



Strategic Analysis of the Global Status of Carbon Capture and Storage

Report 3: Country Studies
Canada

Final Report



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1. Executive summary

Canada claims to have the largest operating CCS project in the world, commencing in 2000 near Weyburn, Saskatchewan. Since then, the interest in CCS has grown exponentially with five provinces and the Federal Government all committing substantial funds to both research and CCS project development.

With the oil sands producers struggling with the prospect of lower CO₂ emissions limits, CCS has been viewed as an ideal emission reduction solution, particularly in western Canada where the geography facilitates CCS activities.

Stakeholder groups in Canada are still considering CCS in light of presently unidentified long-term environmental impacts that it may have. Certainly, governments in Canada will want to ensure that CCS is combined with other CO₂ reduction measures such as investment in renewable energy, reduced emissions standards and energy savings programs to gain broad public support of CCS.

2. Glossary

| | |
|----------------------------|---|
| ACES Act | American Clean Energy and Security Act |
| Alberta Climate Change Act | Alberta Climate Change and Emissions Management Amendment Act, C.140/2007 |
| C\$ | Canadian dollars |
| CEAA | Canadian Environmental Assessment Act, 1992, Chap. 37. |
| CEPA | Canadian Environmental Protection Act 1999, 1999, Chap. 33 . |
| CCS | Carbon capture and storage |
| Federal Government | Government of Canada |
| FIT | feed-in tariff |
| Mining Act | Mining Act of Ontario R.S.O. 1990, Chap. M.14 |
| MNDM | Ministry of Northern Development and Mines |
| NEB | National Energy Board |
| NEB Act | National Energy Board Act RSC 1985 Chap. N-7 |
| Ontario EPA | Ontario Environmental Protection Act R.S.O. 1990, Chap. E.19 |
| TDGA | Transportation of Dangerous Goods Act 1992 |

3. CO₂ pricing

3.1 Introduction

The Federal Government remains stalled on its intended approach to GHG emission reductions. Canada was arguably a leader in GHG emissions reductions in the early and mid-2000s when Montreal played host to the United Nations Climate Change Conference and the presiding government introduced legislation to bring Canada into compliance with the Kyoto Protocol.

Since then, the Federal Government has been reticent to take steps to meet Canada's climate change commitments, spawning provincial and regional initiatives across Canada, leading to divergent approaches and results.

Recently, the Federal Government has re-entered the debate regarding a GHG emissions reduction plan, indicating that Canada would, in all likelihood, replicate the scheme put in place by the new US Government, thereby avoiding some of the protectionist measures contained in the current American Clean Energy and Security Act (ACES Act, sometimes referred to as "Waxman Markey"). It is unclear if Canada will be able to negotiate terms with the U.S. which will be acceptable to Canadians.

3.2 Mandatory cap and trade schemes

At present, Canada has only one operational cap-and-trade scheme.

ALBERTA CLIMATE CHANGE ACT

The Alberta Climate Change and Emissions Management Amendment Act (C.140/2007) came into force on 1 July, 2007 and provides for a "made-in-Alberta" cap-and-trade scheme applicable to all emitters of more than 100,000 tonnes of CO₂ annually.

The Alberta Climate Change Act presents large emitters with the ability to reduce their deemed emissions by obtaining offset credits through an Alberta-based emissions reduction project. Alternatively, payment can be made to an Alberta technology fund at a present price of C\$15/tonne (US\$13), effectively setting the upper limit on the price of an offset credit.

The emissions standards are presently set at intensity-based limits, with a plan to transitionally move to non-intensity based caps in advance of 2050. With the other provincial climate change initiatives developing, Alberta has recently taken the position that the Alberta Climate Change Act may need revision to better harmonize it with other schemes, though no concrete steps have yet been taken in the United States.

OTHER PROVINCES

It is also notable that British Columbia passed, but did not enact, a cap-and-trade scheme under the Greenhouse Gas Reduction (Cap and Trade) Act (SBC c.32) which remains capable of integration with the Western Climate Initiative's proposed plan (see Appendix X).¹ Further, Quebec, Manitoba,

¹ The legislative process involves two steps in Canada. First, legislation must be passed, often, but not necessarily with a committed enactment date. Second, the legislation, if not mandated as enacted as part of its passage, requires a separate act

and Ontario have all recently passed framework legislation which would allow for integration within a regional, national or even international scheme (An Act respecting the Régie de l'énergie, R.S.Q. c. R-6.01; The Climate Change and Emissions Reductions Act, C.C.S.M. c. C135; Environmental Protection Amendment Act (Greenhouse Gas Emission Trading) 2009).

3.2.1 CO₂ cost pass-through

There are two CO₂ tax regimes presently in Canada:

BRITISH COLUMBIA CO₂ TAX

British Columbia enacted a CO₂ tax in 2008 which is applicable to virtually all fossil fuels, including gasoline, diesel, natural gas, coal, propane and home heating fuels (Greenhouse Gas Reduction (Cap and Trade) Act SBC c.32). It set the base CO₂ tax rate at C\$10 per tonne (US\$8.64), with an annual escalation of C\$5 per tonne (US\$4.3) over the next four years.

QUEBEC'S CO₂ FUEL TAX

The Province of Quebec imposes a CO₂ tax applicable only to transportation fuels (An Act respecting the Régie de l'énergie, R.S.Q. c. R-6.01). At present, the province assesses 0.8 cents/litre on gas and 0.9 cents/litre on diesel fuel. The Quebec Government claims that its CO₂ tax was the first in North America.

3.2.2 Application of emission reduction obligations

FOSSIL FUEL EXTRACTION FACILITIES

The Alberta Climate Change Act targets all emitters over 100,000 tonne per year, with a disproportionate impact on the dominant fossil fuel extraction industries in the province.

The draft Federal climate change plan, the Regulatory Framework, would target fossil fuel extraction facilities among other high emitting enterprises (Government of Canada, 2008).

CO₂ CAPTURE AND TRANSMISSION INFRASTRUCTURE

CCS infrastructure has been developing on an ad-hoc, project-by-project basis. To date, none of the provincial Governments, nor the Federal Government has mandated CCS infrastructure spending, though their funds have and will be used in the various CCS projects taking place in Canada.

CO₂ STORAGE FACILITIES

CO₂ storage facilities have not been mandated by law in any Canadian jurisdiction to date.

of the provincial legislature to enact the legislation. This second step has not occurred in with respect to Greenhouse Gas Reduction (Cap and Trade) Act.

3.3 Non-mandatory emission reduction schemes

There are no Canada-specific non-mandatory emissions reduction schemes which are widely adopted in Canada.

3.3.1 Acceptance into mandatory cap and trade schemes

To date, it has not been determined whether CCS would qualify as an offset under either the Alberta Climate Change Act or the Federal Regulatory Framework.

3.4 CO₂ taxation schemes

Neither of Canada's two CO₂ tax schemes recognizes the potential importance of CCS or directly deals with CCS.

3.5 Indirect cost imposition: renewable energy schemes

There are renewable energy promotion schemes in virtually every province in Canada. None of those schemes have, however, touched upon CCS.

It is notable, however, that the ecoEnergy CCS Task Force, which was jointly commissioned by the Federal and Alberta Governments, has called for immediate initiatives to both fund and provide an enabling regulatory framework for CCS investment and project management in its January 2008 report (ecoEnergy CCS Task Force, 2008).

3.5.1 Portfolio energy standards

None of the various Canadian portfolio energy standards have yet included reference to CCS.

3.5.2 Feed-in tariffs

To date, four provinces have established feed-in-tariffs (FITs) for renewable energy: Ontario, Quebec, British Columbia and Prince Edward Island. The FITs have focussed only on providing elevated pricing for certain renewable energy and have not dealt with emissions reductions schemes such as CCS.

3.6 Greenhouse gas emission and energy use reporting schemes

The Federal Government operates an emissions reporting program for a number of GHGs. The following activities are subject to the reporting obligations (Canada Gazette, 2007):

- stationary fuel combustion;
- industrial processes;
- venting and flaring;
- other fugitive emissions;
- on-site transportation; and
- water and wastewater.

Energy efficiency standards fall within provincial jurisdiction in Canada. Most provinces are now imposing obligations upon provincial utility operators to become more energy efficient and to report to their respective provincial parliaments regularly on their progress.

4. Existing CCS initiatives

4.1 Introduction

There has been a dramatic growth in interest in CCS in Canada. Unfortunately, supporting policy and legislation have yet to catch up, leaving a regime with significant committed funding, but little or no concrete direction on how and when CCS should be deployed (Natural Resources Canada, 2008).

More clear direction is anticipated from both the Federal and Alberta Governments shortly, which will be linked to their latest CCS funding initiatives.

4.2 Acreage releases

To date, there has not been a formal process of acreage releases for CCS, though land has been made available on a project-by-project basis.

4.3 Government or government-business research facilities

Many of the current and planned CCS projects in Canada are viewed as pilot or demonstration facilities.

4.3.1 Weyburn Test Facility

The most notable CCS facility is near Weyburn, Saskatchewan and commenced in 2000. The goal of the project, which is sanctioned by the International Energy Agency, is to provide clear evidence that CCS technology can store CO₂ safely for at least 5,000 years. The Federal and Saskatchewan Governments have both argued that the test results and computer simulations prove that the Weyburn project has succeeded (Casey, 2008).

4.3.2 Nova Scotia CCS Research

It is also notable that the Province of Nova Scotia will be receiving C\$5 million (US\$4.3 million) in funding to conduct research into CCS technology and its possible application in the province (Natural Resources Canada, 2008).

4.4 Government funding

4.4.1 Mapping and data collection and sharing

To date, there has not been a formal structure to map, collect and share CCS data across industries and governments in Canada. However, it is understood that informal communications have occurred between governments and project developers regarding CCS technology development.

4.4.2 Research, development and commercialisation

In July 2009, the Alberta Government-appointed CCS Development Council released its recommendations for implementing CCS in the Province. The report sets out a blueprint for the development of CCS to be considered by the Alberta Government (Alberta, 2009a).

There are two notable CCS commercial projects which are due to be developed in the near future:

- TransAlta Corporation and (European) Alstom have announced the signing of an agreement to work together to develop a large scale CCS facility at one of TransAlta's coal fired generating stations west of Edmonton to reduce current CO₂ emissions by 1 million tonnes per year. The project will pilot Alstom's proprietary Chilled Ammonia Process which TransAlta considers as one of the more promising and potentially lowest cost solutions for CCS.
- Alberta utilities company EPCOR and Siemens have partnered to develop a near-zero emission 270 MW generating station at scale using Siemens CCS technology. The project is expected to be operational in 2015 and is alleged to have the potential to capture and store nearly 1 million tonnes of CO₂ each year.

4.4.3 Technology demonstration and early deployment incentives

Significant funding for the deployment of CCS technologies has been promised from both the Federal and Alberta Governments.

Canada's Action Plan (Canada's economic stimulus plan) proposes investment of C\$650 million (US\$562 million) in large-scale carbon capture and storage projects (Government of Canada, 2009).

In 2008, Alberta announced the creation of a C\$2 billion (\$US 1.73 billion) fund to encourage the construction of Alberta's first large-scale CCS project. In June 2009, the Alberta Government selected three projects with which to pursue letters of intent and allocate C\$100 million (US\$86 million) in the current fiscal year for engineering and design work:

- Enhance / Northwest for the Alberta Carbon Trunk Line, to incorporate gasification, capture, transportation, enhanced oil recovery and storage. It will capture CO₂ from the Agrium fertiliser plant and the Northwest upgrader;
- EPCOR/Enbridge for an integrated gasification combined-cycle carbon capture power generation facility; and
- Shell Canada Energy/ Chevron Canada Ltd./ Marathon Oil Sands L.P. for a fully integrated CCS project at the Scotford Upgrader.

Alberta hopes to bring these commercial scale projects online by 2015 (Alberta, 2009b).

4.5 Government-business joint ventures

Most of the current and planned CCS projects have some form of government financing or involvement. Joint projects have or will take place in British Columbia, Alberta, Saskatchewan and Manitoba.

There is a notable government-business project in Manitoba. The province has invested in a "double-barrelled" plan to use CCS for enhanced oil recovery. The C\$5-million (US\$4.3) pilot project will endeavour to capture CO₂ from industrial emitters and then inject it into existing oil pools. The project will take place in the Sinclair Field west of Virden. Local company Tundra Oil & Gas will oversee the process, alongside the Manitoba government, who has offered royalty relief for start-up costs.

4.6 Taxation incentives

To date, there have been no taxation incentives specifically relating to CCS.

4.7 Liability for failure to capture

There has been no development of law or policy regarding the possible liabilities associated with the failure to capture CO₂ using CCS. If the release is verified, it is possible that it would be treated as an emission in accordance with the applicable regulatory scheme.

4.8 Evaluation

As indicated above, there is a dramatic need for the development of policy and legislation to support CCS activities in Canada. To date, government funding has, ironically, been ahead of the regulatory regime.

5. Capture of CO₂

5.1 Introduction

Similar to CCS, there has been little policy or legislative development in the broader field of capture of CO₂. Canada has not introduced dedicated CO₂ capture legislation but amendments to Canada's environmental legislation may portend the approach to be taken by the Federal Government.

5.2 General policy and legislation with applicability to CO₂ capture

The Federal Government has amended the Canadian Environmental Protection Act (CEPA) to designate GHGs as "toxic" substances. Under CEPA emitted CO₂ may be regulated similar to other airborne emissions. As such, Environment Canada may list GHGs as regulated air emissions and move to establish limits upon such emissions without the need for new legislation. Such a scheme would, however, be merely a compliance model, without any of the market mechanisms that a true cap-and-trade scheme would allow.

5.3 Evaluation

The policy and legislation development on CO₂ capture is also in need of substantial development if Canada is to have the regulatory framework to properly meet its post-Kyoto obligations.

6. Transport of CO₂

6.1 Introduction

Like the United States, there is presently no comprehensive regulatory scheme for the transport of CO₂ in Canada. It remains unclear how CCS activities will be regulated in Canada.

The jurisdiction over pipelines and subsurface activities (within a Province) resides with the Provinces and not the Federal Government. As such, each province is in a position to impose its own regulatory requirements upon CCS projects. Activities, including pipelines, which cross provincial or national borders fall under Federal jurisdiction, principally through the National Energy Board (NEB), Environment Canada and the Department of Natural Resources (*Department of the Environment Act* R.S., 1985, c. E-10).

6.2 General policy and legislation specific to transport of CO₂

6.2.1 Licencing of transportation activities

PIPELINES

NEW PIPELINES

As discussed above, the regulation of CCS pipelines, like other pipelines in Canada, will be determined by the scope of the pipeline itself. To date, the significant CCS pipeline projects in Canada have crossed either provincial or national boundaries and have been primarily regulated by the Federal, and not provincial, Governments.

The Federal approval process for a new pipeline is principally handled by the NEB, which is an independent tribunal regulating the construction, operation and maintenance of pipelines. The NEB is constituted and governed by the Federal National Energy Board Act R.S.C. 1985, Chap. N-7 (NEB Act).

In addition, there may be provincial and municipal approval requirements, usually for potential land-related impacts falling within a province or municipality, depending upon the nature of the pipeline and the sensitivities of the underlying land.

It is notable, however, that Section 58 of the NEB Act reaffirms that the Federal Government law (through the NEB Act and other Federal legislation) will be paramount over conflicting provincial (and, by extension, municipal) law applicable to the pipeline.

EXISTING PIPELINES

Existing pipelines (which fall under Federal jurisdiction) must remain in compliance with the specific approval terms and conditions established by the NEB, as well, of course, as all other applicable Federal, provincial and municipal laws. Existing pipelines must also comply with any applicable provincial and municipal approval terms imposed during the approval process.

ROAD AND RAIL TRANSPORT

Under the Federal Transportation of Dangerous Goods Act 1992 (TDGA), CO₂ is a “dangerous good” as defined in Section 1 and set out in the Schedule to the TDGA and, as a result, a series of notification, manifesting and safety compliance obligations will apply under the TDGA.

While there a number of TDGA regulations that deal with specific types of regulated goods and the various forms of transportation, there are none that are designed to address CO₂.

Violations of the TDGA and/or the TDGA regulations may attract sanctions under Section 33(2) of the TDGA of either:

- indictment to imprisonment for a term not exceeding two years; or
- summary conviction to a fine not exceeding C\$50,000 (US\$43,000) for a first offence, and not exceeding C\$100,000 (US\$86,000) for each subsequent offence.

TRANSPORTATION BY SHIP

The TDGA includes the range of transportation of water-borne vessels within its definition of “transport” under Section 1 of the TDGA.

6.2.2 Planning

ZONING FOR TRANSPORT FACILITIES

Provincial and municipal zoning codes would be applicable to proposals to construct CO₂ pipelines. Typically, zoning applications are subject to administrative and, often, regulatory tribunal approval.

CONSTRUCTION AND BUILDING CODES

The NEB regulates the design and construction of CO₂ pipelines (falling within Federal jurisdiction). The process under the various provincial schemes to licence a pipeline is not substantially different. Each province has its own energy regulator, most of whom have jurisdiction over pipelines to be situated within their provincial borders and the approval process and considerations are similar.

PIPELINE LICENCING REGIMES – NEW PIPELINES

ONSHORE PIPELINES

Under the NEB Act, in order to apply to the NEB for approval for a new onshore pipeline (falling within Federal jurisdiction), the application must contain: a business case for the need for the pipeline; detailed specifics and drawings on the pipeline design; the potential environmental impacts of the pipeline (as assessed by third party experts); a description of the nature and outcome of any prior public consultations on the proposed pipeline; identification of what, if any, land rights will be needed for the pipeline; an analysis of the adequacy of the supply for the pipeline and the market potential for the products to be delivered by pipeline; an economic assessment of the viability of the pipeline; the proposed pipeline route corridor; and “any other factors” that may affect the NEB’s approval decision.

In determining if the pipeline should be approved, the NEB must make an overall assessment as to whether the proposed pipeline is in the “public interest”.

OFFSHORE PIPELINES

Offshore pipelines, as situated off of Canada's coastal areas, would necessarily be dealt with under the Federal jurisdiction of the NEB. As such, the approval process would not differ from an on-shore application, save for the input provided to the NEB by the Federal Department of Fisheries and Oceans, pursuant to their statutory mandate to protect coastal regions under Section 4(1) of the Department of Fisheries and Oceans Act RSC 1985 chap F-15.

PIPELINE LICENCING REGIMES – EXISTING PIPELINES

ONSHORE PIPELINES

Pipelines must remain in compliance with all of the terms and conditions of the NEB approval, as well as any additional provincial or municipal approvals required.

OFFSHORE PIPELINES

Offshore pipelines must similarly comply with the terms and conditions of the NEB and provincial and municipal approvals, as required. As offshore pipelines are also under the scrutiny of the Department of Fisheries and Oceans, this Federal department may impose additional reporting and verification requirements upon the project as a condition of continued operation.

ENVIRONMENTAL IMPACT ASSESSMENT

The NEB is tasked with applying the Canadian Environmental Assessment Act (CEAA). Under CEAA, the NEB, as principal regulator of the pipeline project, is required to get the input from any other Federal department whose statutory mandate may be impacted by the pipeline. Often, both Environment Canada and the Department of Natural Resources will be required to provide input to the NEB under the CEAA as to any concerns they may have with the project.

If the pipeline is offshore or impacting on-land coastal areas, the Department of Fisheries and Oceans will also be required to comment. Ultimately, however, it is the NEB which will determine the outcome of the environmental assessment under the CEAA.

STAKEHOLDER ENGAGEMENT

PUBLIC CONSULTATION

Before any pipeline at least 40 kilometers long (and otherwise falling within Federal jurisdiction) can be approved, the NEB is statutorily required to convene a "certificate hearing" into the application. The certificate hearing grants a broad right of participation to persons qualifying as interveners, including affected and potentially affected natural and corporate persons and groups. The hearings are also governed by the *National Energy Board Rules of Practice and Procedure, 1995* and the *National Energy Board Guidelines for Filing Requirements*. Further, any persons wishing to comment on the pipeline application may make submissions on the application without the requirement to attend at the certificate hearing.

If the pipeline may impact lands claimed by aboriginal groups, there will also be an obligation to consult and negotiate with the impacted native peoples. This process can be time-consuming and

costly and often results in an obligation on behalf of the pipeline developer to either pay compensation or royalties to the impacted aboriginal group(s).

LEGAL CHALLENGE

Under the NEB Act, participants in a certificate hearing may challenge an NEB approval of a pipeline application by either:

- requesting that the NEB review and reconsider its approval (NEB Act), often with the obligation of the challenging participant to adduce new information or evidence which may be material to the approval; or
- seeking leave to file an appeal of the decision in the Federal Court of Appeal (NEB Act).

6.2.3 Access / tenure

NATURE OF PROPERTY INTERESTS CONFERRED

Land for pipeline construction in Canada is usually obtained from private parties or the Crown through time-limited easements or leases. Easements are often obtained by the pipeline proponent by way of a pre-existing (easement) option agreement, which has contractual force and is conditional upon approval of the pipeline project route corridor.

ESTABLISHING PRIORITY BETWEEN TRANSPORT AND EXISTING USES AND RIGHTS (INCLUDING PETROLEUM EXTRACTION)

Under Section 79 of the NEB Act, no pipeline may be erected so to interfere with any existing mining or exploration work lawfully conducted. Conversely, Section 81 of the NEB Act permits oil and gas drill work to be performed in the area of an existing pipeline, where such drilling does not occur within forty meters of the pipeline.

PETROLEUM AND RESOURCE EXTRACTION

A number of proposed Canadian CCS projects, including projects in the provinces of Manitoba, Saskatchewan and Alberta, have been funded and approved by the provinces and the Federal Government as “double-barrel” projects which both use CCS to facilitate maximum petroleum recovery, as well as to reduce CO₂ emissions.

FAUNA AND FLORA, INCLUDING ENDANGERED SPECIES

Federally, Environment Canada is tasked with Federal regulation regarding fauna and flora impacts arising from the transport of CO₂. In practice, however, Environment Canada has very limited jurisdiction over fauna and flora in the provinces of Canada and the assessments, if any, of the possible impacts of CCS upon fauna and flora are left to the provincial natural resources ministries. To date, there do not appear to be any prohibitions upon a CCS project imposed by these natural resource ministries.

NAVIGATION

Offshore pipeline operators must continue to satisfy the Federal Department of Fisheries and Oceans as to compliance with the pipeline approval terms, as set out by the NEB in consultation with the Department of Fisheries and Oceans, which has jurisdiction over coastal navigation.

SUBSEQUENT USES

Where there are plans to reclaim land previously used for pipeline purposes, the NEB, along with Environment Canada will impose the reclamation terms contained in the prior NEB pipeline approval, along with any additional remediation activities as determined necessary by Environment Canada, in consultation with the relevant provincial environment ministries.

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

Indigenous groups in Canada continue to challenge the rights of pipeline proponents to situate pipelines in areas which are either on lands claimed as ancestral by indigenous peoples or which would otherwise adversely impact such lands (established or claimed as ancestral.) Such challenges are often made both through the NEB process, as well as through the Federal Court of Canada.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

The Federal Government does have an “expropriation” right at common law, which has been used to obtain land from existing private landholders for certain projects, such as waterways, railways and highways. This right has been mirrored, though not replaced by the Federal Expropriation Act (R.S.C. 1985, c. E-21), which provides a framework that the Federal government may use in exercising its right of expropriation. The leading case on expropriation in Canada is arguably *Cameron v. City of Victoria* (1905-11-03, B.C. S.C.F.C.), which articulated the principles upon which the Federal Government may unilaterally seize privately-held lands.

The *Cameron* decision was an appeal of an application by a local landowner to quash two by-laws which provided for the expropriation of portions of his land for use in a public walkway. Cameron raised eight separate grounds for appeal including technical, procedural and substantive challenges to the proposed expropriation. Most notably, the Supreme Court of British Columbia affirmed that the Crown had the common law right to expropriate and may do so when and as it determines it is necessary or even merely convenient to do so.

This right in Canada is often only recognised by the Federal Court of Canada following clear evidence of reasonable and timely offers refused by the affected landholders. The Federal Government must still provide “fair market value” compensation for expropriated lands.

6.2.4 Environmental and other risks

LEAKAGE OF TRANSPORTED CO₂

Leaks of CO₂ are regulated by the various provincial ministries of the environment unless they occur on Federal jurisdiction lands. In Ontario, CO₂ is not listed as a regulated air emission under Regulation 419 to the Ontario Environmental Protection Act (R.S.O. 1990, Chap. E.19; Ontario EPA), though it would still be subject to Ministry of the Environment review as a possible airborne contaminant.

POLLUTION – NOISE, AIR AND WATER

Noise, air and water pollution are all regulated under provincial ministries of the environment, unless they occur on Federal jurisdiction lands.

WASTE

It is unclear in Canada if CO₂ transferred through a pipeline would be deemed a regulated “waste” in addition to a “dangerous good” under the TDGA, as discussed above. Waste is almost exclusively a provincial jurisdiction issue and not a Federal one, unless it occurs on a Federal jurisdiction land.

For example, Ontario Regulation 347 to the Ontario EPA includes a variety of specific waste definitions, none of which expressly include pipeline CO₂. It is also notable that wastes in most provinces in Canada fall into two broad categories – solids and liquids, making pipeline CO₂ unlikely to be considered a “waste”.

OCCUPATIONAL HEALTH AND SAFETY

Like the other above areas, occupational health and safety is a provincial jurisdiction matter, save for where the issue arises on Federal jurisdiction lands. In Ontario, for example, there is a general prohibition against endangering the health or safety of workers, but there are no specific regulations designed to specifically address CO₂ risks.

THREATENED/ENDANGERED SPECIES

See above.

MIGRATORY SPECIES

See above.

6.3 Taxation of CO₂ transport

Canadian jurisdictions have not introduced any CO₂ specific taxation regulations.

6.4 Evaluation

The law in Canada regarding CO₂ transport, including pipeline infrastructure, remains in a nascent stage. It is anticipated that both Federal Government (for trans-border pipeline projects) and the Provinces presently hosting or considering CCS projects, Manitoba, Saskatchewan, Alberta and British Columbia, may begin to seriously consider the specific regulation of CO₂ transportation as part of its comprehensive regulation of CCS. Existing pipeline regulatory schemes could provide a useful starting point for such regulation.

7. Exploration of potential CO₂ storage sites

7.1 Introduction

The Final Report of the ecoEnergy CCS Task Force, entitled “Canada’s Fossil Energy Future – The Way Forward on CCS” (ecoEnergy CCS Task Force, 2008) specifically identifies exploration of potential CCS sites as a priority item for both the provinces and the Federal Government in Canada. To date, however, no CCS specific regulatory or policy framework has been developed.

7.2 General policy and legislation with application to exploration of potential CO₂ sequestration sites

7.2.1 Exploration licencing

Most subsurface exploration licencing is governed by provincial and not Federal law.

Regulators are still grappling with the possible impacts of CCS to the subsurface and concerns have been raised that the environmental effects of CCS activities in Canada are yet to be properly known (Nikiforuk, 2009).

The CCS projects in Canada, to date, have been pilot projects that have not been subject to a full regulatory approval process. With the commercial CCS projects slated for development in British Columbia, Alberta, Saskatchewan and Manitoba, each of the provinces will require both subsurface and environmental approvals for exploration activities. It is anticipated that the Provinces will eventually enact regulations to facilitate CCS-related exploration. At present, the regulatory regimes across Canada have not been amended to accommodate CCS-related exploration and this, if unaddressed, will lead to regulatory delays and a cumbersome approval process for CCS projects.

APPLICATION CRITERIA

As exploration licencing is a provincial matter, an exploration of a provincial licencing regime is instructive. For example, the Province of Ontario regulates exploration licencing under the Mining Act of Ontario (R.S.O. 1990, Chap. M.14; Mining Act). Under the Mining Act, exploration rights must be sought from the Ministry of Northern Development and Mines (MNDM) for approval. As part of the exploration licencing process, both technical and business information must be provided to MNDM for their consideration, such as a physical description of the nature of the operational equipment and facilities needed, maps showing the legal descriptions of the project locations, access rights and a construction schedule.

If the application receives preliminary approval, the proposed exploration licences are posted on MNDM’s website (and otherwise made available) for public comment and input. It should be noted, however, that there are no specific exploration licencing provisions relating directly to CCS.

Where the exploration activities lead to an application for a proposed mine, MNDM must first conduct a feasibility assessment under the Mining Act, along with other ministries such as the provincial Ministry of the Environment. Contained within that process must be assessments on geology, geophysics, geochemistry, and a physical determination of the requirements to disturb the subsurface.

The Ministry of the Environment's assessment will focus on the soil and groundwater impacts, if any, of the project. Where a CCS project may encounter regulatory difficulties is the impact study regarding subsurface integrity.

RIGHTS CONFERRED BY EXPLORATION LICENCE

Rights in respect of a licence for Crown land exploration will be in the nature of a time-limited lease, for which the Crown would require rents.

LICENCE TERM

The term of the exploration licence would be negotiated with MNM and would be limited to the period agreed upon between the parties as necessary for the exploration.

7.2.2 Access / tenure

NATURE OF PROPERTY INTERESTS CONFERRED

Exploration rights would be a right to access and explore geologic formations.

ESTABLISHING PRIORITY BETWEEN EXPLORATION AND EXISTING USES AND RIGHTS

Both the Federal and provincial governments have identified exhausted (and near exhausted) mining and oil and gas fields as appropriate locations for exploration, including CCS exploration.

FISHING

Offshore exploration is governed by the Department of Fisheries and Oceans and will not be approved where it is viewed as inconsistent with the "conservation and sustainable development of oceans resources." Further, the Department of Fisheries and Oceans is specifically tasked under the Fisheries Act (RSC 1985) to prevent "any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat (Section 35(1))."

FAUNA AND FLORA, INCLUDING ENDANGERED SPECIES

Under the Species at Risk Act 2002, Environment Canada is mandated to take any action "which prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened." Mining exploration in Canada has traditionally had to respond to such concerns.

NAVIGATION

Statutory authority for offshore exploration permitting does not contain additional requirements in relation to impacts on navigation.

MINING

It is unclear under Canadian law as to what the legal outcome would be in the event that CCS proliferated to a mineral stratum causing potential interference with and/or contamination of such usable strata. At present, this issue has not been the subject of any government policy or regulation.

SUBSEQUENT USES

To the extent that exploration activities do not lead to actual injection of CO₂, the impact of exploration on subsequent uses of the property would be limited.

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

Exploration on indigenous lands would be subject to approval of both the affected indigenous groups and the relevant mining regulator, such as MNDM.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

This is discussed in Section 6.2.3. To our knowledge, the Federal Government has yet to use expropriation to facilitate a CCS project.

7.2.3 Planning and construction regulation applicable to CO₂ sequestration facilities

ZONING

Zoning of a CCS operation would be required to adhere to local zoning codes and CCS projects would likely require industrially zoned lands for the operations. In areas not already zoned for industrial use, the default zoning is likely to be agricultural in most parts of Canada, requiring the project to obtain rezoning of the land to industrial use.

ENVIRONMENTAL IMPACT ASSESSMENT

Environment Canada would likely require an environment assessment under CEAA for any CCS exploration projects which required CCS operations on lands within the Federal jurisdiction. Similarly, the provincial environment ministries would also require such an environmental assessment under provincial law, such as the Ontario Environmental Assessment Act (R.S.O. 1990, Chap. E.18) for CCS projects on provincial lands.

PIPELINE LICENCING REGIMES

The NEB would be required to assess and endorse the conclusions of the underlying CCS-related exploration in order to licence a pipeline (within Federal jurisdiction).

CONSTRUCTION AND BUILDING CODES

The design and construction of a CCS facility involving a pipeline (within Federal jurisdiction) would require the approval of the NEB. For CCS facilities outside the NEB's jurisdiction, the construction approvals would fall to the provincial energy regulators, such as Alberta Energy, while the building code requirements would typically be a combination of provincial and municipal requirements, as applicable.

STAKEHOLDER ENGAGEMENT

PUBLIC CONSULTATION

Public consultation at either the Federal or provincial level (as determined by the jurisdiction) would be required for CCS projects. To date, however, the CCS projects in Canada have been pilot projects that have not been subject to a full regulatory approval process.

LEGAL CHALLENGE

As discussed above, persons with standing before the NEB have the legal right to challenge the approval of a CCS facility (with the Federal jurisdiction) by either requiring the NEB to reconsider its decision or appealing to the Federal Court of Appeal.

7.3 Taxation of CO₂ sequestration exploration activities

There is currently no CCS-specific taxation in Canada.

7.4 Evaluation

CCS exploration, like CCS pipeline approvals, requires a coherent and hopefully unified set of standards and approaches to CCS. The recent collaboration between the Alberta and Federal Governments on seeking shared standards for CCS exploration (and CCS project development) is an encouraging sign that CCS is truly a high priority for Canadian Governments (ecoEnergy CCS Taskforce, 2008).

8. Injection and pre-closure of CO₂ storage formations

Canadian jurisdictions are yet to implement regulations regarding injection and pre-closure of CO₂ sequestration formations. As discussed above, subsurface activities, in isolation, are generally provincial and not Federal matters. While Canada does not have legislation regarding injection and pre-closure of CO₂ sequestration formations, there is some limited regulation of underground gas storage. Reg.263/02 to the Ontario Mining Act, for example, regulated where and how a private mining party may store natural and non-natural gases underground. These types of rules, while likely not to be applicable to CCS, may form the legislative backdrop for policy on injection and pre-closure CO₂ sequestration formations.

To encourage the widespread development of CCS projects in Canada it will be necessary to develop legal frameworks able to accommodate injection, provide clear property rights and manage competing uses of land. Existing legislation in Canada provides some indications of how this could be dealt with

9. Post-closure and long-term storage of CO₂

As the field of CO₂ storage is still developing in Canada, there have yet to be passed any policies or legislation regarding post-closure and long-term storage of CO₂.

Perhaps the closest comparator would be the laws relating to the post-closure of subsurface development under mining legislation, such as the Mining Act. A mine may be decommissioned under that Act, but the obligations remain upon the mine owner or operator for any subsequent harm that occurs to human health or the environment.

If the CO₂ were deemed to contaminate soil, groundwater or ambient air, then the existing environmental regimes would regulate the releases, even years following the closure of the CCS site, with liability probably shared jointly and severally among the parties to the CCS activity. Civil liabilities, most notably, tort law, may also apply to issues arising from the post-closure of a CCS site.

These regimes are, unfortunately, not designed to address post-closure and long-term storage of CO₂, perhaps providing the impetus for governments in Canada to develop a more directed regulatory framework.

In order to encourage CCS project development in Canada, Canadian jurisdictions will need to develop regulatory frameworks able to manage the potential long-term liabilities arising from CO₂ storage.

10. Summary

10.1 CCS policy and legislation 'best practice'

CCS policy will ultimately be driven by the western Canadian provinces, which need CCS to be a viable alternative to dramatic emissions reductions. To date, the focus in Canada has been on funding pilot CCS projects and not developing a coherent set of standards for the proper implementation of CCS activities.

In order to encourage CCS project development, Canadian jurisdictions will need to develop regulatory frameworks able to deal with the unique qualities of CCS projects. Existing pipelines and mining legislation could be adapted to this purpose.

With time, it is anticipated that Canada's experiments with CCS will provide useful information for other countries engaged in CCS.

10.2 Priority areas for future policy and legislative development

There will be a need to incorporate CCS into a broader climate change strategy. To date, governments in Canada are still struggling with how to prioritize CCS and ultimately incorporate it into a broader climate change strategy. They should focus on developing robust regulatory frameworks for the CCS project cycle (ecoEnergy CCS Task Force, 2008).

11. References

11.1 Legislation, Regulations, Case Law and International Material

11.1.1 International

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, as modified by the Protocol of 1996, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975).

Kyoto Protocol to the *United Nations Framework Convention on Climate Change*, opened for signature 11 September 1997 2303 UNTS 148 (entered into force 16 February 2005).

Protocol 1978 relating to the International Convention for the prevention of pollution from ships, opened for signature 17 February 1978, 1340 UNTS 62 (entered into force 2 October 1983).

United Nations Framework Convention on Climate Change, opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

11.1.2 Federal

Canadian Environmental Protection Act 1999, 1999, Chap. 33 .

Canadian Environmental Assessment Act, 1992, Chap. 37.

Department of Fisheries and Oceans Act RSC 1985 chap F-15.

Department of the Environment Act (R.S., 1985, c. E-10).

Environmental Protection Amendment Act (Greenhouse Gas Emission Trading), 2009.

Federal Expropriation Act (R.S.C. 1985, c. E-21).

Fisheries Act RSC 1985 Chap. F-14.

Greenhouse Gas Reduction (Cap and Trade) Act, [SBC c.32].

National Energy Board Act RSC 1985 Chap. N-7.

Species At Risk Act, R.S.C. 1985, Chap. F-14.

Transportation of Dangerous Goods Act 1992, 1992, Chap. 34.

11.1.3 Provincial Legislation

Alberta Climate Change and Emissions Management Amendment Act, C.140/2007.

An Act respecting the Régie de l'énergie, R.S.Q. c. R-6.01 (Quebec).

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Ontario Mining Act, O.Reg. 263/02.

Ontario Environmental Protection Act, O. Reg 419/05.

11.1.4 Case Law

Cameron v. City of Victoria (1905-11-03, B.C. S.C.F.C.).

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