PROJECT PIONEER

AN OVERVIEW OF FEDERAL AND PROVINCIAL REGULATORY FRAMEWORKS AND GAPS THAT GUIDE AND AFFECT IMPLEMENTATION OF CCS

A NON-CONFIDENTIAL REPORT

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ABSTRACT OF THE PROJECT

Project Pioneer will be one of the first carbon capture and storage (CCS) projects to utilize an integrated approach for CCS, and is expected to serve as a prototype for the long-term, commercial-scale application and integration of CCS technologies to achieve reductions in greenhouse gas emissions. The partners in Project Pioneer are TransAlta Corporation (TransAlta), Capital Power L.P. (CPLP), Enbridge Inc. (Enbridge), the Alberta provincial and Canadian federal governments, and the Global CCS Institute as a Knowledge Sharing Partner.

Project Pioneer is being proposed to capture 1 million tonnes of carbon dioxide (CO_2) annually from a coal fired power plant and transport the CO_2 by pipeline to a sequestration field or to be utilized for enhanced oil recovery (EOR) in a depleted oil/gas field.

The key components of Project Pioneer are:

- Carbon capture facility (CCF)
- Pipeline from the CCF to the sequestration field
- Pipeline from the CCF to the EOR site
- Saline formation sequestration field

The Carbon Capture Facility (CCF) portion of Project Pioneer will be retrofitted onto the Keephills 3 coal-fired power plant. Keephills 3 is located approximately 70 km west of Edmonton, Alberta and is jointly owned by TransAlta and Capital Power.

The CCF will treat approximately one third of the flue gas from Keephills 3 and will capture approximately 1 million tonnes of CO_2 annually. The CO_2 will be compressed and transported by pipeline to a sequestration site to be injected approximately 2 km underground into a saline formation known as the Nisku Formation. A pipeline will also be built to transport the CO_2 to the primary EOR target, the Pembina oilfield, where the CO_2 will be injected and used for enhanced oil recovery and stored permanently underground. The Pembina oilfield is approximately 80 km southwest of the Keephills 3 facility.

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EXECUTIVE SUMMARY

It is expected that the bulk of the regulatory activity pertaining to Pioneer, will be at the provincial, that is to say Alberta, level. Provincially, CCS projects are neither exempt nor mandatory activities in the determination of the scope of an environmental impact assessment (EIA). Should a federal environmental assessment and provincial EIA be required, it would be carried out using a harmonized approach under the *Canada-Alberta Agreement for Environmental Cooperation.*

Inside the plant boundaries, it is expected that the Alberta Utilities Commission (AUC) and Alberta Environment will have jurisdiction over the carbon capture facility.

Alberta Environment and the ERCB are the approval authorities for both of the CO_2 pipelines, and will also be responsible for the application for all facilities associated with the EOR and sequestration sites.

The Canadian Environmental Assessment Agency (CEAA, or the Agency) is also reviewing the Project.

Alberta Energy is the body that issues storage evaluation permits and sequestration leases.

Intent of the Report

The intent of this report is to provide guidance and reporting on the existing regulatory gaps that Canada and Alberta face as it relates to carbon capture and storage (CCS) projects. This report will also seek to clearly outline for others what regulatory frameworks currently exist in both jurisdictions, as well as outline some of the work that the province of Alberta is conducting in the area of regulatory frameworks and enhanced collaboration with pertinent partners and levels of government.

Current Regulatory Environment; Canada and Alberta

In Canada, carbon capture and storage technology is subject to a significant existing governance framework, with some limited gaps, although recent developments are rapidly closing these gaps. Significant changes were recently made to Alberta's regulatory regime following the enactments of the *Carbon Capture and Storage Statutes Amendment Act, 2010* (CCS Act) and the *Carbon Sequestration Tenure Regulation* (CST Regulation). The CCS Act made amendments to existing legislation to ensure that issues specific to CCS were addressed. While existing regulations cover many of the issues related to CCS, additional work is ongoing to ensure that all regulatory gaps are closed prior to the start-up of the first project. The CST Regulation establishes a tenure system for the acquisition of rights to subsurface formations for CO_2 sequestration.

In March of 2011, the Government of Alberta put into place a Regulatory Framework Assessment Panel (RFA Panel), made up of experts from around the world, who will help to guide further development of the province's CCS regulatory framework processes. More details regarding this process will be outlined below.

Activities related to CCS fall variously under the jurisdiction of the provincial and federal governments in Canada. With respect to CCS, the main point to bear in mind is that provincial governments have jurisdiction over natural resources and property and civil rights. The provincial Crown is therefore the primary body able to regulate and permit CO_2 injection activity in its territory. Given this jurisdiction, well-developed provincial frameworks are already in place for the regulation of oil and gas activity, and power generation, which can be expanded and adapted to manage issues that are specific to CCS.

The federal government could regulate activities if CO_2 were transported across provincial boundaries. Federal government jurisdiction also applies when areas within federal jurisdiction (i.e. the Fisheries Act or Navigable Waters Protection Act) are triggered. There is also federal jurisdiction because of funding arrangements for CCS projects through Natural Resources Canada (NRCan), which will be described in more detail below. Activities which may have an effect on Aboriginal people may trigger a constitutional duty to consult on the part of the provincial and federal governments.

The classification of CO_2 under the Canadian Environmental Protection Act (CEPA) may also enable the federal government to regulate future monitoring and reporting requirements for sequestration projects.

Finally, federal regulation of greenhouse gas (GHG) emissions through national climate mitigation policy may affect the regulation for CCS at the provincial level, and impose constraints on provincial jurisdiction. *(Source: Institute for Sustainable Energy, Environment and Economy, 2010)*

Scope

The bulk of Alberta CCS governance will occur at the provincial scale, because the province has regulatory authority over mineral extraction activity in Alberta, therefore placing most of the regulation within the hands of the province. *(Source: Institute for Sustainable Energy, Environment and Economy, 2010)* It must be noted that because Alberta has a great deal of oil and gas activity, it has a very well-developed existing regulatory framework that is being adapted to address CCS projects.

The federal influence on governance of CCS in Alberta would most clearly manifest itself through national greenhouse gas emissions regulations. Most agree that CCS will be a part of any federal climate change strategy and/or policies, and as a result this would likely mean consequences for compliance for firms operating in CCS in Alberta. *(Source: Institute for Sustainable Energy, Environment and Economy, 2010)*

Below is a brief outline of regulatory overviews for each jurisdiction; Canada and its province, Alberta.

Canadian Regulatory Overview

Canada has made considerable progress in advancing CCS. By taking advantage of the economic overlay of CCS and petroleum production, and by adaptation of existing provincial regulatory frameworks, Canada has facilitated key demonstration projects. There are some limited regulatory gaps that remain for permitting the necessary facilities in the province, which will be outlined below. Furthermore it is not clear how regulatory responsibilities will be allocated between the national government and the provinces as climate change and CCS framework development progresses at the federal level.

The actors involved in the federal regulatory scene include; the department of Natural Resources (NRCan) and the department of Environment Canada (EC).

The federal government may also regulate CCS through CEPA. CO_2 has been classified as toxic under CEPA, allowing the federal government to regulate the release of CO_2 into the environment. Moreover, the federal government has introduced emissions performance standards, such as the recent Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations, which included CCS as a form of compliance. However, given the division of powers between the provinces and the federal government, the federal government's ability to exercise such power to develop regulations concerning CCS permitting and approvals would likely be limited. (Bankes, 2008).

As stated earlier, federal GHG regulations, as they develop, are also important for the governance of CCS.

Alberta Regulatory Overview

The actors involved in the provincial regulatory scene include; Alberta Environment (AENV), Alberta Energy, Alberta Innovates, the Alberta Utilities Commission, and the Energy Resources and Conservation Board (ERCB).

The Alberta Climate Change and Emissions Management Act (CCEMA) enables government regulation of large emitters of CO_2. Carbon capture and storage is explicitly mentioned in the Act, and activities related to CCS fall under CCEMA.

The Alberta Energy and Resources Conservation Board (ERCB) has a well-developed regulatory framework for oil and gas and mineral extraction activities, which includes guidelines for stakeholder engagement, and opportunities for stakeholders to engage in the regulatory process. A series of ERCB directives regulating pipelines, stakeholder engagement, and the injection of acid gas may apply to the injection of CO_2.

Likewise, the Alberta Utilities Commission, which has jurisdiction over the Capture Facility for Pioneer, has expertise on power facilities, and also has a well-developed framework for involving stakeholders.

Several Alberta laws are relevant to CCS, including the Oil and Gas Conservation Act (OGCA), the Environmental Protection and Enhancement Act (EPEA), the Mines and Minerals Act (MMA), the Water Act (WA) and the Surface Rights Act (SRA). Recent amendments were made to Alberta legislation through the CCS Act, which also includes a provision for long-term liability, pore-space tenure.

Continuing Regulatory Work in Alberta

In March of 2011, the Alberta Government announced it would be conducting a Regulatory Framework Assessment (RFA), to ensure that CCS projects would be designed and operated in a safe and responsible way.

As part of this process, CCS experts from Alberta and around the world are examining in detail the technical, environmental, safety and monitoring requirements for CCS projects in Alberta.

This expert panel will report back to the Provincial Minister of Energy in the autumn of 2012.

The review is looking at the existing regulatory regime in Alberta as well as CCS frameworks from other jurisdictions, and is focusing on a number of areas including:

- Regulatory;
- Environmental;
- Geological and technical considerations, and
- Measuring, monitoring and verification requirements.

For each of these four areas of review, four working groups have been created, made up of a broad range of expertise, coming from the following fields: scientific, academic, regulatory, industry and public administration.

The Regulatory Working Group's focus is:

- Approvals/permits;
- Site closure certificates;
- Transfer of responsibility;
  Post closure stewardship fund;
  Pore space open access;
  Pipeline open access;
- Landholder and public consultation; and
- Surface access rights.

The Environmental Working Group's focus is:

- Environmental assessments;
- Safe transport of CO_2;
- CO_2 purity/composition and classification;
- Surface and subsurface reclamation and mitigation plans; and
- Mitigating effects of CO_2 emissions on air, land and water.

The Monitoring, Measurement and Verification (MMV) Working Group's focus is:

- MMV (pre-operational, operational, closure and post-closure);
- Risk assessments; and
- Monitoring requirements for enhanced oil recovery sites that transition to storage sites.

The Geological/Technical Working Group's focus is:

- Site selection criteria;
- Well construction;
- Operations;
- Abandonment; and
- Closure assessment criteria.

In addition to the expert panel, which will provide advice and peer review findings, a steering committee is overseeing the process and guiding the scope of the review.

Working groups are currently developing recommendations for the steering committee's consideration.

2.0

INTRODUCTION

This report will describe and assess the current federal Canadian and provincial Alberta regulatory regimes applicable to the implementation and operation of Pioneer, as well as identifying the regulatory “gaps” that need to be addressed to accommodate implementation and operation of CCS.

3.0

FEDERAL (CANADIAN) JURISDICTION

Federal Environmental Assessment

TransAlta has received federal funding support for Pioneer from programs administered by Natural Resources Canada (NRCan). Under the federal Canadian Environmental Assessment Act (CEAA) the receipt of federal funding triggers the federal environmental assessment (EA) process. In general, an EA is a process to predict the environmental effects of proposed initiatives before they are carried out. An EA:

- identifies possible environmental effects of a project;
- proposes measures to mitigate adverse effects;
- predicts whether there will be significant adverse environmental effects, even after the mitigation is implemented; and
- identifies cumulative effects.

There are two main purposes of an EA:

- minimize or avoid adverse environmental effects before they occur; and
- incorporate environmental factors into decision making.

CEAA is administered by the Canadian Environmental Assessment Agency (the Agency) and by a "responsible authority" (RA). The Agency is responsible for the overall administration of the federal EA process. An RA is a federal authority whose actions or powers trigger the EA of a particular project. The RA must ensure that an EA of the Project is conducted as early as possible in the planning stages of the Project and before irrevocable decisions are made. For the Pioneer Project, the RA is NRCan as it is providing the federal funding.

There are five potential tracks for a federal EA under CEAA depending upon the nature of the project:

- no assessment;
- screening;
- comprehensive study;
- mediation; or
- panel review.

A screening is a systematic approach to documenting the environmental effects of a proposed project and determining the need to eliminate, minimize or mitigate the adverse effects, to modify the Project Plan or to recommend further assessment through mediation or an assessment by a review panel. The RA must ensure that the screening of the project is carried out. Screenings vary in time, length and depth of analysis, depending on the circumstances of the proposed project, the existing environment and the likely environmental effects. Some screenings may require only a brief analysis of the available information and a brief report; others may need new background studies and will be more thorough and rigorous. Both the Shell Quest CCS project and the Enhance Energy Alberta Carbon Trunk Line project were subject to screenings only.

The RA must prepare or ensure the preparation of a report which summarizes the findings of the screening.

It is not known what the results will be of the EA screening of the Pioneer Project, or whether public concerns will cause NRCan to recommend further review.

Finally, note that some projects which are subject to CEAA also require an environmental impact assessment under Alberta's Environmental Protection and Enhancement Act.

The two governments cooperate in an attempt to avoid overlap by following the process set out in *The Canada Alberta Agreement for Environmental Assessment Cooperation, 2005.*

Under this Agreement, the parties agree to consult with each other on projects potentially subject to a cooperative EA process. Once a proponent has filed provincial disclosure documents or a federal project description document, the parties are to begin their cooperation.

For the Shell Quest CCS project, the Agreement was utilized so that the federal EA was coordinated to the extent possible with the provincial environmental assessment.

4.0

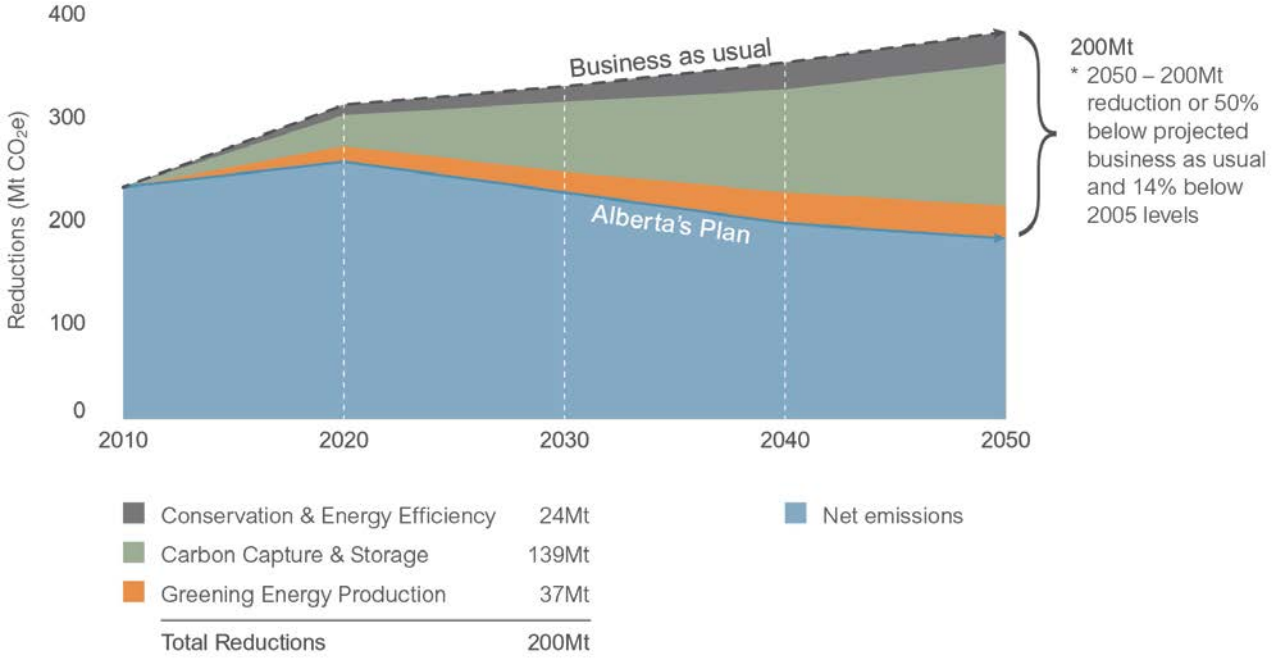
PROVINCIAL (ALBERTAN) JURISDICTION

Highlights of the Regulatory Framework

In 2008, Alberta developed a Climate Change Strategy that committed to reducing projected GHG (greenhouse gas) emissions by 200 megatonnes (Mt) by 2050. Carbon capture and storage (CCS) will provide 70% of Alberta's GHG emissions savings.

fig. 1.0

ALBERTA'S REDUCTION COMMITMENTS



source: Alberta 2008 Climate Change Strategy
** modified slightly from Alberta's Climate Change Strategy 2008*

To achieve this goal, the Government of Alberta has undertaken a number of initiatives:

- the implementation of new legislation: Carbon Capture and Storage Funding Act 2009 and Carbon Capture and Storage Statutes Amendment Act 2010;
- the development of the Carbon Sequestration Tenure Regulation (April 2011);
- a $2 billion CCS funding program (CCS Fund enacted in 2009); and
- the Regulatory Framework Assessment (established in March 2011).

Highlights of the Carbon Capture and Storage Statutes Amendment Act 2010 include amendments to the Mines and Minerals Act addressing matters including:

Ownership of Pore Space: There is a declaration to the effect that all past and future grants of land or mines and minerals in land will be deemed to have excluded title to all subsurface pore space occupied at any time by minerals (including oil and gas) or water. Further, all pore space below the surface of any land (other than federal Crown land) is declared to be vested in and the property of the Alberta Crown, irrespective of whether minerals or water have been or are being recovered from such pore space.

Sequestration Rights Grants: The Minister of Energy (the Minister) is authorized to enter into agreements with respect to the use of subsurface pore space, including agreements to evaluate the geology of a subsurface reservoir to determine its suitability for sequestration of captured CO_2, and agreements to allow injection of captured CO_2 into subsurface reservoirs for sequestration. Sequestration is defined as “permanent disposal”.

Liability: A lessee under an agreement granting sequestration rights (a Sequestration Lessee) will be required to monitor all wells and facilities and, upon ceasing injection operations, to comply with all of the closure requirements set by regulations to be established in the future. The Sequestration Lessee may then apply to the Minister for a closure certificate, which the Minister may issue if he is satisfied that:

- the Sequestration Lessee has met all monitoring, closure, abandonment, decommissioning, reclamation and other obligations to be set by future regulations, and complied with all relevant environmental laws;
- a “closure period” to be set by future regulations has passed; and
- the injected CO_2 is behaving in a stable and predictable manner, with no significant risk of future leakage.

Upon issuance of a closure certificate the Crown will assume all of the Sequestration Lessee’s obligations and responsibilities with respect to sequestration operations and the sequestered CO_2, *Carbon Capture and Storage Statutes Amendment Act* and will indemnify the Sequestration Lessee for damages awarded under third party tort claims related to sequestration operations, subject to compliance with any conditions set by future regulations.

Post-Closure Stewardship Fund: Sequestration Lessees will be required to make contributions to a new Post-Closure Stewardship Fund (the Fund), which will be available to the Crown for use in sequestration monitoring activities, fulfilling sequestration-related obligations assumed by it, and undertaking reclamation or remediation activities in respect of orphan facilities. Although the Fund may also be used “for any other purpose prescribed in the regulations”, it is not clear whether it will be used for the Crown’s post-closure indemnification obligation.

Ownership of Injected CO_2: Upon issuance of a closure certificate the Crown will become the owner of the captured CO_2 injected under a sequestration agreement. The Act also proposes changes to the Energy Resources Conservation Act and the Oil and Gas Conservation Act, addressing ERCB regulation of CO_2 injection and sequestration activities. As is the case with other projects under its jurisdiction, the ERCB will be required to determine if a project for the injection and sequestration of captured CO_2 is in the public interest, having regard to the social, economic and environmental effects of the project.

In addition, the 2010 Act allows for a right-of-entry order under the Surface Rights Act, providing surface access rights for the drilling and operation of injection and monitoring wells, and for the installation and operation of associated facilities and equipment.

Although the 2010 Act is a significant step towards establishment of a legal and regulatory regime to accommodate implementation of large scale CCS in Alberta, there are still a number of issues and detail to be worked out. The evolution of the Act and the establishment of the regulations contemplated thereby can be expected to involve further interesting developments.

Under the ***Carbon Sequestration Tenure Regulation 2011***, companies will apply for pore space tenure following the same model that is currently in place for petroleum and natural gas rights. Companies will need to continue to work with landowners to obtain surface access and the Energy Resources Conservation Board to obtain necessary approvals required by law. For example, these projects will need a well license before they can drill test wells or an injection well, as well as approval before they can begin commercial scale sequestration. Existing provisions available to ERCB landowners to intervene in the application process and to seek compensation apply to CCS projects.

The regulation sets out several administrative details and processes that include:

- establishing a five-year evaluation permit to determine storage site suitability;
- establishing a 15-year sequestration lease for longer term commercial needs;
- requiring permit and lease holders to submit monitoring, measurement and verification plans which must be approved by the Minister and updated every three years;
- outlining the requirements for closure plans and requiring lease holders to submit closure plans which must be approved by the Minister and updated every three years;
- setting annual rental rates of one dollar per hectare and application fees of $625 for both permits and leases;
- setting the minimum carbon dioxide injection depth at one kilometre; and
- setting the maximum area for permits and leases at 73,728 hectares (eight townships).

The *Carbon Sequestration Tenure Regulation* is similar to other regulations under the Mines and Minerals Act that grant tenure for oil, natural gas, oil sands, mines and minerals.

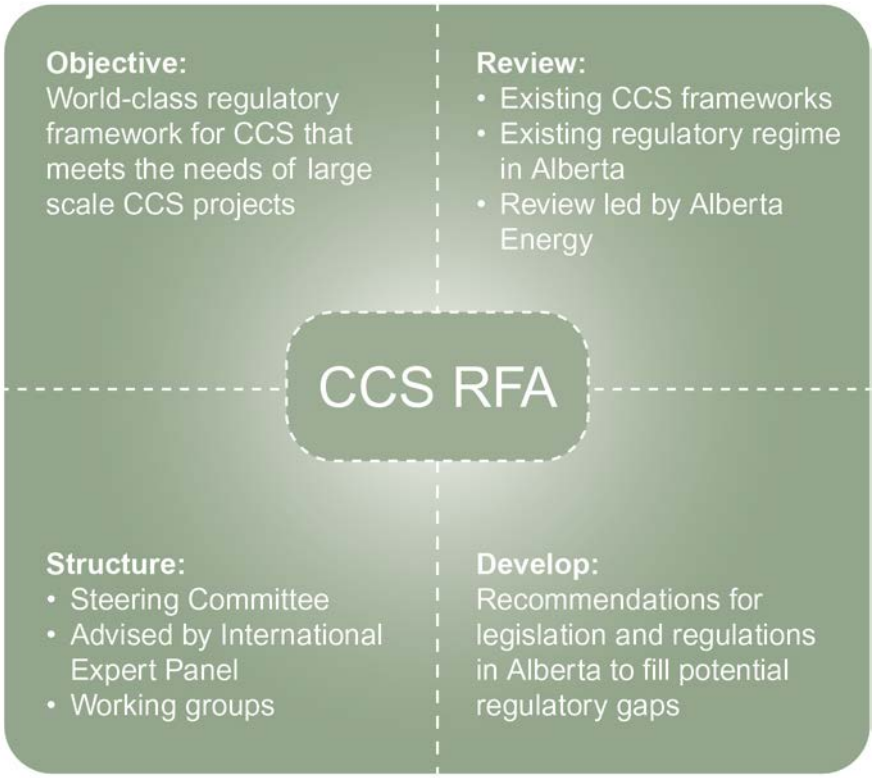
Regulatory Gaps Being Examined

CCS experts from Alberta and around the world are examining in detail the technical, environmental, safety and monitoring requirements that apply at every stage of a CCS project.

Four working groups were established and are comprised of highly specialized teams with members from relevant government agencies, industry, non-governmental organizations and academic and research institutes.

fig. 2.0

THE REGULATORY FRAMEWORK ASSESSMENT



Source: Chris Arnot, Senior Analyst, CCS Development, Government of Alberta

The working groups are examining specific issues raised through the RFA and will provide recommendations in Alberta through legislation, guidance documents and/or best practice manuals. It is expected that any amendments to the existing regulatory framework will be in place well before any of Alberta's large-scale CCS projects begin operating. The process started in early 2011 and is expected to be complete by late 2012.

The areas for study identified, are those areas where gaps have been identified in the regulatory system in Alberta.

The following sections are organized according to those four areas being examined.

Regulatory Gaps

The following five areas have been identified for further exploration of process and details.

1. Approvals/permits

As noted above, there is a very well-developed regulatory framework in Alberta for oil, gas, and power facilities. Steps have been taken to adapt this regulatory framework to CCS projects. Work is ongoing in the RFA to ensure that issues related to CCS are covered by existing or new regulations.

2. Site closure certificates

Additional detail is required to develop the requirements to 'close' a sequestration site. Work is occurring in the RFA process to develop out clear closure requirements for CCS projects.

3. Transfer of responsibility/liability

This is related to the closure requirements set out above. Working groups in the RFA process are working out details regarding requirements that must be met by project proponents before a closure certificate will be issued.

4. Landholder and public consultation

Work is occurring in the RFA process to determine whether the existing regulatory frameworks for involving stakeholders are sufficient for CCS projects, and if not, how they might be improved.

5. Surface access rights

In Alberta, there exists a Surface Rights Board, which deals with conflicts over surface access and compensation. The RFA is examining whether additional details are required to cover matters that are specific to CCS (i.e. measuring, monitoring and verification facilities).

Post closure Steward Fund

The subgroup is identifying gaps between coverage of existing financial security mechanisms and the PCSF. If necessary, the group will make recommendations on how to fill those gaps, which may include: modifying existing financial security mechanisms; modifying the PCSF; and, creating new financial security mechanisms.

Pore Space Open Access

The subgroup is reviewing if, and under what conditions, third party access to CO_2 storage should be granted or facilitated.

Pipeline Open Access

The subgroup is reviewing when and under what conditions third party access should be granted.

Environmental Gaps

The following five areas have been identified as needing further process and details.

1. Environmental assessments

This issue is being examined to determine the need for an Environmental Impact Assessment (EIA) for CCS projects and whether the current information requirements for ERCB and Alberta Environment approval applications are sufficient.

2. Safe transport of CO_2

The RFA is currently examining existing regulations, to determine if further regulations (i.e. EPZ requirements for CO_2 projects) are required.

3. CO_2 purity/composition and classification

Even though CO_2 has been classified as toxic under CEPA in order to allow the federal government to regulate the emissions of CO_2, there are currently no legal standards for the purity of the CO_2 stream. This issue is being examined in the RFA process.

4. Surface and subsurface reclamation and mitigation plans

This issue is being examined to determine whether the criteria for reclamation for CCS projects, including timelines for abandonment, are sufficient in Alberta.

5. Mitigating effects of CO_2 emissions on air, land and water

This issue is being examined to determine the potential impact of CO_2 stream emissions (including impurities) on the environment during all phases of a CCS project, determining the emissions requirements/outcomes for air, land and water, and to determine if the roles and responsibilities are defined for the emitter and the regulator(s) when there is non-compliance with emissions standards.

Monitoring, Measurement and Verification Gaps

The following 3 areas have been identified as requiring further details.

1. MMV (pre-operational, operational, closure and post-closure)

The RFA is currently examining requirements for MMV plans during all phases of a CCS project.

2. Risk assessments

The requirements around suitable risk assessment methodologies and establishing appropriate guidelines for risk assessment application and comprehensiveness will be reviewed.

3. Monitoring requirements for enhanced oil recovery sites that transition to storage sites

Monitoring requirements will need to be developed for EOR sites that transition to storage sites

Geological/Technical Gaps

The following four areas are also being examined.

1. Site selection criteria

This group will address key issues including determining what must be demonstrated to ensure objectives are met, and what characteristics are important elements in storage location.

2. Well construction
3. Operations and Abandonment

This working group is determining well construction standards, maintenance, operation, abandonment and post-abandonment maintenance requirements for CCS related wells, and other wells located in the area of influence, including wells that transect CO_2 reservoirs. The group will also address well location/setbacks, limits to proliferation of wells and whether previously drilled wells would be suitable for use in CCS schemes.

4. Closure assessment criteria

This working group will determine the subsurface criteria (for example plume behavior, ‘reservoir’ pressures, performance standards) that must be achieved for operations to be deemed stable so the project can move to the post-closure phase.

5.0

RECOGNITION OF CO_2 EMISSIONS REDUCTIONS

The legislative terms and regulatory processes for recognizing and rewarding CO_2 emissions reductions achieved through CCS are still evolving, and there is still a great deal of uncertainty in this respect. This is a very significant regulatory gap.

Alberta

Provincial regulation of CO_2 emissions in Alberta is governed by the *Climate Change and Emissions Management Act* (CCEMA) and associated regulations, including *the Specified Gas Reporting Regulation* (SGRR) and the *Specified Gas Emitters Regulatio*n (SGER). The SGER applies to specified facilities having annual "direct emissions" of 100,000 tonnes or more (Specified Facilities). Keephills 3 will be a Specified Facility.

The SGER requires all Specified Facilities, whether "established" or "new", to reduce their "emissions intensity" in accordance with specified terms.

Emissions intensity is defined as the quantity of specified gases (including CO_2) "released" by a Specified Facility per unit of production from that facility. Of relevance to the Project is the CCEMA definition of "release", which specifically excludes CO_2 that is captured and "stored" in a geological formation.

There are a number of elements of uncertainty with respect to the recognition of CCS derived emissions reductions under the CCEMA and SGER, some of the more significant of which are as follows:

(a) Quantification/Measurement

The quantification of net CO_2 emissions reductions through CCS involves at least two elements of uncertainty. The first is the calculation of the CO_2 emissions generated in connection with the capture, transportation and injection of the sequestered CO_2, so as to determine the net emissions reduction achieved through the sequestration process. The second, applicable primarily in the case of miscible CO_2 EOR, is the determination of the percentage of the injected CO_2 that will remain permanently sequestered, as opposed to being recycled in oil production effluent or otherwise re-produced from the reservoir. There will also be issues with respect to injection measurement protocol, but these should be comparatively routine in nature.

AENV has commissioned the preparation of quantification protocols in the context of both EOR-based CCS and acid gas disposal, but these are expressly stated to be for guidance only, and do not have force of law.

(b) Sequestration Verification

There are currently no established rules for sequestration verification. It is expected that verification will require the involvement of a qualified, independent verification organization, but the precise requirements for acceptable certification of permanent sequestration have yet to be established.

(c) Credit Entitlement/Realization

Because the various components of the Project are likely to be undertaken by different parties, there will be a need to consider the point at which an emission reduction can be said to have occurred, and who is entitled to claim credit for that reduction. Having regard to the definition of “release” under the CCEMA, and to various other CCEMA/SEGRE provisions relating to “geological storage”, it is apparent that credit for a reduction of emissions from a Specified Facility through CCS is intended to accrue to the operator of the Specified Facility by virtue of the treatment of that reduction as a direct emissions reduction. However, the effectiveness of this intention has not yet been tested, and its fit with the reduction recognition rules being developed by other jurisdictions remains to be seen.

(d) Harmonization

Given that the federal government will also be involved in CO_2 emissions regulation, and that both the federal government and the Alberta government will likely wish to harmonize their respective regimes so as to minimize conflict and emitter compliance burden, there is an expectation that there could be some adjustment of the Alberta rules relative to emissions reduction recognition as the harmonization process evolves. Because there is also likely to be a desire to pursue some level of harmonization with other North American and international jurisdictions, this process could be protracted, and a significant element of uncertainty will remain until it is completed.

Federal

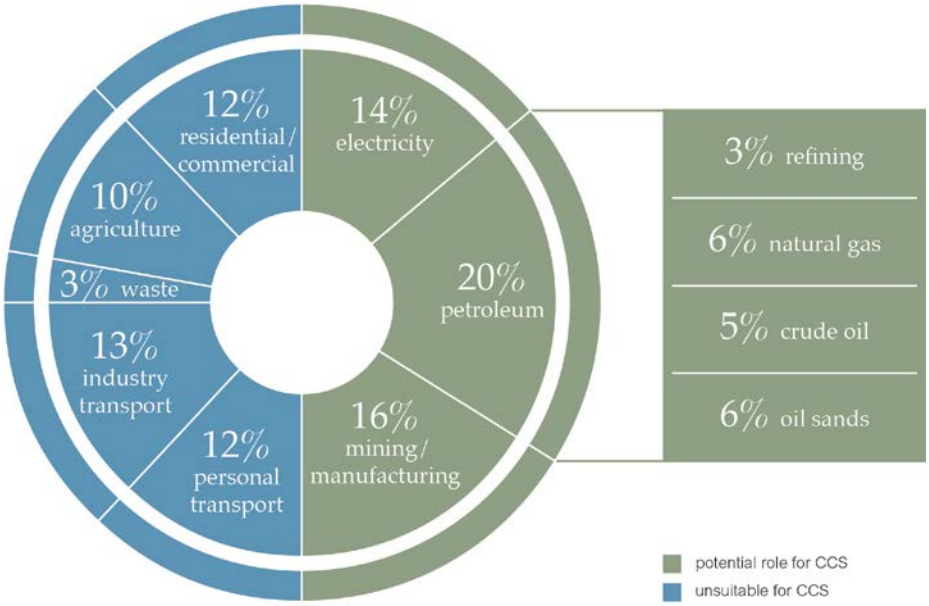
The Canadian federal government has announced numerous greenhouse gas emission reduction initiatives over the last decade, but to date has not tabled definitive legislation. There is accordingly considerable doubt about what the future federal regulatory regime may consist of with respect to CCS in general, and the creation, recognition and use of carbon credits from CO_2 sequestration specifically.

Environment Canada (EC) has issued a Notice with Respect to Reporting of Greenhouse Gases for 2010 under section 46 of the *Canadian Environmental Protection Act,* 1999. The Notice requires any person who operates a facility described in Schedule 2 thereto to provide certain information to EC by June 1, 2011. A new Notice is to be issued each year, and so the reporting requirement is an annual obligation.

Schedule 2 to the Notice provides that all persons who operate a facility that emits 50,000 tonnes of CO_2 or more in the 2010 calendar year are subject to the reporting requirements. The specific reporting requirement includes reporting the total quantity of “direct emissions” of CO_2. The term “direct emissions” is defined in the Notice to mean “release from sources that are located at a facility”. It is unclear whether CO_2 that is captured and sequestered as part of a CCS project is considered to reduce “direct emissions” or should continue to be reported.

fig. 3.0

CANADA'S 2008 SECTORAL GHG EMISSION SUMMARY
2009 TOTAL EMISSIONS – 690 MT CO_2 EQ



Source: Environment Canada

6.0

CONCLUDING THOUGHTS

Since the bulk of this report was written, several elements have come to bear on the regulatory process in both federal and provincial jurisdictions that could produce consequences in terms of successful CCS in Canada and Alberta.

Federal Regulations for Coal-Fired Electricity Generation

The Canadian Environment Minister released the federal government's draft emissions regulations for the coal-fired power sector on August 19, 2011. The rules would limit coal-fired plants reaching 45 years of age to emission levels no greater than those of extremely high-efficiency natural gas-fired power plants, but would not set regulations for new gas plants.

33 of the country's 51 coal-fired power stations will come to the end of their lives by 2025 (*source: www.businessgreen.com*). The regulations would also cover all plants that are commissioned after July 1, 2015.

Proposed regulations were published by the government in the Canada Gazette on August 27, 2011. The final regulations are due sometime in 2012, and are scheduled to go into force on July 1, 2015 (*source: www.cbc.ca*).

The proposed regulations can be found online: Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations.

A New Provincial Government in Alberta

Under Alberta's former Premier, Ed Stelmach, all of the following initiatives were undertaken:

- the implementation of new legislation: *Carbon Capture and Storage Funding Act 2009* and *Carbon Capture and Storage Statutes Amendment Act 2010*;
- the development of the *Carbon Sequestration Tenure Regulation* (April 2011);
- a $2 billion CCS funding program (CCS Fund enacted in 2009); and
- the Regulatory Framework Assessment (established in March 2011) .

When Stelmach resigned at the beginning of 2011, it triggered a leadership race within his own political party, culminating in an election of not only a new leader for the party, but also the new Premier of Alberta, Allison Redford, elected in October 2011.

It remains to be seen how supportive this current provincial administration will be of carbon capture and storage projects and research.

Changing Global Economics

The world economic situation is such that public spending and budgeting is being curtailed and closely monitored in Canada, as well as Alberta.

Public funding is an important part of the success of CCS in Canada, and in Alberta.

TransAlta's polling activities in 2010 and 2011 indicate that although there is a belief that environment and climate change concerns need to be addressed, the percentage of people who believe that it is 'urgent', have decreased, and other issues with an economic or financial component have replaced environmental concerns. At least in part, this can be attributed to the current global economic climate and the fact that many are more concerned with economic matters, including how emerging debt-ridden countries will affect our Canadian and Albertan economies, as well as the effects any downturns in the American economy could potentially have here in this country and this province.

Canada Departing the Kyoto Protocol

Canada's departure from the Kyoto Protocol, and the international criticism and scrutiny that it endured after having done so, might have an effect on successful CCS in this country. It would be hard to predict exactly what that effect might be, however, the politics of this decision regarding an international treaty may impact upon domestic environmental policy, legislation and direction.

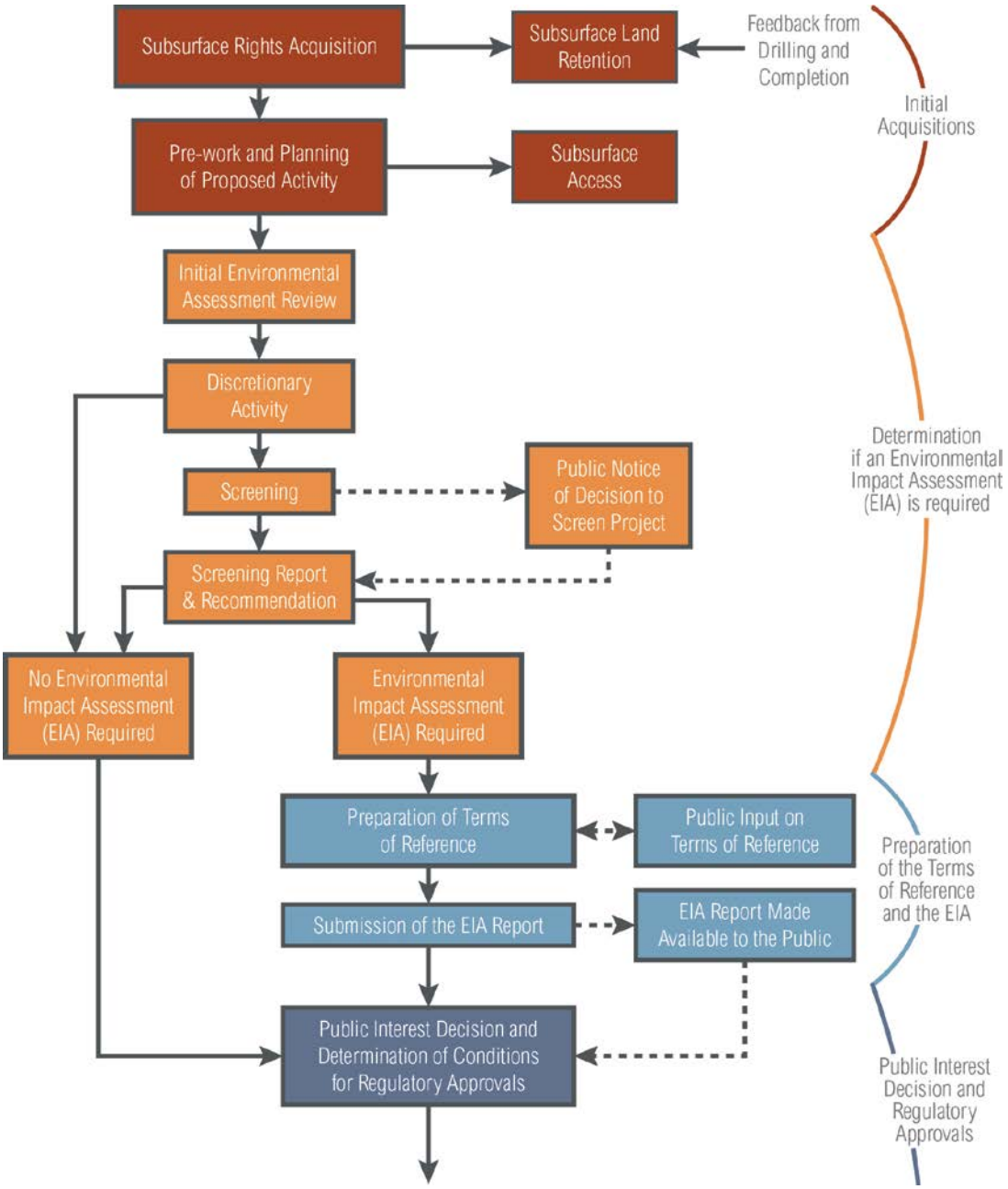
7.0

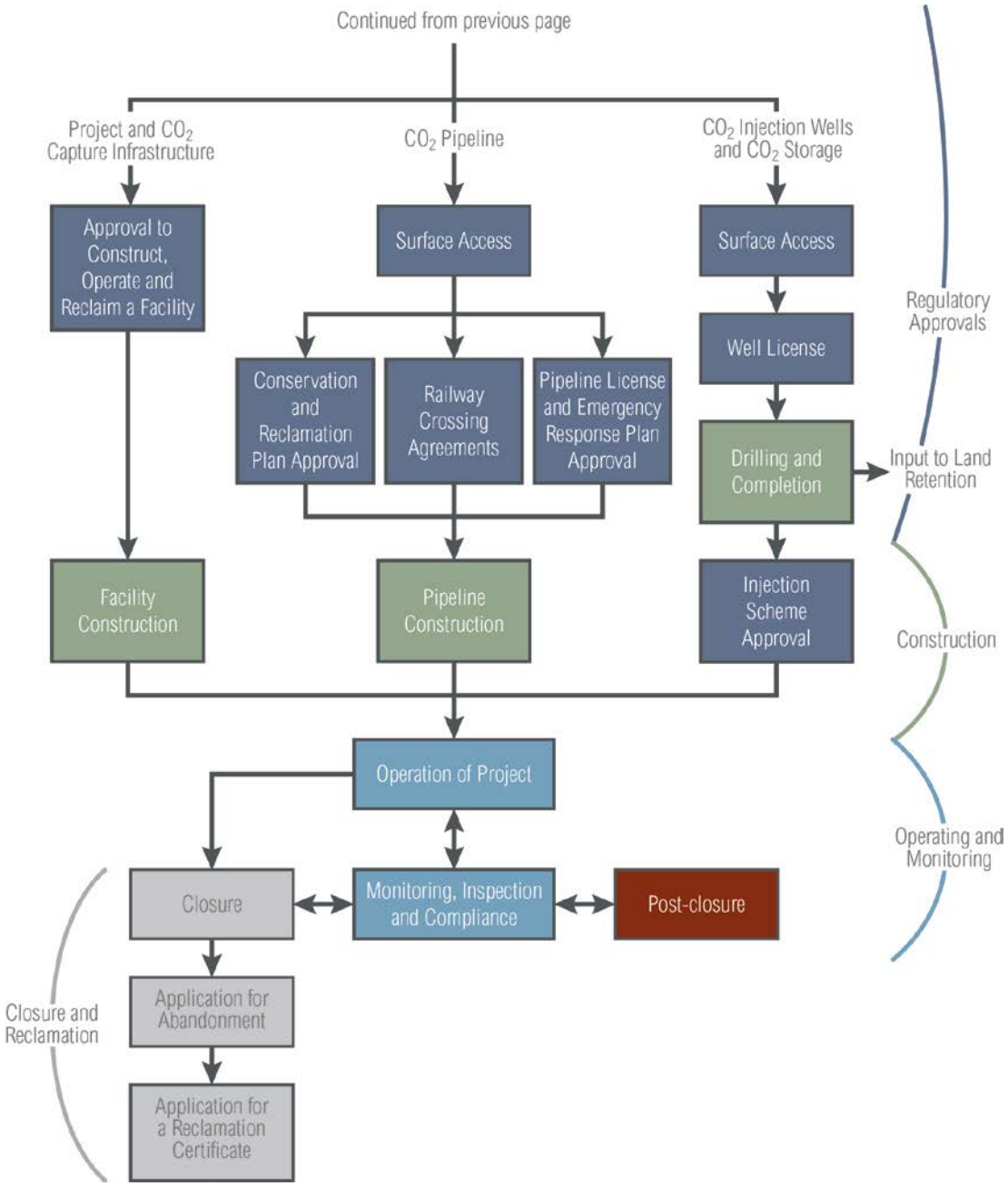
ACRONYMS AND ABBREVIATIONS

ADoE	Alberta Department of Energy
AENV	Alberta Environment
ASRD	Alberta Sustainable Resources Development
AUC	The Alberta Utilities Commission
CCS	Carbon Capture and Storage
CCEMA	Climate Change and Emissions Management Act
CEAA	Canadian Environmental Assessment Act
CO_2	Carbon dioxide
EA process	Environmental assessment
EAB	Alberta Environmental Appeals Board
EC	Environment Canada
EFR	The Environmental Field Report
EIA	Environmental impact assessment
EOR	Enhanced oil recovery
EPC	Emission performance credit
ERCB	Energy Resources Conservation Board
FTOR	Final terms of reference
HEEA	The Hydro and Electric Energy Act
NRCan	Natural Resources Canada
OGCA	Oil and Gas Conservation Act
PIL	Installation Lease
PLA	Pipeline Agreement
PTOR	Proposed terms of reference
QPs	Quantification Protocols
RA	Responsible authority
SGRR	Specified Gas Reporting Regulation
SGER	Specified Gas Emitters Regulation
SRA	Surface Rights Act
SRB	Surface Rights Board

appendix 1

OVERVIEW OF THE REGULATORY PROCESS APPLICABLE TO CCS PROJECTS IN ALBERTA


Subsurface Rights Acquisition
Subsurface Land Retention
Feedback from Drilling and Completion
Initial Acquisitions
Pre-work and Planning of Proposed Activity
Subsurface Access
Initial Environmental Assessment Review
Discretionary Activity
Screening
Public Notice of Decision to Screen Project
Determination if an Environmental Impact Assessment (EIA) is required
Screening Report & Recommendation
No Environmental Impact Assessment (EIA) Required
Environmental Impact Assessment (EIA) Required
Preparation of Terms of Reference
Public Input on Terms of Reference
Preparation of the Terms of Reference and the EIA
Submission of the EIA Report
EIA Report Made Available to the Public
Public Interest Decision and Determination of Conditions for Regulatory Approvals
Public Interest Decision and Regulatory Approvals


Continued from previous page
Project and CO_2 Capture Infrastructure
CO_2 Pipeline
CO_2 Injection Wells and CO_2 Storage
Approval to Construct, Operate and Reclaim a Facility
Surface Access
Surface Access
Well License
Conservation and Reclamation Plan Approval
Railway Crossing Agreements
Pipeline License and Emergency Response Plan Approval
Drilling and Completion
Facility Construction
Pipeline Construction
Injection Scheme Approval
Operation of Project
Closure
Monitoring, Inspection and Compliance
Post-closure
Application for Abandonment
Application for a Reclamation Certificate
Regulatory Approvals
Input to Land Retention
Construction
Operating and Monitoring
Closure and Reclamation

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