INTERNATIONAL CCS KNOWLEDGE CENTRE

CHANGES TO THE COMPETITION ACT IN CANADA

Public Consultation on New Greenwashing Provisions Summer 2024

Key messages relating to CCS considerations

INTRODUCTION

For companies considering emission reduction strategies, carbon capture and storage (CCS/CCUS) is one of the proven technology options available today. *Canada's Carbon Management Strategy*, developed by Natural Resources Canada, identifies carbon capture as a critical emissions reduction tool for many industrial sectors and to permanently remove emissions from the atmosphere.[i] In the strategy, carbon management technologies are described as an opportunity "to decarbonize many industrial sectors and develop new ones in support of a prosperous, net-zero economy of the future."

On June 20, 2024 new provisions were added to Canada's *Competition Act* under the passing of Bill C-59 and were considered to be "improvements to the deceptive marketing practices provisions".[ii] The amendments focusing on greenwashing claims simply stated that businesses are now required to have testing or substantiation to support certain environmental claims.

With the launch of these changes, industrial sectors have taken a cautious approach and reviewed any claims regarding environmental benefits. It is imperative that we reduce emissions, and it is also as important that all tools to reduce emissions remain on the table. One of those tools is CCS. In the pursuit to attract investors and deploy this megatonne-scale emission reduction technology, companies need confidence that they can be transparent about CCS benefits and the role they can play in helping achieve Canada's emission reduction goals.

A public consultation is now underway respecting guidance on enforcement provisions relating to environmental claims. The comment period concludes on September 27, 2024. There are specific questions that the Competition Bureau is looking to be addressed which can be found on the Government of Canada's website at https://competition-bureau.canada.ca/how-we-foster-competition/education-and-outreach/public-consultation-competition-acts-new-greenwashing-provisions. These questions are highlighted below with key messages pertaining to CCS specific considerations.

Submission of responses during the consultation period should be provided to greenwashingconsultationecoblanchiment@cb-bc.gc.ca.

Questions provided by the Competition Bureau and comments for consultation

The Bureau is seeking feedback relating to "statements, warranties or guarantees of a product or service's environmental benefits"; and "representations made about environmental benefits of businesses and business activities."[iii] The responses in this document pertain specifically to carbon capture and storage (CCS).

New Greenwashing Provisions in *The Competition Act*

74.01 (1) A person engages in reviewable conduct who, for the purpose of promoting, directly or indirectly, the supply or use of a product or for the purpose of promoting, directly or indirectly, any business interest, by any means whatever,

(b.1) makes a representation to the public in the form of a statement, warranty or guarantee of a product's benefits for protecting or restoring the environment or mitigating the environmental, social and ecological causes or effects of climate change that is not based on an adequate and proper test, the proof of which lies on the person making the representation.

(b.2) makes a representation to the public with respect to the benefits of a business or business activity for protecting or restoring the environment or mitigating the environmental and ecological causes or effects of climate change that is not based on adequate and proper substantiation in accordance with internationally recognized methodology, the proof of which lies on the person making the representation.

Questions and answers respecting both subsections (b.1) products and services and (b.2) businesses or business activities

What kinds of claims about environmental benefits are commonly made about products or services / businesses or business activities in the marketplace? Why are these claims more common than others?

CCS technology has been heralded as an important climate mitigation tool for decades with growing prevalence as urgency for emission reduction action increases. Examples of reputable international bodies as well as the Canadian government are highlighted on page 3.

General statements about the technology's benefits are common. However, it is important to note that there are various stages and types of CCS, as well as other carbon management technologies. Some are at different levels of innovation along the technology readiness levels scale. This is further explained on page 7.

Are there certain types of claims about environmental benefits of products or services / businesses or business activities that are less likely to be based on adequate and proper testing? Is there something about those types of claims that makes them harder to test?

The section of this document on "legacy" technology vendors (page 6) explains how adequate and proper testing has been used for longstanding technology providers. It also explains how the reliance on proven technologies is favoured in the near term, and testing support may be required for emerging technology.

It is important to note however, developing a "standard" for capturing emissions off a facility is not as straightforward as the technology's testing itself given that the capture process is unique to each facility. There is, however, an ISO process and methodology for CCS on a power plant which could be considered.

What challenges may businesses and advertisers face when complying with this provision?

Respecting CCS, the Bureau should be aware environmental benefits are demonstrated by emissions reduced from a facility utilizing a technology, often a chemical, purchased from a vendor. This means that the environmental benefit claims stem from reliance on a procured third-party solution.

This nuance is particularly important for the companies looking to reduce their emissions with CCS because they will be the ones claiming the benefit. However, they are not the parties that have pursued extensive testing and are reliant on the vendors to disclose the test parameters and results, and to provide adequate and proper support of the capture technology.

What other information should the Bureau be aware of when thinking about how and when to enforce this provision?

We hope this key messaging document acts to help begin a conversation respecting this question, especially as it pertains to risks to investment, transparency and public understanding.

Please keep in mind that CCS is not standard. Even power plant capture efficiency ISO standards which have been developed are not necessarily in use at proven sites because they are based on ideal lab-oriented scenarios, not deployed projects. They were also designed for one type of capture process.

Finally, projects have significant hurdles to cross as they advance. The Bureau must ensure this new provision does not hinder progress. It is important for anyone designing guidance to know that every project developer will try and capture as much CO_2 as efficiently as possible. Companies will also seek to continuously optimize operations, due to the high investment dollars and shareholder accountabilities linked to the desire to ensure it works.

Questions relating to adequate and proper testing and internationally recognized methodologies

What should the Bureau consider when it evaluates whether testing to support claims about the environmental benefits of products or services is "adequate and proper"?

Are there certain types of claims about the environmental benefits of businesses or business activities that are less likely to be based on "adequate and proper substantiation in accordance with internationally recognized methodology"? Is there something about those types of claims that makes them harder to substantiate?

What internationally recognized methodologies should the Bureau consider when evaluating whether claims about the environmental benefits of the business or business activities have been "adequately and properly substantiated"? Are there limitations to these methodologies that the Bureau should be aware of?

What other factors should the Bureau take into consideration when it evaluates whether claims about the environmental benefits of businesses or business activities are based on "adequate and proper substantiation in accordance with internationally recognized methodology"?

Given the degrees of complexity, and various stages and parties involved in ensuring CCS technology is tested, substantiated and validated, it is recommended that the Bureau rely on reputable neutral third-party organizations to support claims relating to carbon management validation as being "adequate and proper." In-depth analysis, testing and transparency all play a role in ensuring that the representations of environmental benefits derived from the application of CCS are anything but "deceptive" marketing practices.

When it comes to substantiation in accordance with internationally recognized methodologies, as mentioned in the engineering and design section of this report (page 8), substantiation comes as a necessary step of any CCS project. It is in fact a detailed and unique application which requires engineering and design support that should be relied on case-by-case and not for a broad methodology. Standard front-end engineering design, and feasibility studies can show in much greater detail substantiated results through their examination of the potential or sustained capacity for emission reductions using CCS technology vendors. A standard methodology and formula for reporting on capture efficiency and total volumes captured once operational could be beneficial for public transparency.

These studies help make internal business decisions. And while some aspects can be public facing (especially if public dollars are attached to them), there are various aspects that may not be made publicly available. Not providing the details of the studies should not mean that the claim is not substantiated.

Due to the lack of a prescribed international methodology the below section on validation further explores how there can be disparate interpretations on what the definition of a data point is, and various types of data may not always align across reporting requirements or internal reporting systems. A common language in Canada to better align the understanding of the environmental benefits of CCS, pertaining to how much CO_2 is avoided, captured and/or sequestered would be beneficial.

Environmental Benefits of CCS:

What is CCS and how do we know that it works?

CCS can be many technologies that encompass the processes by which CO_2 is separated from emissions sources, transported, and injected to be stored permanently deep underground. CCS technology has been in use for more than 50 years, and around 300 million tonnes (Mt) of CO_2 have already been successfully captured and stored.[iv]

The drive to develop large-scale carbon capture and storage projects to reduce CO_2 emissions from industrial activities is increasing. Globally, there are more than 45 operating CCUS projects reducing CO_2 emissions by 50 Mt, and more than 500 projects are at varying stages of development.[v]

Credible backing of CCS technology

International climate organizations including the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA) state carbon management technologies play a considerable role in efforts to limit global temperature increases and meet countries' respective NDCs. For example, by 2030, the IEA's Net Zero Emissions Scenario has CCUS facilities globally capturing and storing approximately 1,000 Mt of CO_2 annually, a 20-fold increase in current facility capacities.[vi]

Claims about CCS and Risks in Not Stating Benefits

Applying a typical approach for competition amongst products is not necessarily applicable to carbon capture technologies or their application. CCS is not something that you can buy off a shelf, nor is the proven technology of amine-based chemical solvent, for instance, widely available. Therefore, we believe that it proves difficult to apply the same straightforward approach in place for common products and services – the benefits of CCS and rigour behind its design deserves consideration.

Canada includes CCS in its climate commitments

Canada has two climate targets, each focusing on different time scales. The first is a commitment under the Paris Agreement to reduce national greenhouse gas emissions by 40% to 45% relative to 2005 levels by 2030. The second is a legislated commitment to achieve net-zero greenhouse gas emissions by 2050. To this support this, Canada has included CCS in its Nationally Determined Contribution under the Paris Agreement as a measure to reduce emissions to reach its climate goals.[vii] The federal government has developed the 2030 Emissions Reduction Plan and forwarded a suite of regulations, tax incentives, programs, and strategies to deliver GHG emission reductions.[viii]

The 2030 Emissions Reduction Plan includes Canada's *Carbon Management Strategy* - a strategy that identifies carbon capture as a critical emissions reduction tool for many industrial sectors and to permanently remove emissions from the atmosphere.[i] In the strategy, carbon management technologies are described as an opportunity "to decarbonize many industrial sectors and develop new ones in support of a prosperous, net-zero economy of the future."

The Canada Energy Regulator (CER), in its Canada's Energy Futures 2023 report, highlights the key role that carbon management will play in domestic emissions reductions.[ix] In the CER's Global Net-Zero Scenario, in which Canada and the rest of the world achieve net-zero emissions by 2050, 60 Mt of GHG emissions are sequestered via CCUS annually. In the Canada Net-Zero Scenario, in which Canada reaches net-zero emissions by 2050 but the rest of the world moves more slowly, the CER estimates that CCUS will be needed to sequester as much as 80 Mt annually due to the greater global demand for fossil fuels.

The Carbon Management Challenge is an international effort and call-to-action to accelerate the deployment of carbon management technologies to keep a global temperature rise of 1.5°C within reach. The challenge's 20 participant countries (including Canada) and the European Commission call for a 20-fold increase in current capture and storage capacity to reach a gigatonne scale by 2030 and up to 200 times to reach net-zero emissions globally by 2050.[x] Countries committed to the challenge represent a growing momentum to increase resources and policies to enable CCS.

In the aforementioned reports and forecasts, CCS represents the bulk of the emissions reduced using carbon management solutions in the near term, with novel utilizations beyond enhanced oil recovery (EOR) and CDR technologies still developing.

Risks to being unable to state the environmental benefits of CCS

It is imperative to reduce emissions at a global scale and take action now. The nature of the large investment in CCS projects to reduce emissions, while ensuring continued operations as we transition into a cleaner economy, is part of its increasing value with emission reduction timelines compressing.

The new legal provisions have created concern from companies that they cannot state a reliance on CCS as part of their net zero goals. The Knowledge Centre believes any detriment to CCS investment during a hospitable incentive climate is contrary to emission reduction opportunities and intent.

There are three main risks of not sharing CCS's environmental benefits:

1. Investment

The maximum benefit for CCS in Canada issued under the federal government's Investment Tax Credit (ITC) halves after 2030.[xi] If companies are deterred from investing due to fear of promoting their project based on emission reduction potential, this would hinder the federal government's goals. In fact, the ITC requires corporations to explain how the corporation's governance, strategies, policies and practices contribute to achieving Canada's commitments under the Paris Agreement, and goal of net-zero emissions by 2050 – for the climate risk disclosure reporting requirement.[xii]

Coupled with the investment risk is competitiveness concerns. If there is a lack of investment, competition for projects may increase with the United States.

2. Transparency

One of the most important parts of government dollars supporting projects, is the public knowledge that can be attached to them. Being transparent is crucial for making good use of these funds. As CCS projects move forward, if they do not communicate about the projects due to the greenwashing provisions this transparency is lost.

3. Public understanding

The Competition Tribunal and courts have identified features of an "adequate and proper test" to include that the determination depends on the claim being made as understood by the common person.[xiii] Understanding how CCS works is complex, and as a result many analogies and comparisons are made to assure the public of its safety, and to indicate the amount of emissions it can reduce.

With respect to representations of an individual project's emission reduction potential, there is value in conveying measurable quantities by way of common commodity. A common example is how many cars are taken off a road. Natural Resources Canada provides a tool to calculate greenhouse gas equivalencies.[xiv] These reference points are valuable to show the public that large investments in these projects matter in a way that can be easily conceptualized. It is important these communication tools are not irradicated with fear of non-compliance.

A rigorous process - accepting CCS as emission reductions tool

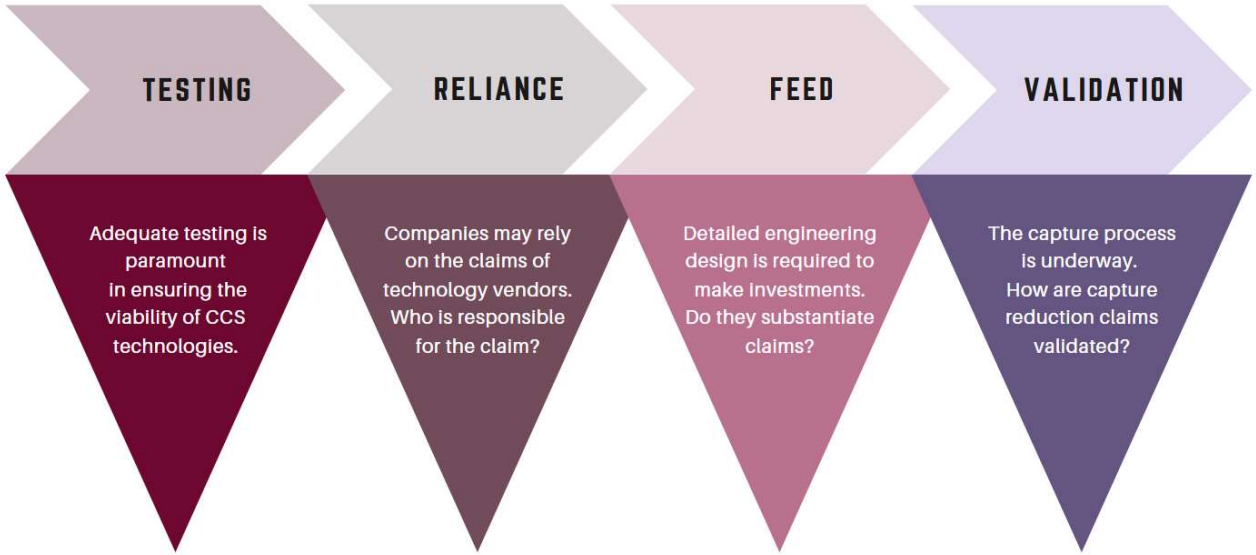
It takes time to complete a CCS project with many levels of engineering and design stage gates to make sound investment decisions. Figure 1 below demonstrates how environmental claims relating to CCS are verified. There are four elements to this that we consider: testing, reliance, other substantiation (FEED), and validation. The first three happen prior to operations and the last is during operations.

Adequate testing is paramount when ensuring the viability of CCS technologies. The next page shows how legacy vendors have delivered extensive testing prior to entering the market for large scale capture. This is key for the reliance the companies have on third party vendors. Understanding who is responsible for the environmental benefit claim is important when enforcing the new provisions. Additionally, when detailed engineering and design are factored into the development of a CCS project, there is reason to state that this is adequate substantiation of an environmental benefit claim. These three "pre-operation" steps are further articulated on the next page.

When it comes to the operational phase of capture projects, understanding how the capture reduction claims are validated is also important. The section on validation below explains these considerations.

As well, CCS projects require public engagement to receive regulatory approval. Companies need to be able to share the benefits and purpose of the projects – reducing emissions – in order to get public support.

Figure 1: Backing the Environmental Benefits of CCS



The Road to Reliable Capture Rates and the Path Taken by Legacy CCS Technology Vendors

This section explores questions related to capture rates promised by vendors such as: when a vendor makes a representation to a company that their technology has a certain environmental benefit, what process goes in to backing this claim? How has the technology been tested? What else goes in to substantiating the claim? And what are the related guarantees that get projects across the line.

How Legacy Technology Vendors Stand Behind Capture Rates

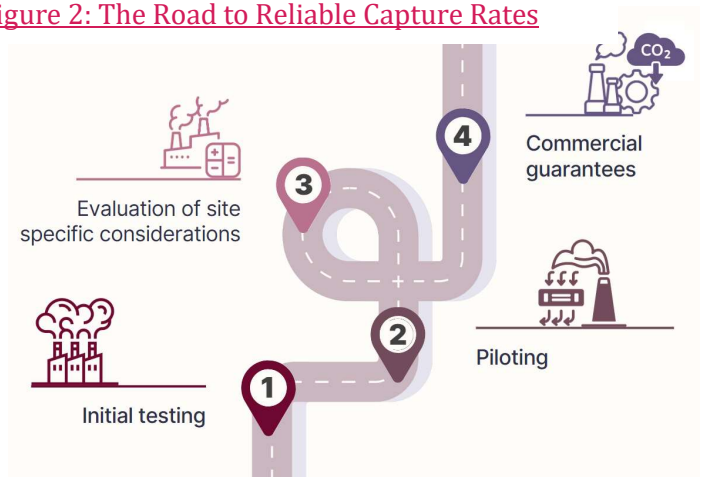
Following the Road to Reliable Capture Rates, point of interest 1 is initial testing. Testing of CCS technology is an important first step in ensuring that any claim of its emissions reduction potential can be relied upon and communicated to the public. Amine capture technologies are at a technology readiness level (TRL) of 9 based on having been deployed in commercial operations.

Beyond small scale, proof of concept, lab-based testing, legacy vendors have also demonstrated pilots and intermediate scale development of their technologies. This is point of interest 2 on the accompanying visual. These crucial stages have paved the way, often over decades, for them to develop confidence in the product they are selling.

Even though amine-based CCS technology is at a TRL-9, interactions with different emissions can play a role in its efficacy. If there is an "unusual" flue gas (for instance the burning of waste), or a low CO_2 concentration, or other project constraints then a technology may have lower capture rates. Therefore, the vendor will need to adjust their assurance on capture rates, as it isn't consistent across all emissions types. This is point of interest 3.

Finally, at point of interest 4, an internal validation process is conducted in order for the vendor to guarantee the capture rates. Backstops and protections are also often put in place in contracts to back product claims. Commercial guarantees can be structured in different ways and if the rates are not achieved then there can be financial or "make-right" provisions.

Figure 2: The Road to Reliable Capture Rates



Reliance on Vendors

Given the robust process and decades of leadership from legacy technology vendors, choosing proven solutions is a currently favoured course of action amongst developers along a 2030 timeline. Given the large financial risk and potential other operating uncertainties, minimizing technical risk is one of the common sentiments expressed by those looking for near-term final investment decisions to maximize Canada's CCUS Investment Tax Credit.

One way that companies could look to make claims relating to their own environmental action may be to openly state reliance on claims from a named vendor of choice and explain the testing background of that technology.

Considering ways new technology providers can learn from legacy vendors and the ability to deploy next-generation carbon management technologies in a faster and more streamlined process is important in a 2050 timeline. Ensuring availability of testing resources and the utilization of best practices to substantiate claims of capture rates will be important.

Testing and technology readiness levels

According to the new provisions of the Act, businesses can no longer promote benefiting the environment through activities based on claims without adequate and proper tests. The Act requires these businesses to follow, conduct and partake in testing procedures that meet internationally recognized methodologies.

Technology readiness levels

		Technology Readiness Level & Description
Demonstration	*9*	*Actual technology proven through successful deployment in an operational setting*
	8	*Actual technology completed and qualified through tests and demonstrations*
	7	*Prototype ready for demonstration in an appropriate operational environment*
Development	*6*	*System/subsystem model or prototype demonstration in a simulated environment*
	5	*Component and/or validation in a simulated environment*
	4	*Component and/or validation in a laboratory environment*
Research	*3*	*Analytical and experimental critical function and/or proof of concept*
	2	*Technology concept and/or application formulated*
	1	*Basic principles of concept are observed and reported*

CCS technologies are at different stages of development. These are the 9 TRLs, with 1 being the least ready and 9 being already used in real-life conditions. The below table is adapted from Innovation, Science and Economic Development Canada's Clean Growth Hub Technology Readiness Levels Chart.[xv]

The Global CCS Institute releases an annual Technology Compendium which aims to provide insight on various CCS technologies along the TRL scale and their application.[xvi] Proven, established technologies used for many decades in various industries are represented in the Compendium, as well as emerging technologies that will drive further improvements in performance, system costs, and energy usage. This self-declared "non-exhaustive" 2024 edition contains over 120 state-of-the-art CCS offerings at a level of TRL 5 or higher. This means there is an abundance of CCS technologies across the globe which are at the development and demonstration stage. The additional benefit of the Compendium is that it also publishes key data for each technology listing a number of metrics such as TRL, number of commercial or pilot plants, and capture rate range.

Testing in Canada

Canada has several organizations providing expertise and facilities to help advance new CCUS technologies across all technology readiness levels (TRLs). The Canadian CCUS Research and Technology Network brings together six trusted, neutral organizations with the experience to validate technologies at over 10 facilities supporting capture, utilization, transport, storage, and measurement, monitoring and verification advancements.

Metrics shared by vendors in publications, such as the Global CCS Institute Technology Compendium, must undergo adequate testing and verifications to make claims on the technology's performance. Unlike in the US where DOE oversees testing facilities, Canada benefits from third-party organizations to verify technology performance claims.
These organizations define testing conditions, parameters, and key performance indicators. As such they will be responsible for designing tests that cater to each type of technology available in the market and score these irrespective of another.

Public access to the test results and publishing reports with some analysis on a technology's performance within different industries would provide the industry with perspective and data. This system would eliminate the need for an international standard, and prioritize Canada's industrial sector and its need for true numbers from CCS technology vendors to meet emission reduction targets.

Engineering and Design - substantiating environmental benefit statements

As for any large capital investment, proceeding with a project requires smart and informed decisions. Front-end engineering and design (FEED) studies are an essential step in providing certainty, minimizing risk, and enabling decision makers to feel confident in final investment decisions (FID). With them comes many learnings about the specific project, which, we argue, should be a valid form of substantiation for any claim of environmental benefit of a specific CCS project.

What is a FEED study?

As highlighted in our *The Need for FEED* document, major capital projects, such as those required to construct large-scale CCS facilities, require several stages of approval by the owner/decision maker to proceed to an FID.[xvii] Each of these steps require additional investment and result in reducing the uncertainty regarding project risk, cost, scope, and schedule. A FEED study is the important final stage gate that leads to the FID by the owner/decision maker. FEED studies are not research or conceptual studies. They are a necessary part of the pathway to deploy a capital project which provides certainty for larger investment. It encompasses much of the actual engineering and design work that can be the basis of the CCS project.

FEED studies for major projects require significant engineering effort and often include analysis to support the probability associated with the cost model for decision makers. In some cases, the FEED study will take the project development far enough that major contracts are ready to be awarded at the time of the FID. As a FEED study is comprehensive, its substantiveness takes time and significant cost – up to 5% of the project value (which includes 50% of the engineering costs and are typically 10% of the total project).

How do FEED studies assess emission reductions for a project

Given the fact that a FEED study encompasses thorough engineering assessments, evaluations, modelling, and analysis it is a reliable method to substantiate emission reductions that can come from a CCS facility. In the funding application process for FEED studies, government programs require an estimate of the potential emission reductions that will come from the project. This means that businesses will already have calculated estimates of emission reductions to provide in their application.

This environmental benefit analysis then becomes much deeper during the FEED process. The study begins with a baseline emissions assessment of the facility, collecting data and establishing the current emissions scenario.

Multiple carbon capture technologies may be selected for a FEED study, as it allows for better comparison of capture efficiency, energy consumption, and other feedstock requirements of the technologies. Optimization assessments are also conducted on selected technologies to create an efficient process with the most net-positive environmental impact.

Advanced software tools are used to simulate the project's operations and estimate the resulting emissions. These tools model various scenarios to assess the technology's operability under different conditions. Emission factors – emissions generated per unit of activity coefficients – are applied to the model to estimate the total emissions for different operating conditions.

Regulatory requirements are considered to ensure the CCS project complies with provincial and federal emission reduction obligations. A thorough risk assessment is also conducted to evaluate risks associated with implementing the emission reduction technology on the existing project operation and the surrounding environment.

Validation

When concerns are raised about the true environmental benefits of CCS, they often link to statements regarding operating projects and their emission reductions to date compared to their intended capture rates. It is important to differentiate a project's design capacity versus what is being achieved in order to explain why this matters for representations linked to potential greenwashing claims.

The difference between "capture rate" and "capture efficiency"

Streamlining definitions and how data is collected and presented is a potential option for ensuring consistency of reporting for projects moving forward. Projects are often discussed in terms of the 'capture rate' they achieve, which generally refers to the amount of CO_2 they capture as a percentage of what they were intended to capture. The Clean Air Task Force in their recent report *Carbon Capture and Storage: What we can learn for the project track record*, has compiled a table showing the various ways in which capture rate is used and how useful they are in assessing project performance:[xviii]

The different ways in which the term 'capture rate' is used *(directly sourced from Clean Air Task Force)*

Definition	*Comments*	*Example*
The percentage of CO_2 the capture equipment separates from the exhaust gas it receives.	This measures how well the capture equipment works when it's operating, but doesn't account for periods when the equipment is offline. CCS projects often report a target for this value, which is typically 80-95%.	*The Boundary Dam CCS project separates on average around 90% of the CO_2 from the gas it treats.*
The percentage of CO_2 the capture equipment separates as a proportion of all CO_2 produced by the targeted exhaust stream.	This accounts for any periods when CO_2 is emitted due to capture equipment being offline. It is the best way to assess the performance of the capture project.	*The Boundary Dam CCS project is often not able to process all the exhaust gas it was designed for, and has also been offline more than expected for maintenance and upgrades.*
The percentage of CO_2 the capture equipment separates as a proportion of all CO_2 produced by the target source.	This penalizes capture projects that were not designed to deal with all the gases produced by a single polluting source. This can be due to diverse factors including available funding or technical challenges. It should not be used to assess project performance, but may provide important context for how easily a given application of CCS could be used to approach zero emissions.	*The Brevik CCS project in Norway is designed to process 50% of the exhaust gases from a cement kiln. This is determined by the waste heat energy available from the cement plant. Treating all the gas is technically possible, but would require additional energy costs.*
The percentage of CO_2 the facility captures as a proportion of all CO_2 produced by the industrial site.	This penalizes capture projects located in larger industrial sites with several sources of emissions. This is not usually informative, as the other sources would typically require separate capture equipment.	*The Illinois Industrial CCS project is designed to take all the CO_2 from the fermentation of corn sugars to ethanol at ADM's Decatur plant. However, the whole industrial site produces several million tonnes of other CO_2 emissions, largely associated with fossil fuel combustion for heat and power.*

As evidenced in the table, there can be disparate interpretations on what the definition of a data point is, and various types of data may not always align across reporting requirements or internal reporting systems. Methods for reporting information and data, and the reliance on data, are important factors to consider and having a common language would be beneficial. At the very least, to better align understanding of the environmental benefits of CCS, companies should explain what goes into their definitions of how much CO_2 is avoided, captured and/or sequestered.

In Canada, both the Quest and Boundary Dam CCS facilities have been operating for almost a decade. They have proven that CCS projects are able to be scaled up and have increased the understanding of the technology's application, development and operations. With the knowledge shared from these projects and their transparent reporting processes, future projects have been able to be informed about potential hurdles as the technology scales up. The Quest project falls under the Alberta government's annual knowledge sharing reporting structure and has released detailed information online about its operations. And SaskPower releases regular updates online about the performance of its CCS facility. One criticism the Quest project sometimes faces in the public is that it does not capture all of the emissions at the Scotford refinery. However, the pilot project captures at the rate at which it was designed – it was never designed to capture all of the emissions. This is similar to the Boundary Dam CCS facility where, in its last available update report, it notes the facility has just completed its strongest 12-month period to date where it was available 88.7% of the time, exceeding SaskPower's target of 75%. [xix]

The ISO standard for capture efficiency of a power plant

The International Standards Organization (ISO) is an independent, non-governmental, international standards development organization composed of representatives from member countries. The ISO is responsible for developing standards applicable to member countries, with the Standard Council of Canada serving as Canada's member body to ISO.

ISO 27919-1:2018, titled "Part 1: Performance evaluation methods for post-combustion CO_2 capture integrated with a power plant", was published in 2018. It currently holds a status of 90.93 on the ISO stage, meaning it has been reviewed by respective bodies and is considered an international standard. This standard is also described on the ISO website as contributing to achieving climate neutrality.[xxi]

ISO 27919-1:2018 claims to provide standardized methods for measuring, evaluating, and reporting the performance of post-combustion CO_2 capture (PCC) systems integrated with thermal power plants. It specifically addresses PCC technologies using chemical absorption with reactive liquids and focuses on key performance indicators (KPIs) such as specific thermal and electrical energy consumption, reduction in CO_2 emissions, and chemical consumption. The document defines system boundaries, outlines the necessary measurements, and provides guidelines for calculating and reporting these KPIs. It includes detailed sections on system boundaries, basic plant performance, utility measurements, and performance evaluation, but does not cover benchmarking or comparison of different PCC technologies or projects. Additionally, this standard serves as a resource in the development of regulations and provides a foundation for future standards.

The document advocates for continuous testing measures at the PCC facility to ensure emission reduction targets are met. The KPIs identified by the standard include measurements of all required streams—product, feed, and utility—to assess the performance of the capture facility. This approach ensures accurate accounting of emissions throughout the facility's operational life. Even though the ISO is directly designed to address a PCC system integrated with thermal power plants, the KPIs identified could be applied across industry for various PCC technologies.

Similarly, the American Carbon Registry (ACR) analyzes emissions at the project level. ACR employs a FEED study approach, with calculations covering baseline emissions, project emissions for capture, transport, and storage, and emissions reduction predictions. Unlike ISO, ACR regulations consider additional greenhouse gases, such as methane (CH_4) and nitrous oxide (N_2O), by using their Global Warming Potential (GWP) coefficients to express these gases in CO_2 equivalence.

Both ISO and ACR methods evaluate more than just capture technology during the capture phase of a project, which includes pre-treatment, capture, compression, and associated utilities. However, the capture technology provider initially establishes the claims for capture efficiency, which are then verified by the emitting company integrating the technology into their facility. To ensure compliance with current and future anti-greenwashing requirements, a standardized testing network could be established.

MRV processes

The measurement, reporting and verification processes quantifies the amount of CO_2 captured and stored and ensures data is collected throughout the process using established methodologies. Facilities must report on their emissions and capture data to regulatory bodies, which conduct independent verification to confirm compliance and the effectiveness and permanence of CO_2 solution.

Additional resource:

The International Emissions Trading Association (IETA) has set out high-level criteria for carbon geostorage activities.[xxii] The High-Level Criteria are built upon existing methodologies for geostorage projects that have been or are being drawn up by the United Nations' Clean Development Mechanism, the Global Carbon Council and the American Carbon Registry, as well as the carbon storage protocols developed by ISO TC265. The criteria also align with the rules and methods that countries will follow in tracking their actions in pursuit of NDCs. The criteria provide recommendations for both methodological design and regulatory safeguards that can underpin safe, secure and permanent deployment of the technology.

References

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The International CCS Knowledge Centre advances large-scale carbon capture and storage (CCS) projects to support global climate goals. Leveraging expertise from the world's first integrated post-combustion CCS facility, Boundary Dam 3, we provide advisory services to optimize project performance and promote CCS deployment worldwide.

The Knowledge Centre was founded in 2016 as a non-profit organization by BHP and SaskPower. ccsknowledge.com

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