaptive Policy

Policies that are designed implicitly or explicitly to operate within a certain range of conditions often face challenges outside that range, resulting in unintended impacts or failure to accomplish the policy's objective (IISD and TERI 2006). Adaptive policies should be robust and help achieve a policy's objectives under a wide range of conditions and have "features that enable them to continue to adapt to both anticipated and unanticipated conditions" (IISD and TERI 2006).

Adaptive policies in and of themselves do not drive adaptation, although they can enable adaptation (Parry 2015). Adaptive policies, simply stated, are policies that can adjust or adapt over time and can therefore contribute to policy-makers capability to respond to new information or challenges.

There can (and should) be multiple avenues and triggers for review of policy (Swanson et al. 2010). For well understood systems, policies can be designed to adjust automatically; in less well understood systems formal policy reviews may be required to adapt to anticipated or unanticipated changes (Swanson et al. 2010).

Swanson (2010) outlined seven principles of adaptive policies:

1. Integrated and forward-looking analysis
2. Built in policy adjustment
3. Formal policy review and continuous learning
4. Multi-stakeholder deliberation
5. Enabling self-organization and social networking
6. Decentralization of decision-making
7. Promoting variation

Appendix C: Evaluation Framework

The following evaluation framework was developed by OCCIAR to assess whether specific policies effect the ability of different stakeholders to adapt to climate change. In includes specific evaluation criteria for each policy element, as well as a scoring and ranking system to provide a general assessment of relative policy performance.

Policy Evaluation Criteria

This project requires systematic identification and evaluation of policies to identify specific features that either enable or create barriers to adaptation. The following table outlines criteria for evaluating the effect of policy on the ability of actors at different levels to implement actions that support their capacity to adapt to climate change.

Table 14: Policy evaluation criteria

	Reference	Criteria	Notes and indicators
Driver	D1	Presence of climate-related terminology	Simple yes/no.
	D2	Presence of risk-management terminology	Simple yes/no.
	D3	Creation of an adaptive **political** environment within a company or market	Refers to features that identify political action that could be taken to promote climate change adaptation **OR** features that build political support for climate change adaptation in the sector. Example: a policy that emphasizes sustainability and adaptive action, which closely mirrors current political goals.
	D4	Creation of an adaptive **economic** environment within a company or market	Refers to features that provide direct or indirect support to climate change adaptation **OR** requires practitioners to commit funding to climate change adaptation related activities. This could include direct funding or investment to climate change research, guidance and adaptation measures. Examples include tax incentives, targeted allocations from carbon levies.
	D5	Creation of an adaptive **legal** environment within a company or market	Refers to features that suggest a minimum standard or practice that must be met to avoid climate related liability.
	D6	Creation of an adaptive **social** environment within a company or market	Refers to features that encourage or require outreach or engagement of public by sector stakeholders to

	Reference	Criteria	Notes and indicators
			promote climate change adaptation in the community or region. Example: a requirement for public engagement throughout planning and review phases.
	D7	Creation of an adaptive **operational** environment within a company or market	Refers to features that provide tools and support to incorporate climate change adaptation into decision-making.
	D8	**Encourages or mandates** adaptive behaviour change	Refers to features that encourage or mandate specific action by sector stakeholders. Examples include strategy that emphasizes climate change adaptation by the sector.
	D9	**Demonstrates flexibility** with regard to changing climate trends	Refers to policy tools that promote standards that adjust (or are adjusted) to accommodate changing environmental, climate or technological conditions. Examples include policies that have a built in review process.
	D10	**Facilitates adaptation** - taking action is easier, less expensive, more efficient	Refers to elements of policy tools that provide stakeholders with information resources, tools or economic assistance to support appropriate and efficient adaptation action. Includes data tools or guidebooks that provide stakeholders with information to develop or implement specific adaptation actions.
Barrier	B1	**Blocked or hindered** (unintentionally) adaptive behavior or actions within a company.	Refers to elements that unintentionally hinder climate change adaptation. Multiples examples include: restrictions on access to technology, equipment or information required to act; limits the ability of a company to act; encouragement of short-term action or prioritization in decision-making.
	B2	**Promotes maladaptation** (actions or activities that increase risk or vulnerability of company or operations)	Refers to features that promote action that may increase the risk of climate change. An example would include promotion of a standard based on historical weather trends in lieu of incorporating climate projections.
	B3	**Discourages adaptation**	Refers to features that actively discourage adaptation action.
	B4	Creates an environment where taking adaptive action unfairly **hampers competitiveness**	Refers to features that impose prohibitive costs on adaptive measures OR requires adaptive action from some stakeholders and not others.
	B5	**System-level barriers** to	System level barriers to adaptation;

	Reference	Criteria	Notes and indicators
		adaptation	indirect constraints on adaptation or resiliency outside policy's target scope. Examples include indirect impacts in the larger policy framework or outside the policies target influence. An example would be a municipality adversely affected by actions taken under a policy regulating the oil and gas sector.

Scoring of drivers and barriers

An evaluation system was used to generate an overall picture of the policy (or policy instrument) and its influence on adaptation. The system differentiates between policy tools that have an immediate, direct or explicit impact on adaptation (either as a driver or a barrier) and those elements of policy that indirectly create opportunities or hindrances with respect to adaptation. A policy that requires public consultation by a project proponent does not directly support adaptation, but does create a social environment (see Criteria above) where climate impacts and adaptation can be addressed.

Table 15: Scoring of policy drivers and barriers

Level of support	Description
A = Driver	Directly or strongly supportive of climate change consideration in planning OR climate change adaptation action.
B = Enabler	Enables adaptation but does not directly encourage or require it. Indirect or weak support of climate change consideration in planning OR insinuation that climate change is a challenge.
C = No Effect	This policy element has no effect on how climate change impacts are considered OR policy element is not thematically relevant to the driver/barrier criteria in question.
D = Hinders	Indirect or weak hindrance of climate change consideration or adaptation.
F = Barrier	Strong or direct barrier to climate change adaptation action.

Using the ranking system

The ranking system provides a high level representation of whether the policy drives, enables or hinders adaptation to climate change. Each significant element or clause of a policy is evaluated for its potential role as a driver or barrier against the evaluation criteria, and provided a grade.

Table 16: Grading distribution (sample)

Policy				
Total number of elements reviewed				13
Number of elements with no effect				6
	A – Drive	B – Enable	D – Hinder	F – Barrier
Number of drivers / barriers identified	2	15	4	2

Note that individual elements that are reviewed can be assigned multiple or different grades corresponding to the different criteria (i.e. a single element can be an active driver under one evaluation criteria and enable it under another). For example, an element that was found to mention climate change and also creates an adaptive political environment would be represented as 2(1): two 'A' scores originating from a single policy element.

The distribution of scores provides an indication of the overall influence of the policy with respect to adaptation, and opportunities for strengthening its role. The presence of 'A' scores indicates there are several strong, active drivers of adaptation within the policy; 'B' scores indicate a specific elements or processes within the policy enable adaptation – that is, they create space for adaptation to occur without necessarily requiring or encouraging it. The identification of 'D' and 'F' barriers are, equally, an opportunity to address specific elements of a policy that hinder adaptation. Shifting or eliminating even a small number of these barriers could significantly improve the overall impact of the policy.