ENERGY INSIGHT - MAKING DOLLARS AND SENSE OF CARBON MARKETS - PART 1: CARBON CAPTURE

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In this three-part series, we will explore the complexities and critical issues surrounding carbon policy, carbon management and carbon as a commodity, starting with an introduction to carbon capture.

PART 1: Carbon Capture Utilization and Storage

In this article, we will examine the economic and policy challenges associated with carbon capture, utilization and storage ("CCUS"), highlighting its current costs, the need for significant government assistance, and the misalignment of policies across various levels of government.

CCUS technology, while promising, presents several significant challenges for both industry and policymakers. CCUS projects are economically challenging as they require enormous upfront capital investment while the returns and timing of realization on such investment remain questionable at best. Similar to any industrial project, a CCUS project requires a level of certainty as to its economic viability before it can proceed. Presently, CCUS projects do not appear to be economically viable without substantial government support. This support, often in the form of carbon credits and valuation mechanisms, is still being developed and, as will be discussed in this series, poses many questions and issues for industry. Additionally, government policies related to CCUS are frequently not aligned across international, federal, provincial, and local jurisdictions. This lack of alignment creates a complex regulatory environment that complicates decision-making for industries looking to adopt CCUS technologies. Harmonizing and simplifying the various policies and approaches would help to ensure the viability of a CCUS industry in Canada.

In this three-part series, we will delve into the complexities and challenges associated with carbon markets and carbon pricing policies. By understanding the challenges and the current state of CCUS markets and policy, stakeholders can better prepare and plan for a CCUS industry and make informed decisions about their role in this critical aspect of climate strategy.

The Role of Carbon Capture in Climate Change

Greenhouse gas emissions caused by increased carbon dioxide (CO_2) levels in the atmosphere due to human

activity have been identified by the United Nations Framework Convention on Climate Change (the "UNFCCC") as a key cause of increased global temperatures. According to the UNFCCC, there is a direct causal link between increased global temperatures and extreme climate change events, such as prolonged droughts and killer heatwaves in certain parts of the world, and extreme storms and torrential rainfall in other parts of the world, which are negatively impacting people and natural environments.[1] As a result, the UNFCC adopted an international treaty on climate change which seeks to hold global average temperature increases to 1.5°C above pre-industrial levels.[2]

One hundred and ninety-six member nations of the UNFCCC adopted the treaty and its goals through an agreement known as the Paris Agreement. The Paris Agreement seeks to stop and reverse the extreme climate changes by having the UNFCCC signatory nations commit to eliminate the generation of greenhouse gas emissions, and specifically CO_2, in the atmosphere within a prescribed period of time. The Paris Agreement set aggressive CO_2 emission reduction targets by 2030 with the ultimate goal of net-zero carbon emissions by 2050. In Canada, these commitments were codified into law through the *Canadian Net-Zero Emissions Accountability Act*[3] (the "*Act*"). As will be discussed further in this series, the *Act* requires carbon producers and emitters to completely eliminate carbon emissions from any and all sources, including industrial production and operations to personal travel. The *Act*, together with various other legislation, regulations, policies and orders, combine to punish emitters for carbon production and emissions, as well as reward those businesses which eliminate carbon from their supply chain and operations though various taxes, penalties and incentive schemes.

The energy industry is both a significant source of carbon emissions and an essential player in eliminating CO_2 emissions from the atmosphere and thereby achieving the net-zero emissions targets. One possible method of eliminating CO_2 from the industrial production of power and energy in the energy sector is through carbon capture, utilization and storage.

What is Carbon Capture, Utilization and Storage?

CCUS involves the separation and collection of CO_2 molecules at the source of industrial production and before such CO_2 molecules can be released into the atmosphere. The collected CO_2 is then compressed, transported to a storage site, and injected into secure underground geological formations, either for permanent storage or to be used for enhanced oil recovery. Once injection is complete, the site is sealed and monitored to ensure there are no leaks or risks to public health or the environment.

CCUS is comprised of four main steps: capture, transport, utilization and storage.

- **Capture:** CO_2 is separated from other gases produced at large industrial facilities like steel mills, cement

plants, petrochemical plants, and coal and gas power plants, or directly from the atmosphere. Various proven and effective capture methods are used, depending on the emission source.

- **Transport:** The separated CO_2 is compressed to increase its pressure, allowing it to behave like a liquid. It is then dehydrated and sent through a transport system, such as a pipeline or rail, truck or marine vessels.
- **Utilization:** Utilization refers to the process where captured CO_2 is repurposed for beneficial uses. One common application is injecting CO_2 into producing oil wells to enhance the recovery of oil and gas. The CO_2 is used to re-pressurize the well, which improves the recovery of hydrocarbons. However, it is important to note that utilization is not always applied.
- **Storage:** After transportation, the CO_2 is injected into deep underground rock formations, typically at depths of one km or more, where it is safely and permanently stored. These formations are similar to those that once contained oil and gas for millions of years.

CCUS and carbon capture and storage ("CCS") are often used interchangeably, but they are not the same. While CCS involves only the capture and storage of CO_2, CCUS includes the additional step of utilizing the captured CO_2 for various purposes, such as enhanced oil recovery. Newer projects are increasingly focusing on just the storage aspect, reflecting advancements and priorities in climate change mitigation strategies.

Why CCUS is Important to Canada and the Energy Industry

CCUS is a critical technology for reducing greenhouse gas emissions in Canada, particularly in the energy sector. By capturing CO_2 emissions from industrial sources and storing or utilizing them, CCUS can significantly reduce the carbon footprint of energy production. This is essential for Canada to achieve its net-zero emissions targets and position itself as a global leader in low or zero carbon emissions power generation.

CCUS offers numerous benefits for the Canadian energy industry. CCUS serves as a bridging mechanism, enabling Canada's oil and gas industry to enhance energy security while significantly lowering its carbon emissions. Additionally, the adoption and development of cutting-edge CCUS technologies provide opportunities for Canada to export these innovations to other jurisdictions, boosting the country's technological and economic competitiveness on a global scale. The participation of the energy industry, which is inherently carbon-intensive, is crucial for the success of any net-zero emissions strategy.

Key Requirements for CCUS to Work

For CCUS to be effective and economically viable, several key requirements must be met, spanning technical, geological, infrastructure, and policy considerations. First, the presence of suitable geological formations for CO_2 storage, such as deep saline aquifers and depleted oil and gas fields, is essential. Proximity of industrial

plants and power generation facilities to these storage sites minimizes transportation costs and logistical challenges.

Advanced capture technologies must efficiently separate CO_2 from other gases produced at industrial facilities, and these technologies need to be scalable to handle large volumes of CO_2.

Robust transportation infrastructure, particularly an extensive and reliable pipeline network, is crucial for transporting captured CO_2 to storage sites. Where pipelines are not feasible, alternative transportation methods like rail, truck, or marine vessels must be available.

The long-term economic feasibility of CCUS will depend on its cost-effectiveness when compared to other emission reduction strategies. A stable and predictable carbon market is therefore essential, where the price of carbon reflects the true cost of emissions, driving investment in CCUS.

A clear and supportive regulatory framework, including regulations governing the capture, transport, utilization, and storage of CO_2, is critical for CCUS projects and could also support the continued development of a stable carbon market. In addition, governmental financial incentives, such as tax credits, subsidies, and carbon pricing mechanisms, are necessary to help offset the high costs associated with CCUS, and thereby encourage companies to invest in these technologies and infrastructure.

Continued technological advancements to reduce costs and improve efficiency will also be required to make CCUS economically viable. Ongoing research and development efforts, supported by government and research institutions, are essential for advancing CCUS technologies and optimizing storage techniques. Stakeholder collaboration is also vital, with major industrial stakeholders, including oil and gas companies, power generators, and heavy industries, needing to commit to integrating CCUS into their operations, and investing in the necessary research, development and infrastructure.

By meeting these requirements, CCUS can become a viable and effective tool for reducing CO_2 emissions and helping Canada achieve its net-zero emissions targets. These elements collectively ensure that CCUS projects are technically feasible, economically viable, and socially acceptable, paving the way for widespread adoption and success.

Canada's Advantage in CCUS

Canada has been an enthusiastic developer and implementer of CCUS technologies, currently accounting for nearly 20 per cent of installed CCUS capacity globally.[4] By 2025, over 140 CCUS projects could be operational worldwide, capturing at least 145 million tonnes per annum (mtpa) of CO_2, emissions.[5]

Canada, particularly Alberta, has a unique advantage for implementing CCUS due to its mix of industrial plants and large capacity caverns suitable for CO_2 storage. The geography and geology of the region are favorable for CCUS, offering extensive storage capabilities that are not available in many other parts of the world. This advantageous mix makes Canada a prime location for large-scale CCUS projects. Notably, the Alberta Carbon Trunk Line, the world's largest CCS project, exemplifies this potential. It consists of a 240 km pipeline which will gather, compress, and store up to 14.6 million tonnes of CO_2 per year, and inject this CO_2 into depleted oil reservoirs.[6]

Alberta's industrial landscape includes a high concentration of major carbon producers, such as oil sands operations, petrochemical plants, and refineries, which are prime candidates for CCUS. The proximity of these facilities to potential storage sites reduces transportation costs and logistical challenges, making CCUS more economically viable.

Alberta also has a well-developed pipeline network that can be repurposed for transporting CO_2 from capture sites to storage locations. This infrastructure advantage reduces the need for new investments in transportation networks, further lowering the overall costs of CCUS projects.

Given these advantages, Canada is uniquely positioned to lead in the development and implementation of CCUS on a global scale. The combination of geological, industrial, and infrastructural strengths, along with robust government support and a strong research base, makes Canada a prime candidate for successful CCUS deployment. This strategic advantage will not only help Canada meet its net-zero emissions targets but also sets a precedent for other countries looking to adopt similar technologies.

Pathways Alliance Progresses with CCS Initiatives

A prime example of Canada's carbon capture potential is the Pathways Alliance, a collaboration among Canada's largest oil sands companies, including Canadian Natural Resources, Cenovus Energy, ConocoPhillips Canada, Imperial, MEG Energy, and Suncor Energy.[7] Their goal is to achieve net-zero emissions from oil sands operations. The first phase of their plan focuses on creating a CCS network that would transport and store captured CO_2 from more than 20 oil sands facilities from the Fort McMurray and Cold Lake regions of Alberta, and the Christina Lake area of British Columbia, delivering it to a carbon storage hub near Cold Lake, Alberta.

On March 22, 2024, the Pathways Alliance announced the submission of regulatory applications for its proposed $16.5-billion carbon capture transportation network and storage hub project.[8] This project aims to reduce emissions from oil sands operations by 10-12 million tonnes annually, contributing to the Pathways Alliance's goal of achieving net-zero emissions by 2050. The project includes a 400+ kilometre CO_2 transportation pipeline that will capture CO_2 from industrial facilities, liquefy it, and store it over one kilometre

underground. The construction phase is projected to significantly boost Alberta's GDP by $13.3 billion, generate $10.3 billion in labor income, and create over 100,000 full-time jobs, translating to 15,000 to 35,000 jobs annually during construction.

Enormous Interest and Industry Commitment

There is significant interest in developing CCUS on a world-scale basis in Canada. If successful, Canada could serve as a model for other countries looking to implement similar technologies. It has been reported that there are 81 proposed carbon capture projects in Canada, with 61 of these in Alberta alone, highlighting the province's pivotal role in the national CCUS landscape.[9]

Challenges and Economic Viability

Both the federal and provincial governments in Canada have set ambitious net-zero targets, yet economic viability remains a significant challenge. Recent withdrawals from key CCS projects underscore these challenges.[10] Despite potential federal support through carbon contracts for difference and tax credits covering up to half of the capital costs for CCS equipment, some projects are still deemed uneconomic. This highlights the need for continued government support and investment to make CCUS projects feasible.

While the U.S. *Inflation Reduction Act* (the "*IRA*"), initially provided substantial financial incentives, putting real money on the table for CCUS projects and making the U.S. an attractive destination for such investments, Canada has been gradually responding with its own incentives. The overall stack of incentives for carbon capture projects in Canada is beginning to match or even surpass those in the U.S., but significant uncertainty in Canadian policies still poses a substantial barrier to attracting investments. The evolving dynamic highlights the need for Canada to streamline its regulatory permitting processes and provide more stable and predictable incentives to capitalize on its natural advantages and compete more effectively in the global CCUS market.

CCUS is indispensable for Canada to achieve its net-zero goals and maintain its leadership in sustainable energy production. With its unique geographical advantages and strong industrial base, Canada is well-positioned to advance CCUS technologies. However, overcoming economic challenges and ensuring viable storage solutions are critical for the success of CCUS initiatives. The interest and commitment from the industry, as evidenced by numerous proposed projects, indicate a strong potential for CCUS to play a transformative role in Canada's energy future.

Industry Perspectives on Challenges to Implementing Carbon Capture

Competitive Disadvantages in Canada?

Some industry players have emphasized the competitive challenges Canada faces in attracting carbon capture

investments compared to the United States, often citing the more favorable incentives available south of the border. While the U.S. has indeed put substantial financial support on the table through the *IRA*, it is important to note that Canada has been gradually responding with its own incentives. However, as is discussed further below, the lack of clear and consistent policy frameworks at both the federal and provincial levels continues to be a challenge in Canada.

The perception of a competitive disadvantage due to the net present value of tax benefits in the U.S. is countered by the unique geological and logistical advantages Canada possesses, with storage sites located closer to production facilities. These advantages can significantly reduce transportation and storage costs, making Canada an attractive location for CCUS projects, provided that its incentive programs, carbon pricing, and regulatory permitting processes are effectively streamlined. As described above, Canadian industry participants such as Pathways Alliance remain committed to establishing a robust carbon storage hub in Alberta and in fact Shell Canada announced on June 26, 2024, that it will proceed with two new carbon capture projects in Alberta.[11] The industry perspective underscores a cautious optimism, recognizing both the challenges posed by international competition and the potential for Canada to leverage its strengths in the CCUS landscape.

The *IRA*, which increased tax credits for carbon capture, has created a more competitive investment environment, further complicating Canada's position. Industry insights reflect the broader industry sentiment that Canada must enhance the certainty and appeal of its incentives to effectively compete with the U.S.[12]

While the overall stack of incentives for CCUS in Canada is beginning to match or even surpass those in the U.S., the significant uncertainty in Canadian policies still poses a substantial barrier to attracting investments. Canada's federal and provincial incentive programs are slowly closing the gap created by the *IRA*, but the lack of clear and consistent policy frameworks continues to be a challenge. This evolving dynamic highlights the need for Canada to streamline its regulatory permitting processes and provide more stable and predictable incentives to capitalize on its natural advantages and compete more effectively in the global CCUS market.

Industry Urges Action on Tax Credits

Industry leaders have expressed growing concerns over delays in the federal investment tax credit essential for advancing CCUS projects.[13] Urgency is needed to implement the tax credit to secure investments, including significant projects that aim to capture substantial amounts of CO_2 annually from major industrial complexes.[14]

The federal government had pledged a 50% tax credit for CO_2 capture equipment and 37.5% for transportation and storage equipment in its 2021 and 2022 budgets.[15] Although legislation was introduced in November and

is expected to pass by June, the incentives are still not in place, causing delays and uncertainty. Federal Employment Minister Randy Boissonnault highlighted the retroactive nature of the tax credit and mentioned that other major projects are proceeding in Alberta despite the delays.[16]

However, beyond the tax credit, other considerations significantly impact whether these projects proceed. Certainty in project economics, clarity on credit amounts, and streamlined processing times for regulatory permits and determinations on tax credits are crucial. The complexity and delays in the current regulatory environment create substantial barriers, emphasizing the need for a more predictable and efficient framework. Addressing these issues is critical for realizing Canada's carbon capture potential and meeting net-zero emissions targets by 2050.

Industry-Government Tensions

The rollout of CCUS technology in Canada is being hindered by disagreements between the federal government and the industry over financial risk-sharing. Currently, there is only one successful carbon offtake agreement that guarantees compensation if carbon prices fall below a set level.[17] This model is seen as crucial for widespread CCUS adoption. However, many companies have struggled to secure similar deals due to disputes over the appropriate strike price.

The federal government, through the $15-billion Canada Growth Fund,[18] is working on standardized contracts to reduce investor uncertainty and promote faster CCUS deployment. These standardized contracts aim to address the financial concerns of the industry and create a more predictable investment environment for CCUS projects.

Another area of tension which is impacting CCUS which is referenced here, but will be the subject matter of a separate McMillan Insight, is the federal, *Fall Economic Statement Implementation Act, 2023*[19] ("FESIA"), which received Royal Assent and became law on June 20, 2024 and which, among other matters, makes significant changes to the Canadian *Competition Act*.[20] The FESIA amendments include stringent provisions and significant penalties on businesses with respect to "greenwashing" practices, or more particularly statements or claims by businesses about environmental matters related to their products or practices, including their sustainability, "net-zero", carbon neutrality and eco-friendliness. FESIA had an immediate impact on the energy industry with The Pathways Alliance removing all of its content from its website[21] and the Alberta Government announcing it may take legal action to push back against the federal legislation.[22] This is the latest example of industry and government-to-government tensions which add uncertainty and risk to the industry as a whole.

Government of Alberta Advances Carbon Capture Incentives

On April 3, 2024, the Government of Alberta announced updates to the Alberta Carbon Capture Incentive Program (the "ACCIP").[23] This initiative aims to bolster the development of CCUS infrastructure through financial incentives, with expected support ranging from $3.2 to $5.3 billion from 2024 to 2035. The ACCIP will be finalized following the enactment of the federal CCUS investment tax credit (the "CCUS ITC"),[24] and it is specifically designed to complement this federal initiative, fostering enhanced intergovernmental cooperation. The program offers a 12% grant for new eligible CCUS capital costs, which will be distributed in three installments over three years, commencing after the first year of operation. Funding for this program is sourced from the Technology Innovation and Emission Reduction Fund.

Eligibility for the ACCIP includes projects that involve capturing, preparing, compressing, transporting, storing, or utilizing CO_2 within Alberta. However, projects that have already received funding from the Alberta Petrochemicals Incentive Program or Alberta's royalty regimes for the same expenses are ineligible. The program also covers costs retroactively from January 1, 2022, without requiring a minimum carbon capture rate, making it accessible to a broad range of initiatives. Eligible costs under the ACCIP include capital expenditures for modifying existing equipment, monitoring, and tracking CO_2 in facilities used for CCUS projects. Additionally, the purchase and installation of certified equipment for CCUS projects, provided the CO_2 is permanently sequestered, are covered. However, engineering studies, pilot projects, and proof of concept initiatives do not qualify for funding under this program which would appear to be a missed opportunity for developing a made-in-Canada CCUS solution.

The ACCIP is structured in three stages to ensure comprehensive support and accountability. The first stage, Pre-approval Notification, allows companies to assess potential project eligibility through a pre-approval form available on the Alberta Energy and Minerals Electronic Transfer System (the "ETS"). The second stage, Final Approval Notification, will launch by the end of 2024, requiring applicants to provide a detailed project breakdown and actual costs. The final stage, Payment and Reporting, involves the disbursement of grants in three installments over three years, with progress reports required between payments. Looking ahead, the province will refine ACCIP guidelines through a collaborative process with industry stakeholders to ensure the program's effectiveness and relevance.

This initiative can be characterized as an acknowledgment by government policymakers in Alberta that CCUS requires significant incentives to improve project economics and make CCUS a reality. The ACCIP responds to industry reactions and economic challenges in implementing CCUS by offering financial support and aligning with the federal CCUS ITC. It also reflects a response to the IRA, highlighting the competitive pressure to enhance Canada's own incentive programs.

However, there are notable shortcomings in the ACCIP. Industrial projects involving CCUS are costly and pose

significant risks to operations. Introducing new technology or processes into existing systems can lead to operational disruptions and financial losses. Proof of concept and pilot plants are essential for de-risking new technology, protecting existing systems, and ensuring operability and production outputs. The exclusion of funding for these preliminary steps under the ACCIP overlooks the high costs and economic benefits these projects provide to the industry. Recognizing and addressing this gap through other means, such as innovation and technology grants and programs, would be crucial for fostering a comprehensive CCUS ecosystem in Canada.

Conclusion

The advancement of CCUS in Canada faces significant hurdles, primarily revolving around project economics. CCUS, as it stands, is not a revenue generating stream for the industry yet. It requires enormous upfront capital outlays in the billions of dollars; for instance, Pathways says it plans to spend $16.5 billion on its foundational carbon capture project by 2030. There are also enormous potential liabilities in the event of failure of a storage facility which have not been adequately addressed and incentive programs have been slow to materialize and quantify compared to the United States and other jurisdictions. While the Government of Alberta's ACCIP program and federal initiatives like the Canada Growth Fund provide crucial support, the lack of clear, consistent policies, and the competitive tax advantages in the U.S., pose substantial challenges.

Successful carbon offtake agreements, such as those that guarantee compensation if carbon prices fall below a set level, serve as models for future projects and demonstrate the necessity of government-backed assurances for economic viability.[25] However, many major industry players have encountered difficulties in negotiating similar agreements, highlighting the need for more consistency across the industry and streamlined regulatory and tax processes.

The industry's call for prompt action on tax credits and clear policy frameworks underscores the urgency for Canada to enhance its CCUS incentives. This enhancement is vital for attracting investments, achieving net-zero targets, and maintaining a competitive edge in the global market. Collaborative efforts between federal and provincial governments, alongside industry stakeholders, are essential to overcoming these obstacles and realizing the full potential of CCUS technology in Canada.

Gearing Up for Part 2: The Price of Carbon

In the next part of our Carbon Market series, we will delve into the critical issue of carbon pricing. Carbon pricing is a fundamental component of the carbon market, setting a financial incentive for reducing greenhouse gas emissions. Effective carbon pricing mechanisms, such as carbon taxes or cap-and-trade systems, are essential for making CCUS projects economically viable in Canada. By assigning a cost to carbon emissions, these mechanisms both encourage industries to invest in carbon capture and other emission

reduction technologies while penalizing industries who fail to do so.

This next installment will explore how carbon pricing works, the various models in place around the world, and the impact of these systems on driving investments and supporting the transition to a net-zero economy. Stay tuned to learn how a robust carbon pricing strategy can be a game-changer in the fight against climate change.

Next on the Horizon: The Carbon Highway

Part 3 of our series will delve into the intricacies of carbon transportation. After capturing and compressing CO_2, transporting it safely and efficiently to storage sites is a critical step. This segment will examine:

- **Logistical Challenges:** Addressing the technical and infrastructural challenges of moving CO_2, including pipeline construction and maintenance.
- **Global Market Dynamics:** Understanding the need for a solid market price on a global scale to make carbon transportation economically feasible.
- **Case Studies:** Exploring successful carbon transportation projects, such as those in the North Sea and the US Gulf Coast, which serve as models for transporting CO_2 from areas without storage capacity to those with ample geological storage potential.
- **Regulatory and Safety Considerations:** Ensuring that transportation methods adhere to stringent safety and environmental standards to prevent leaks and other risks.

By linking carbon capture with effective transportation strategies, we can facilitate the large-scale deployment of CCUS technologies. This installment will highlight how these elements work together to form a comprehensive approach to managing carbon emissions.

Your Strategic Partner in Carbon Markets

McMillan LLP is dedicated to helping clients navigate the complexities of the evolving carbon market landscape. We provide expert legal guidance and strategic advice to ensure the successful development and implementation of CCUS projects.

Our legal teams are skilled at structuring and closing complex transactions in Canadian, US and international markets, and providing innovative transactional advice and solutions. Our understanding of business imperatives and our relationships with the regulators helps us deliver unmatched value to our clients.

Contact us to learn how we can support your CCUS initiatives and help you capitalize on opportunities within the carbon market. Together, we can contribute to achieving a net-zero economy.

[1] *Paris Agreement, being an Annex to the Report of the Conference of the parties on its twenty-first session, held in parties from 30 November to 13 December 2015--Addendum Part two: Action taken by the Conference of the parties at its twenty-first session*, 12 December 2015, UN Doc FCCC/CP/2015/10/Add.1, 55 ILM 740 [*Paris Agreement*].
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[20] *Competition Act*, RSC 1985, c C-34.
[21] Amanda Stephenson "Pathways oilsands group removes website content over anti-greenwashing rules", *The Canadian Press* (21 June 2024).
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A Cautionary Note