Canadian Natural Resources Limited
Climate Change Questionnaire 2018

C0. Introduction

(C0.1) Give a general description and introduction to your organization.

Canadian Natural is one of the largest independent crude oil and natural gas producers in the world. The Company continually targets cost effective alternatives to develop our portfolio of projects and to deliver our defined growth plan, thereby creating value for shareholders.

We have an effective and efficient, diversified combination of assets in North America, the UK portion of the North Sea and Offshore Africa, which enables us to generate significant value.

Our balanced mix of natural gas, light oil, heavy oil, in situ oil sands production, oil sands mining and associated upgrading facilities, represents one of the strongest and most diverse asset portfolios of any energy producer in the world.

Our financial discipline, commitment to a strong balance sheet, and capacity to internally generate cash flows provide us the means to grow our Company in the long term.

At Canadian Natural, we are committed to conducting our business in a way that embraces the key piece of our mission statement "doing it right". Environmental protection is a fundamental value of our company and this is reflected in our approach to energy development.

Our goal is to develop resources in a sustainable and responsible way. We are committed to managing and minimizing the environmental impacts of our operations during all phases of our projects. To reach high standards of environmental performance and achieve regulatory compliance, we adhere to the principles of continuous improvement, efficient operations and technological innovation.

Our Environment team works together with management and all our operating divisions to ensure environmental stewardship is factored into our decision-making process. Through the Environmental Excellence program, we work together to proactively reduce greenhouse gas (GHG) emissions, minimize habitat disturbance and advance reclamation, protect biodiversity and wildlife, and reduce fresh water use. We foster a culture of environmental awareness where everyone has a vital role to play in identifying and mitigating environmental impacts from our operations. We reinforce environmental excellence through employee training, due diligence and communication of environmental priorities.

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years
Row 1	January 1 2017	December 31 2017	No

(C0.3) Select the countries/regions for which you will be supplying data.

Canada
Cote d'Ivoire
Gabon
United Kingdom of Great Britain and Northern Ireland

(C0.4) Select the currency used for all financial information disclosed throughout your response.

CAD

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your consolidation approach to your Scope 1 and Scope 2 greenhouse gas inventory.

Operational control

(C-OG0.7) Which part of the oil and gas value chain and other areas does your organization operate in?

Oil and gas value chain
Upstream
Other divisions
Carbon capture and storage/utilization

C1. Governance

(C1.1) Is there board-level oversight of climate-related issues within your organization?
Yes

(C1.1a) Identify the position(s) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Other, please specify (Corporate	Our Corporate Management Committee (MC), a group comprised of Canadian Natural's senior executives who share the responsibilities normally associated with a Chief Executive Officer position, has the overall responsibility for climate-related issues. Three members of the MC are also directors of the Company — the Executive Chair, Executive Vice-Chair and the President.

Position of individual(s)	Please explain
Management Committee)	• Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions. • Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems. • Board of Directors is responsible for overseeing and ensuring that the MC has appropriate and effective measures in place to manage climate-related risk.

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	• Reviewing and guiding strategy • Reviewing and guiding major plans of action • Reviewing and guiding risk management policies • Reviewing and guiding annual budgets • Reviewing and guiding business plans • Setting performance objectives • Monitoring implementation and performance of objectives • Monitoring and overseeing progress against goals and targets for addressing climate-related issues	Our governance structure, including our Board, Management Committee and Operations Committees, is supported by policies and controls (including performance standards) that influence our decisions at every level of the Company. Canadian Natural's Health, Safety, Asset Integrity and Environmental Committee of the Board of Directors meet every quarter to discuss stewardship matters. The directors in the Committee oversee and monitor the company-wide efforts to support, manage and improve our performance, and ensure the effectiveness of health, safety, asset integrity, environmental risk and social programs. The Health, Safety, Asset Integrity and Environmental Committee reviews quarterly the key performance indicators for health and safety, asset integrity and environmental performance against goals, objectives and targets in those areas and on a periodic basis, actions and initiatives undertaken to mitigate related risk. The health and safety, asset integrity, environment, stakeholder relations and community investment groups report on a regular basis to Senior Management, who in turn provides updates to the Health, Safety, Asset Integrity and Environmental Committee. Canadian Natural's Board of Directors brings a mix of experience, knowledge and understanding gained through senior level positions held in the public and private sectors. Our directors bring expertise from a range of sectors, such as oil and natural gas, energy storage solutions, technology, legal, finance, health, and retail, where leadership and governance over corporate social responsibility matters have been a longstanding priority. Specifically, two directors have relevant experience in the area of climate change, and eight directors have relevant experience in the areas of health, safety, asset integrity and environment.

(C1.2) Below board-level, provide the highest-level management position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Other committee, please specify (Management Committee)	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored.

Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions.

The Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems. Canadian Natural's Health, Safety, Asset Integrity and Environmental Committee of the Board of Directors meet every quarter to discuss stewardship matters. The directors in the Committee oversee and monitor the company-wide efforts to support, manage and improve our performance, and ensure the effectiveness of health, safety, asset integrity, environmental risk and social programs. The Health, Safety, Asset Integrity and Environmental Committee reviews quarterly the key performance indicators for health and safety, asset integrity and environmental performance against goals, objectives and targets in those areas and on a periodic basis, actions and initiatives undertaken to mitigate related risk. The health and safety, asset integrity, environment, stakeholder relations and community investment groups report on a regular basis to Senior Management, who in turn provides updates to the Health, Safety, Asset Integrity and Environmental Committee. The health and safety, asset integrity, environment, stakeholder relations and community investment groups report on a regular basis to Senior Management, who in turn provides updates to the Health, Safety, Asset Integrity and Environmental Committee.

Our Corporate Management Committee, a group comprised of Canadian Natural’s senior executives who share the responsibilities normally associated with a Chief Executive Officer position, is responsible for the identification, assessment and management of climate change risks. The Board of Directors is responsible for overseeing and ensuring that the Management Committee has appropriate and effective measures in place to manage climate-related risk.

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

Yes

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues.

Who is entitled to benefit from these incentives?

All employees
Types of incentives
Monetary reward
Activity incentivized

Other, please specify (GHG emissions intensity) – Greenhouse gas emissions intensity (tonnes/boe) is one measure in the corporate performance scorecard on which performance bonuses are based.

C2. Risks and opportunities

(C2.1) Describe what your organization considers to be short-, medium- and long-term horizons.

	From (years)	To (years)
Short-term	0	1
Medium-term	1	3
Long-term	3	100

(C2.2) Select the option that best describes how your organization's processes for identifying, assessing, and managing climate-related issues are integrated into your overall risk management.

Integrated into multi-disciplinary company-wide risk identification, assessment, and management processes

(C2.2a) Select the options that best describe your organization's frequency and time horizon for identifying and assessing climate-related risks.

	Frequency of monitoring	How far into the future are risks considered?	Comment
Row 1	Six-monthly or more frequently	>6 years	Risk management with regards to climate change risks and opportunities is monitored quarterly.

(C2.2b) Provide further details on your organization's process(es) for identifying and assessing climate-related risks.

Canadian Natural's business strategy is influenced by incorporating knowledge of climate change risks into decisions made by the Company's Management Committee and Board of Directors. Canadian Natural reviews external scenario analyses of climate change from energy firms/agencies and on that basis developed two internal scenarios in order to assess business risk. Across the range of ambitious climate change scenarios, the expectation is that there will be a continued need for global production and consumption of crude oil and natural gas for decades to come. Even under more ambitious climate change scenarios, Canadian Natural's GHG management strategy mitigates a substantial amount of risk to our reserves.

Aspects of climate change risk that most influence the Company's business strategy are: future compliance costs/regulatory changes, access to markets, and reputational risk. Canadian Natural provides ongoing reporting on how we are addressing climate and other environmental related financial risks. Performance results are reported internally through a management review process and externally through the annual sustainability report. Annual performance objectives and targets are tracked and corporate status reports are presented quarterly to senior management and Board of Directors.

Canadian Natural uses a multi-disciplinary risk management process which considers climate change risks and opportunities as part of our business evaluation. Our governance approach includes:

- Management Committee is responsible for the identification, assessment and management of climate change risks.
- Management Committee and the GHG Operations Strategy Committee provide direction and guidance to business units on climate-related risk assessment and project implementation.
- GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation.
- Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions.
- Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems.
- Board of Directors is responsible for overseeing and ensuring that the Management Committee has appropriate and effective measures in place to manage climate-related risk.

Climate risk management also occurs at the asset level through recurring project reviews, technology reviews, and economic evaluations including forecasting GHG intensity and compliance costs, and reviewing abatement projects.

The costs of complying with environmental legislation in the future may have a material adverse effect on the Company's financial condition. Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. The Company is tracking the development of policies and regulations at the international level, and at the national and provincial level in Canada.

The Company's associated environmental risk management strategies focus on working with legislators and regulators to ensure that any new or revised policies, legislation or regulations properly reflect a balanced approach to sustainable development. Specific measures in response to existing or new legislation include a focus on the Company's energy efficiency, air emissions management, released water quality, fresh water use reduction, and the minimization of the impact on the landscape to conserve high-value biodiversity. The Company has internal procedures designed to ensure that the environmental aspects of new acquisitions and developments are taken into account prior to proceeding.

(C2.2c) Which of the following risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	**Please explain**
Current regulation	Relevant, always included	Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. As governments develop and implement new GHG emissions laws and regulations, we work to encourage technological innovation, energy efficiency, and targeted research and development while maintaining industry competitiveness.
Emerging regulation	Relevant, always included	Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. The Company tracks the development of policies and regulations at the national and provincial level. Various

	Relevance & inclusion	Please explain
		jurisdictions have enacted or are evaluating low carbon fuel standards, which may affect access to market for crude oils with higher emissions intensity. The Company's associated environmental risk management strategies focus on working with legislators and regulators to ensure that any new or revised policies, legislation or regulations properly reflect a balanced approach to sustainable development.
Technology	Relevant, sometimes included	The Company works with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness.
Legal	Relevant, always included	The Company strives to carry out its activities in compliance with applicable regional, national and international regulations and industry standards. Environmental specialists in Canada and the UK track numerous environmental performance indicators, review the operations of the Company's world-wide interests and report on a regular basis to senior management, who in turn report on environmental matters directly to the Health, Safety, Asset Integrity and Environmental Committee of the Board of Directors. The Company regularly meets with and submits to inspections by the various governments in the regions where we operate. Our associated environmental risk management strategies focus on working with legislators and regulators to ensure that any new or revised policies, legislation or regulations properly reflect a balanced approach to sustainable development.
Market	Relevant, always included	Various jurisdictions have enacted or are evaluating low carbon fuel standards, which may affect access to market for crude oils with higher emissions intensity.
Reputation	Relevant, always included	Aspects of climate change risk that most influence the Company's business strategy are: future compliance costs/regulatory changes, access to markets, and reputational risk.
Acute physical	Not evaluated	Acute physical risks are incorporated into Canadian Natural's Emergency Response Plans. Canadian Natural acknowledges that climate change issues pose potential, unpredictable risks to physical infrastructure. However, given the geographically diverse nature of our operations, Canadian Natural does not view weather related issues as having a substantive, material impact on our operations.
Chronic physical	Not evaluated	Chronic, physical risks are effectively managed through regulatory frameworks and the Company's Environmental Management System.
Upstream	Relevant, always included	Canadian Natural is the largest producer of natural gas in Canada representing 25% of our product mix. As a reliable, affordable, and lower GHG intensive energy source for power generation, natural gas delivers improved environmental performance as a clean burning hydrocarbon with less than half the carbon footprint compared to coal. Global demand for natural gas is expected to grow, continuing to be an important source of energy and a way to significantly lower global GHG emissions.

	Relevance & inclusion	Please explain
Downstream	Relevant, sometimes included	Canadian Natural is a leader in Carbon Capture and Storage (CCS) projects – including a 70% interest in the Quest CCS facilities at the Scotford Upgrader (capturing over 1 million tonnes of CO2 a year) and a 50% stake in the North West Redwater Sturgeon Refinery which, when fully online, will capture 2.7 million tonnes of CO2 per year and along with our other CO2 capture initiatives, will make Canadian Natural the third largest owner of CCS capacity in the global oil and gas sector based on data from the Global Carbon Capture and Storage Institute.

(C2.2d) Describe your process(es) for managing climate-related risks and opportunities.

Canadian Natural uses a multi-disciplinary risk management process which considers climate change risks and opportunities as part of our business evaluation. Our business strategy is influenced by incorporating knowledge of climate change risks, including current and potential policies and regulations, into decisions made by our Management Committee. Our governance approach includes:

- Management Committee is responsible for the identification, assessment and management of climate change risks;
- Management Committee and the GHG Operations Strategy Committee provide direction and guidance to business units on climate-related risk assessment and project implementation;
- GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation;
- Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions;
- Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems;
- Board of Directors is responsible for overseeing and ensuring that the Management Committee has appropriate and effective measures in place to manage climate-related risk;

Climate risk management also occurs at the asset level through recurring project reviews, technology reviews, and economic evaluations including forecasting GHG intensity and compliance costs, and reviewing abatement projects.

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Policy and legal: Increased pricing of GHG emissions

Type of financial impact driver

Policy and legal: Increased operating costs (e.g., higher compliance costs, increased insurance premiums)

Company- specific description

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology. In Canada, the federal government has ratified the Paris climate change agreement, with a commitment to reduce GHG emissions by 30% from 2005 levels by 2030. Canada has also committed to reduce methane emissions from the upstream oil and natural gas sector by 40-45% by 2025, as compared to 2012 levels. Governments of Alberta and British Columbia have announced comparable methane reduction targets. The federal government is also developing a Clean Fuel Standard with draft regulations expected to be released in 2019. In British Columbia, carbon tax is currently being assessed at $35/tonne of CO2e on fuel consumed and gas flared in the province. The BC Government will be increasing the carbon tax at a rate of $5 per tonne of CO2e annually to $50 per tonne of CO2e on April 1, 2021. The Saskatchewan Government has released a Climate Change Strategy that will regulate facilities emitting more than 25 kilotonnes of CO2e annually and will likely require two Canadian Natural heavy oil in situ facilities to meet reduction targets. The Saskatchewan strategy also includes measures that will regulate GHG emissions (including methane) at below the 25 kilotonne/years threshold. Effective January 1, 2018, the Alberta large-emitter system has changed to a system of output-based allocations (by product type), compared to the previous system of facility-specific baselines. In the UK, GHG regulations have been in effect since 2005. In Phase 3 (2013 – 2020) the Company's CO2 allocation was further reduced. The Company continues to focus on implementing reduction programs based on efficiency audits to reduce CO2 emissions at its major facilities and on trading mechanisms to ensure compliance with requirements now in effect.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

Unknown

Potential financial impact

-

Management method

The Company's GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation. Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. The Company's associated environmental risk management strategies focus on working with legislators and regulators to ensure that any new or revised policies, legislation or regulations properly reflect a balanced approach to sustainable development.. In addition, the Company is working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness.

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Technology: Costs to transition to lower emissions technology

Type of financial impact driver

Technology: Costs to adopt/deploy new practices and processes

Company- specific description

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology.

Time horizon

Unknown

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Management method

The Company's GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation. Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. The Company's associated environmental risk management strategies focus on working with legislators and regulators to ensure that any new or revised policies, legislation or regulations properly reflect a balanced approach to sustainable development. In addition, the Company is working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness.

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Market: Other

Type of financial impact driver

Market: Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatement)

Company- specific description

The crude oil and natural gas industry is experiencing incremental increases in costs related to environmental regulation, particularly in North America and the North Sea. Various jurisdictions have enacted or are evaluating low carbon fuel standards, which may affect access to market for crude oils with higher emissions intensity.

Time horizon

Unknown

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Management method

Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. The Company's GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation. The Company's associated environmental risk management strategies focus on working with legislators and regulators to ensure that any new or revised policies, legislation or regulations properly reflect a balanced approach to sustainable development. In addition, the Company is working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness.

Risk 4

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Reputation: Other

Type of financial impact driver

Reputation: Reduced revenue from decreased production capacity (e.g., delayed planning approvals, supply chain interruptions)

Company- specific description

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to

create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology. Canadian Natural has a variety of exploration, development and construction projects underway at any given time.

Time horizon

Unknown

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Management method

The Company, directly and through CAPP (Canadian Association of Petroleum Producers), works with Canadian legislators, regulators, and stakeholders to work toward effective and efficient regulatory processes.

Risk 5

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

-

Type of financial impact driver

-

Company- specific description

Canadian Natural acknowledges that climate change issues pose potential, unpredictable risks to physical infrastructure. However, given the geographically diverse nature of our operations, Canadian Natural does not view weather related issues as having a substantive, material impact on our operations.

Time horizon

Unknown

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Management method

Canadian Natural recognizes that climate change issues pose risks that are unpredictable although, due to the geographically diverse nature of our operations Canadian Natural does not see weather related issues as having a substantive impact.

Risk 6

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

-

Type of financial impact driver

-

Company- specific description

Personnel safety. Equipment issues.

Time horizon

Unknown

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Management method

The Company plans for extreme weather variations through our operations. Our climate risks are primarily concerned with policy and regulation changes, not with changes in physical climate parameters.

Risk 7

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

-

Type of financial impact driver

-

Company- specific description

Rising levels could affect onshore support facilities related to offshore exploration and production platforms.

Time horizon

Unknown

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Management method

Canadian Natural recognizes that climate change issues pose risks that are unpredictable although, due to the geographically diverse nature of our operations Canadian Natural does not see weather related issues as having a substantive impact.

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

Canadian Natural is a leader in CCS projects, with a CO2 capture capacity. Our CCS initiatives will capture 2.7 million tonnes of CO2, making Canadian Natural the third largest owner of CCS capacity in the global oil and gas sector, based on data from the Global Carbon Capture and Storage Institute. Canadian Natural's CCS projects include:

- CO2 capture from Horizon's hydrogen plant and then sequestered in tailings to enhance tailings management.

- Quest Carbon Capture and Storage (CCS) project (Quest) is part of the Athabasca Oil Sands Project (AOSP), of which, Canadian Natural has 70% ownership interest. In its first two years of operations, Quest capture technology and storage capability have exceeded its target of capturing two million tonnes of CO2.
- Enhanced Oil Recovery. At our Hays gas plant in Taber (southeast Alberta), we capture 12,200 tonnes of produced CO2 per year for use in our nearby Enchant EOR operations to increase the amount of crude oil that can be extracted from the field. We are also a 50% partner in the North West Redwater (NWR) Sturgeon Refinery. The NWR is expected to capture 1.2 million tonnes of CO2 annually when fully online in 2018, supplying its CO2 as a feedstock to an independent company specializing in EOR.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Potential financial impact

-

Explanation of financial impact

Reduction in compliance costs.

Strategy to realize opportunity

With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that involves:

- integrating emissions reduction in project planning and operations;
- leveraging technology to create value and enhance performance; -investing in research and development and supporting collaboration; -focusing on continuous improvement to drive long-term emissions reductions;
- leading in carbon capture and sequestration/storage (CCS) projects;
- engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions; and
- considering and developing new business opportunities and trends.

Comment

Investment in CO2 capture and sequestration is significant part of Canadian Natural’s Integrated GHG Management Strategy.

Opp2

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

Canadian Natural is working with the National Research Council of Canada (NRC) and Pond Technologies, a Canadian algae technology company, and St Marys Cement on an Algal Carbon Conversion Project. Testing on this technology began in 2016 at a pilot-scale biorefinery, located at St Marys Cement plant in Ontario. The pilot captures carbon dioxide from cement plant operations by placing them in large tanks with algae to promote photosynthesis with LED lights. Algae are pressed to release bio-oil for potential use in biofuels and biomaterials — and, at an oil sands operation, would be blended into heavy oil or synthetic crude oil. The leftover biomass can then be used to feed livestock and for land reclamation.

Time horizon

Long-term

Likelihood

More likely than not

Magnitude of impact

Unknown

Potential financial impact

-

Explanation of financial impact

Not yet determined.

Strategy to realize opportunity

Canadian Natural is actively evaluating and developing a wide range of unique projects with the potential to make a significant difference in emission reduction, including opportunities to take waste CO2 emissions and transform them into valuable products.

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

Canadian Natural is a founding member and active participant in Canada's Oil Sands Innovation Alliance (COSIA). Through COSIA, Canadian Natural, along with 10 other oil sands operators, is sharing valuable research and development information and technologies. This is an unparalleled collaboration effort to improve industry's environmental performance in the course of our operations. COSIA's aspiration is to produce crude oil with lower greenhouse gas emissions than global sources of crude oil. The vision is to enable responsible and sustainable growth of Canada's oil sands while delivering accelerated improvement in environmental performance through collaborative action and innovation. COSIA's Greenhouse Gas Environmental Priority Area (EPA) is investigating ways to reduce energy use and associated GHG emissions through the development of innovative technologies for oil sands in situ and mining operations. As one of the largest COSIA contributors, Canadian Natural has an important role in helping to meet the industry's goal. We know that the investments we are making now to lower our GHG emissions will create long-term value for generations to come, all while delivering the safe, secure, reliable and environmentally responsible energy the world needs.

Time horizon

Current

Likelihood

More likely than not

Magnitude of impact

Unknown

Potential financial impact

-

Explanation of financial impact

Reduction in compliance costs

Strategy to realize opportunity

With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that involves: -integrating emissions reduction in project planning and operations; -leveraging technology to create value and enhance performance; -investing in research and development and supporting collaboration; -focusing on continuous improvement to drive long-term emissions reductions; -leading in carbon capture and sequestration/storage (CCS) projects; -engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions; and -considering and developing new business opportunities and trends.

Comment

COSIA's members share technologies, research and innovation. To date, companies have contributed 981 technologies at a development cost of $1.4 billion to improve environmental performance through COSIA. 163 of these technologies have been shared in the GHG Environmental Performance Area portfolio alone.

Opp4

Where in the value chain does the opportunity occur?

Supply Chain

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

The Company has a 50% interest in the NorthWest Redwater Partnership ("Redwater Partnership"). Redwater Partnership has entered into agreements to construct and operate a 50,000 barrel per day bitumen upgrader and refinery (the "Project"). Phase 1 will process 50,000 bbl/d of bitumen to finished products and will incorporate an integrated CO2 management solution.

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

Medium-high

Potential financial impact

-

Explanation of financial impact

Canadian Natural believes it is important to ensure conversion capacity is available in the mid and long term to support heavy oil demand and facilitate unlocking the value of the Company's vast heavy oil assets in Alberta.

Strategy to realize opportunity

With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that involves: -integrating emissions reduction in project planning and operations; -leveraging technology to create value and enhance performance; -investing in research and development and supporting collaboration; -focusing on continuous improvement to drive long-term emissions reductions; -leading in carbon capture and sequestration/storage (CCS) projects; -engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions; and -considering and developing new business opportunities and trends.

Comment

Canadian Natural is a 50% partner in North West Redwater.

Opp5

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

Canadian Natural has achieved a 71% reduction in venting at our Alberta heavy oil operations from 2013 – 2017, and a 9% reduction from 2016 – 2017 levels. This represents a significant voluntary reduction in methane emissions.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

Unknown

Potential financial impact

-

Explanation of financial impact

Reduction in compliance costs.

Strategy to realize opportunity

Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation projects are a significant focus in our heavy oil operations. Pneumatic controller retrofit projects are underway across our operations to further reduce emissions. The company's GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation.

Comment

Capital expenditure will be required to retrofit equipment and to tie in wells and deploy new technology (e.g. combustion) as appropriate.

Opp6

Where in the value chain does the opportunity occur?

Supply Chain

Opportunity type

Products and services

Primary climate-related opportunity driver

-

Type of financial impact driver

Other, please specify (carbon conversion technology support)

Company- specific description

In addition to current projects and innovative operating practices, we support the US$20 million NRG COSIA Carbon XPRIZE. This global competition is intended to identify new technologies that will transform CO2 emissions from industrial facilities into valuable and usable products. The governments of Canada and Alberta, together with industry partners and the Shepard Energy Centre (a joint venture of ENMAX and Capital Power); have invested in the development of a $20 million Alberta Carbon Conversion Technology Centre (ACCTC). The ACCTC is a facility where NRG COSIA Carbon XPRIZE finalists will test their technologies and one of the few places in the world where carbon conversion technologies can be tested on a large, commercial scale.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

Unknown

Potential financial impact

-

Explanation of financial impact

-

Strategy to realize opportunity

With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that involves: -integrating emissions reduction in project planning and operations; -leveraging technology to create value and enhance performance; -investing in research and development and supporting collaboration; -focusing on continuous improvement to drive long-term emissions reductions; -leading in carbon capture and sequestration/storage (CCS) projects; -

engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions; and -considering and developing new business opportunities and trends.

Opp7

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

Enhanced steam quality measurement and control to improve steam efficiencies at Primrose and Wolf Lake thermal operations.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

Medium

Potential financial impact

-

Explanation of financial impact

At Primrose this technology implemented is expected to boost efficiencies and increase oil production by 2%. The technology is cost effective and quickly implemented. Production and efficiency improvements payout within a couple of months.

Strategy to realize opportunity

As part of our integrated GHG management strategy we integrate emissions reduction in project planning and operations; leverage technology to create value and enhance performance; and focus on continuous improvement to drive long-term emissions reductions.

Opp8

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

Carbon Conversion – recovering hydrocarbons and reducing emissions with new technology. Canadian Natural and Titanium Corporation are working together to develop the first commercial scale prototype for Titanium's patented CVWTM (Creating Value from Waste) technology. CVWTM is a suite of froth treatment tailings remediation technologies designed to reduce the environmental footprint of tailings and ponds by recovering valuable bitumen, solvents and minerals from tailings streams. Titanium Corporation developed this technology with the support of major oil sands companies and the Governments of Canada and Alberta. CVWTM has been proven at a demonstration plant and Titanium is now working with Canadian Natural on the deployment of a first commercial scale prototype.

Time horizon

Medium-term

Likelihood

Unknown

Magnitude of impact

High

Potential financial impact

-

Explanation of financial impact

Reducing and avoiding emissions from ponds and tailings and accelerate tailings remediation. Recovering valuable commodities from froth treatment tailings (bitumen, solvent, zircon, titanium and rare earths). Technology could potentially create a new minerals industry for Alberta and Canada that will translate into economic growth, jobs, diversification and potential exports. Additional potential economic value by increasing bitumen recovery, and revenues through sales of minerals.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Comment

Other partners involved include: Canada's Oil Sands Innovation Alliance (COSIA) members, Emissions Reduction Alberta, Alberta Energy, Sustainable Development Technology Canada, National Research Council (NRC)/Industrial Research Assistance Program (IRAP) and Canadian investors.

Opp9

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Other

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

Using rifle tubing technology to increase water efficiencies at in situ oil sands operations. Industry is exploring boiler designs that could convert more water into steam while also reducing greenhouse gas (GHG) emissions intensity. Pilot tests of boilers retrofitted with rifle tubes, have shown that this technology has the potential to enable OTSGs to transform up to 90 per cent of water into steam using less water. The technology is now considered to be commercial.

Time horizon

Current

Likelihood

Very likely

Magnitude of impact

Medium

Potential financial impact

-

Explanation of financial impact

Reduced GHG emissions between one and six per cent, since less water is required for steam generation. Increased energy efficiency and reduced frequency of boilers needing to be taken off-line and cleaned, which impacts costs and production.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Comment

Improving the efficiency of steam generation in in situ operations is one of COSIA's key areas of focus. This is another great example of COSIA contributed technology.

Opp10

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

Canadian Natural is working on a project to enhance the accuracy of greenhouse gas (GHG) emissions measurements from large industrial area sources, typical of the oil sands region of Alberta. This research will help address some challenges faced by industry in quantifying the rates of methane and carbon dioxide (CO2) emissions, and allow the implementation of more effective strategies to reduce GHG emissions. This project is deploying different working groups and approaches for measuring emissions. The objective is to develop a holistic system of advanced sensors, laser and fiber optic technology, as well as computer models and meteorological data. The groups will deliver commercially proven technologies, guidelines for measurement and more accurate emissions profiles.

Time horizon

Medium-term

Likelihood

Unknown

Magnitude of impact

High

Potential financial impact

-

Explanation of financial impact

Improved quantification of GHG emissions will result in operational efficiencies and the deployment of cost-effective solutions. Accurate quantification of methane and CO2 emissions through all seasons will allow for quicker identification and implementation of mitigation strategies. In turn this will lead to development of technologies that more effectively reduce emissions from area sources.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Comment

Industry partners include innovators (vendors) and academic institutions: Petroleum Technology Alliance Canada (PTAC), Luxmux Technology Corporation, Agar Corporation, Boreal Laser, University of Guelph, University of Alberta, University of British Columbia, RWDI Air, SAIT (Southern Alberta Institute of Technology) and the NASA Jet Propulsion Laboratory (JPL). This project is also a joint industry project through Canada's Oil Sands Innovation Alliance (COSIA) with other industry partners. This project is also supported by Emissions Reduction Alberta.

Opp11

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

Carbon capture and utilization – fuel cells for carbon capture and electricity generation. This COSIA initiative involves the use of Molten Carbonate Fuel Cells (MCFCs) to capture carbon dioxide (CO2) from natural gas-fired processing units while generating electricity. Following a feasibility study and COSIA preliminary front end engineering and design, industry partners are now conducting a larger scale pre-FEED that will evaluate the preliminary cost of piloting a 1.4 megawatt power generation project, at an oil sands facility.

Time horizon

Medium-term

Likelihood

Unknown

Magnitude of impact

High

Potential financial impact

-

Explanation of financial impact

Captured CO2 can be used at EOR operations to increase resource recovery. CO2 capture may also generate carbon credits, further enhancing economic viability of this technology. Electricity for on-site use or export to the Alberta grid can provide a revenue stream to offset the costs associated with carbon capture.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Comment

This project is led by Alberta Innovates, in collaboration with members of Canada's Oil Sands Innovation Alliance's (COSIA).

Opp12

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

Carbon Capture and utilization – converting GHGs into liquid fuels. Canadian Natural is studying how CEFCO Global Clean Energy's "CEFCO Process" could be successfully applied and customized in our operations, as an additional means of reducing greenhouse gas (GHG) emissions. The CEFCO process is a patented, industrial gas scrubbing technology that combines aerodynamic physics and physical chemistry. It uses supersonic shockwaves that cause collision impact force and common chemicals to capture and convert emissions and pollutants, turning them into valuable coproducts.

Time horizon

Long-term

Likelihood

Unknown

Magnitude of impact

High

Potential financial impact

-

Explanation of financial impact

The CEFCO process is scientifically complex but it's also efficient and cost-effective. It requires only a small plant footprint, small equipment and little net energy consumption. The process can provide operations with coproducts (i.e. liquid fuels) for sale.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Opp13

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Energy source

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

Reducing GHGs from SAGD (Steam Assisted Gravity Drainage) steam boilers – scan and evaluation of natural gas decarbonization technologies. A Canadian Natural led project (Scan and Evaluation of Natural Gas Decarbonization Technologies), undertaken through the COSIA framework, is identifying chemical pathways to convert natural gas into a hydrogen rich fuel and a valuable co-product. This hydrogen rich fuel, when burned in the boiler, produces less carbon dioxide (CO2) emissions.

Time horizon

Long-term

Likelihood

Unknown

Magnitude of impact

High

Potential financial impact

-

Explanation of financial impact

New technology/methods for decarbonization of natural gas holds significant cost saving potential for oil producers, by creating valuable co-products for sale. Annual cost savings have potential to reach $900 million/year.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Comment

Research related to this project has been conducted through COSIA, in partnership with the Gas Technology Institute (GTI) and Alberta Innovates.

Opp14

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

-

Type of financial impact driver

-

Company- specific description

New product utilization – assessing the viability of non-combustion products. The main objective of this project is the identification and assessment of the techno-economic potential of Alberta oil sands constituents for producing non-combustion products i.e., products that are not fuels, such as conventional asphalts, carbon fibres or fertilizers, among many others. The aggregate of all product categories should utilize, by the year 2030, at least 500,000 barrels per day of bitumen.

Time horizon

Long-term

Likelihood

Unknown

Magnitude of impact

Unknown

Potential financial impact

-

Explanation of financial impact

Diversification in the uses of oil sands constituents, resulting in high-value products that can be made by or in partnership with Alberta's oil sands industry. Accommodating increased oil sands production in Alberta by creating new and/or expanded markets for oil sands constituents and their derived products. Potential to find new revenue

streams that can be realized based on the existing process of mining or in situ extraction of bitumen. Although this project is in very early stages, we anticipate the production of new oil sands derived products will reduce greenhouse gas emissions intensity.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Opp15

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Use of more efficient production and distribution processes

Type of financial impact driver

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company- specific description

Canadian Natural is undertaking a field pilot of its In-Pit Extraction Process (IPEP) technology, an alternative to conventional oil sands mining and ore processing. The IPEP technology involves a relocatable, modular extraction plant that can be moved as the mine face advances. Ore processing and bitumen separation occurs adjacent to mining operations, significantly reducing material transportation. In addition to reducing GHG emissions, IPEP produces stackable tailings within the mine pit, greatly reducing the volume of fluid tailings and ultimately accelerating reclamation of oil sands mines. Canadian Natural estimates that the IPEP technology could reduce GHG emissions by up to 40% in bitumen production compared to typical oil sands surface mining and extraction processes. The IPEP system would also enable expansion of mining operations without constructing new central ore processing facilities. Canadian Natural has committed to make this technology available to oil sands mining companies through COSIA for more rapid industry-wide adoption.

Time horizon

Short-term

Likelihood

Likely

Magnitude of impact

Medium-high

Potential financial impact

-

Explanation of financial impact

In addition to reducing GHG emissions and creating other environmental benefits, it is estimated that the technology will reduce production costs by roughly $2/bbl and substantially reduce long term tailings management costs and liabilities.

Strategy to realize opportunity

As part of our integrated GHG management strategy we leverage technology to create value and enhance performance; invest in research and development and support collaboration; and consider and develop new business opportunities and trends.

Comment

This project is supported by Emissions Reduction Alberta.

(C2.5) Describe where and how the identified risks and opportunities have impacted your business.

	Impact	Description
Products and services	Impacted	RISKS: Current and potential climate change policies and regulations are considered when making decisions to advance the Company's business strategy. Climate risk management occurs at the asset level through recurring project and technology reviews, as well as economic evaluations, including forecasting GHG intensity and compliance costs, and reviewing abatement projects. Canadian Natural uses an internal price of carbon to evaluate returns on future projects under different potential carbon regulations and to evaluate emission reduction projects.
Supply chain and/or value chain	We have not identified any risks or opportunities	
Adaptation and mitigation activities	We have not identified any risks or opportunities	
Investment in R&D	Impacted	RISKS: The Company is working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness. OPPORTUNITY: Canadian Natural is a founding member and active participant in Canada's Oil Sands Innovation Alliance (COSIA). Through COSIA, Canadian Natural, along with other oil sands operators, is sharing valuable research and development information and technologies. This is an

	Impact	Description
		unparalleled collaboration effort to improve industry's environmental performance in the course of our operations. As one of the largest COSIA contributors, Canadian Natural has an important role in helping to meet the industry's goal. We know that the investments we are making now to lower our GHG emissions will create long-term value for generations to come, all while delivering the safe, secure, reliable and environmentally responsible energy the world needs. To date, companies have contributed 981 technologies at a development cost of $1.4 billion to improve environmental performance through COSIA. 163 of these technologies have been shared in the GHG Environmental Performance Area portfolio alone.
Operations	Impacted	RISKS: The Company is working with relevant parties to ensure that new policies maintain industry competitiveness for emissions intensive trade exposed sectors. OPPORTUNITY: With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that involves: -integrating emissions reduction in project planning and operations; -leveraging technology to create value and enhance performance; -investing in research and development and supporting collaboration; -focusing on continuous improvement to drive long-term emissions reductions; -leading in carbon capture and sequestration/storage (CCS) projects; -engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions; and -considering and developing new business opportunities and trends.

C3. Business Strategy

(C3.1) Are climate-related issues integrated into your business strategy?

Yes

(C3.1a) Does your organization use climate-related scenario analysis to inform your business strategy?

Yes, qualitative and quantitative

(C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b) Indicate whether your organization has developed a low-carbon transition plan to support the long-term business strategy.

Yes

(C3.1c) Explain how climate-related issues are integrated into your business objectives and strategy.

Canadian Natural's business strategy is influenced by incorporating knowledge of climate change risks into decisions made by the Company's Management Committee and Board of Directors. Aspects of climate change risk that most influence the Company's business strategy are: future compliance costs/regulatory changes, access to markets, and reputational risk. Canadian Natural provides ongoing reporting on how we are addressing climate and other environmental related financial risks. Performance results are reported internally through a management review process and externally through the annual sustainability report. Annual performance objectives and targets are tracked and corporate status reports are presented quarterly to senior management and Board of Directors.

Canadian Natural uses a multi-disciplinary risk management process which considers climate change risks and opportunities as part of our business evaluation. Our governance approach includes:

- Management Committee is responsible for the identification, assessment and management of climate change risks.
- Management Committee and the GHG Operations Strategy Committee provide direction and guidance to business units on climate-related risk assessment and project implementation.
- GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation.
- Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions.
- Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems.
- Board of Directors is responsible for overseeing and ensuring that the Management Committee has appropriate and effective measures in place to manage climate-related risk.

Climate risk management also occurs at the asset level through recurring project reviews, technology reviews, and economic evaluations including forecasting GHG intensity and compliance costs, and reviewing abatement projects.

Internally, the Company is pursuing an integrated emissions reduction strategy, to ensure it is able to comply with existing and future emissions reduction requirements, for both GHG and air pollutants (such as sulphur dioxide and oxides of nitrogen). The Company continues to develop strategies that will enable it to deal with the risks and opportunities associated with new GHG and air emissions policies, such as provincial and federal methane policy development. In addition, the Company is working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness.

With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. Canadian Natural's defined pathway to drive long-term emissions reduction includes:

- Carbon capture and sequestration/storage (CCS) initiatives – Canadian Natural is leading the oil and natural gas industry in CCS projects, with a carbon dioxide (CO_2) capture capacity of 1.5 million tonnes at our Oil Sands Mining and Upgrading operations – including CO_2 capture and sequestration facilities at Horizon and a 70% interest in the Quest CCS facilities at Scotford. These initiatives combined with CO_2 capture at our Hays gas plant for use in enhanced oil recovery and a 50% stake in the North West Redwater Sturgeon Refinery, when fully online, will capture 2.7 million tonnes of CO_2, making Canadian Natural the third largest owner of CCS capacity in the global oil and gas sector, based on data from the Global Carbon Capture and Storage Institute.

- Methane emission reduction projects – Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation projects are a significant focus in our heavy oil operations. Over the last five years, we have conserved 17.9 million tonnes of carbon dioxide equivalent (CO2e) — equivalent to removing 3.8 million passenger vehicles from the road over the same period. Pneumatic controller retrofit projects are underway across our operations to further reduce emissions.
- Natural gas production as a low carbon supply of energy – Canadian Natural is the largest producer of natural gas in Canada representing 25% of our product mix. As a reliable, affordable, and lower GHG intensive energy source for power generation, natural gas delivers improved environmental performance as a clean burning hydrocarbon with less than half the carbon footprint compared to coal. Global demand for natural gas is expected to grow, continuing to be an important source of energy and a way to significantly lower global GHG emissions.
- Leveraging technology to create value and enhance performance, and investing in research and development and supporting collaboration.
- Focusing on continuous improvement to drive long-term emissions reductions.
- Considering and developing new business opportunities and trends.
- Engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions.

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology.

(C-AC3.1e/C-CE3.1e/C-CH3.1e/C-CO3.1e/C-EU3.1e/C-FB3.1e/C-MM3.1e/C-OG3.1e/C-PF3.1e/C-ST3.1e/C-TO3.1e/C-TS3.1e) Disclose details of your organization's low-carbon transition plan.

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology. Canadian Natural's oil sands operations have been continuously improving emissions intensity - currently it is only approximately 5% higher than the average intensity for all global crude oils. Canadian Natural has a pathway to lower GHG emissions intensity to below the global crude average with further advancement in technologies and ongoing investment in carbon capture initiatives.

Canadian Natural's pathway to drive long-term reductions in emissions intensity includes:

- Carbon capture and sequestration/storage (CCS) initiatives – Canadian Natural is leading the oil and natural gas industry in CCS projects, with a carbon dioxide (CO2) capture capacity of 1.5 million tonnes at our Oil Sands Mining and Upgrading operations – including CO2 capture and sequestration facilities at Horizon and a 70% interest in the Quest CCS facilities at Scotford. These initiatives combined with CO2 capture at our Hays gas plant for use in enhanced oil recovery and a 50% stake in the North West Redwater Sturgeon Refinery, when fully online, will capture 2.7 million tonnes of CO2, making Canadian Natural the third largest owner of CCS capacity in the global oil and gas sector, based on data from the Global Carbon Capture and Storage Institute.
- Methane emission reduction projects – Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation projects are a significant focus in our heavy oil operations. Over the last five years, we have conserved 17.9 million tonnes of carbon dioxide equivalent (CO2e) — equivalent to removing 3.8 million passenger vehicles from the road. Pneumatic controller retrofit projects are underway across our operations to further reduce emissions.

- Natural gas production as a low carbon supply of energy – Canadian Natural is the largest producer of natural gas in Canada representing 25% of our product mix. As a reliable, affordable, and lower GHG intensive energy source for power generation, natural gas delivers improved environmental performance as a clean burning hydrocarbon with less than half the carbon footprint compared to coal. Global demand for natural gas is expected to grow, continuing to be an important source of energy and a way to significantly lower global GHG emissions.
- Technology and Innovation – Leveraging technology to create value and enhance performance, including investments in research and development and support for collaborative, industry efforts to accelerate environmental performance improvement.

(C4.1) Did you have an emissions target that was active in the reporting year?
Intensity target

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number
Int 1
Scope
Scope 1+2 (location-based)
% emissions in Scope
-
% reduction from baseline year
-
Metric
Metric tons CO2e per unit of production
Base year
-
Start year
-
Normalized baseline year emissions covered by target (metric tons CO2e)
Target year
Is this a science-based target?
-
% achieved (emissions)
4.1
Target status
-
Please explain
Canadian Natural's overall scope 1+2 emission intensity decreased by 4.1% in 2017 compared to 2016

% change anticipated in absolute Scope 1+2 emissions

-

% change anticipated in absolute Scope 3 emissions

-

(C4.2) Provide details of other key climate-related targets not already reported in question C4.1/a/b.

Target

Other, please specify (CNRL Emission Reduction Pathway)

KPI – Metric numerator

TCO2e

KPI – Metric denominator (intensity targets only)

BOE

% achieved in reporting year

-

Target Status

Underway

Please explain

Canadian Natural's oil sands operations have been continuously improving emissions intensity - currently it is only approximately 5% higher than the average intensity for all global crude oils.

Target

Methane reduction target

KPI – Metric numerator

Heavy Oil venting (e3m3)

KPI – Metric denominator (intensity targets only)

per year

Base year

2013

Start year

2012

Target year

2017

% achieved in reporting year

71

Target Status

Underway

Please explain

71% reduction in absolute vent volumes from 2013-2017. Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation projects are a significant focus in our heavy oil operations. Over the last five years, we have conserved 17.9 million tonnes of carbon dioxide equivalent (CO_2e) — equivalent to removing 3.8 million passenger vehicles from the road. Pneumatic controller retrofit projects are underway across our operations to further reduce emissions.

Canadian Natural supports the governments of Canada and Alberta's goal to reduce methane targets, and we will continue to improve as we work to ensure methane emissions are 45% lower than baseline by 2025.

Is this target part of an overarching initiative?

Other, please specify (Alberta Climate Leadership Plan)

(C-OG4.2a) Explain, for your oil and gas production activities, why you do not have a methane-specific emissions reduction target or do not incorporate methane into your targets reported in C4.2; and forecast how your methane emissions will change over the next five years.

Please see methane reduction target above

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

(C4.3a) Identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	39	
To be implemented*	3,375	1,999,641
Implementation commenced*	375	2,440,284
Implemented*	42	144,807

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Activity type

Fugitive emissions reductions

Estimated annual CO2e savings (metric tonnes CO2e)

2,440,838

Scope

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in CC0.4)

9,612,291

Investment required (unit currency – as specified in CC0.4)

6,989,500

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Compliance with regulatory requirements/ standards	Canadian Natural has integrated emissions reduction strategies to meet performance goals and comply with requirements for GHG emissions and air pollutants. We participate in both the Canadian federal and provincial regulated GHG emissions reporting programs and quantify annual GHG emissions for internal and external reporting purposes. In November 2015, Alberta announced an unprecedented Climate Leadership Plan that incents ongoing innovation and technology investment in the crude oil and natural gas sector. Canadian Natural supports the Province of Alberta's strong leadership to reduce emissions from the crude oil and natural gas sector. Canadian Natural supports the governments of Canada and Alberta's goal to reduce methane targets, and we will continue to improve as we work to ensure methane emissions are 45% lower than baseline by 2025.
Dedicated budget for other emissions reduction activities	Canadian Natural is committed to doing our part to reduce our emissions. Canadian Natural has been the leading R&D investor for the crude oil and natural gas sector for a number of years. Leveraging technology and innovation is the best way to deliver improved environmental performance, reduced costs, and increased productivity.
Employee engagement	Climate risk management occurs at the asset level through recurring project reviews, technology reviews, and economic evaluations including forecasting GHG intensity and compliance costs, and reviewing abatement projects. Our Field Operations teams provide valuable input on new opportunities.
Internal price on carbon	Canadian Natural uses an internal price of carbon to evaluate returns on future projects under different potential carbon regulations, and for evaluating emission reduction projects.
Internal incentives/recognition programs	Greenhouse gas emissions intensity (tonnes/boe) is one measure in the corporate performance scorecard on which performance bonuses are based.
Marginal abatement cost curve	Canadian Natural has developed marginal abatement cost curves that guides our R&D investment
Partnering with governments on technology development	Working with the National Research Council of Canada (NRC) and Pond Technologies, a Canadian algae technology company, and St Marys Cement on an Algal Carbon Conversion Project. Testing on this technology began in 2016 at a pilot-scale biorefinery, located at St Marys Cement plant in Ontario. The pilot captures carbon dioxide from cement plant operations by placing them in large tanks with algae to promote photosynthesis with LED lights. Algae are pressed to release bio-oil for potential use in biofuels and biomaterials — and, at an oil sands operation, would be blended into heavy oil or synthetic crude oil. The leftover biomass can then be used to feed livestock and for land reclamation. Canadian Natural is undertaking a field pilot of its In-Pit Extraction Process (IPEP) technology, an alternative to conventional oil sands mining and ore processing. Emissions Reduction Alberta (ERA) is a partner in this project. IPEP technology involves a relocatable, modular extraction plant that moves as the mine face advances. Ore processing and bitumen separation occurs adjacent to mining operations, significantly reducing material transportation. Canadian Natural estimates that the IPEP technology could reduce GHG emissions by up to 40% in bitumen production compared to typical oil sands surface mining and extraction processes. In addition, Canadian Natural is working on another ERA funded project to enhance the accuracy of GHG emissions measurements from large industrial area sources,

Method	Comment
	typical of the oil sands region of Alberta. This research will help address some challenges faced by industry in quantifying the rates of methane and carbon dioxide (CO2) emissions, and allow the implementation of more effective strategies to reduce GHG emissions. This project deploys different working groups and approaches for measuring emissions using a holistic system of advanced sensors, laser and fiber optic technology, as well as computer models and meteorological data. The groups will deliver commercially proven technologies, guidelines for measurement and more accurate emissions profiles.
Other	Canadian Natural reviews external scenario analyses of climate change from energy firms/agencies and on that basis developed two internal scenarios in order to assess business risk. Across the range of ambitious climate change scenarios, the expectation is that there will be substantial global production and consumption of crude oil and natural gas for decades to come. Internally, the Company is pursuing an integrated emissions reduction strategy, to ensure it is able to comply with existing and future emissions reduction requirements, for both GHG and air pollutants (such as sulphur dioxide and oxides of nitrogen). The Company continues to develop strategies that will enable it to deal with the risks and opportunities associated with new GHG and air emissions policies, such as provincial and federal methane policy development. In addition, the Company is working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness.

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?

Yes

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.

Level of aggregation

Product

Description of product/Group of products

Production of natural gas allows electricity generators to reduce Scope 1 greenhouse gas emissions by switching from coal to natural gas. As well, cleaner burning natural gas can be used for fleet and public transportation vehicles.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Alberta coal phase out)

% revenue from low carbon product(s) in the reporting year

-

Comment

Alberta is phasing out coal pollution as per the government policy detailed in the web site provided below. *https://www.alberta.ca/climate-coal-electricity.aspx*

(C-OG4.6) Describe your organization's efforts to reduce methane emissions from oil and gas production activities.

Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation projects are a significant focus in our heavy oil operations. Canadian Natural has achieved a 71% reduction in absolute vent volumes from 2013-2017. Over this time period, we have conserved 17.9 million tonnes of carbon dioxide equivalent (CO2e) — equivalent to removing 3.8 million passenger vehicles from the road. Pneumatic controller retrofit projects are underway across our operations to further reduce emissions.

Canadian Natural supports the governments of Canada and Alberta's goal to reduce methane targets, and we will continue to improve as we work to ensure methane emissions are 45% lower than baseline by 2025.

(C-OG4.7) Does your organization conduct leak detection and repair (LDAR) or use other methods to find and fix fugitive methane emissions from oil and gas production activities?

Yes

(C-OG4.7a) Describe the protocol through which methane leak detection and repair or other leak detection methods, are conducted for oil and gas production activities, including predominant frequency of inspections, estimates of assets covered, and methodologies employed.

The goal of Canadian Natural's Fugitive Emission Management and Control (FEMC) program is to reduce fugitive emissions by providing an efficient means to identify larger gas leaks and prioritize them for repair. In Alberta, the procedure applies to any location that has more than 1,000 hp (utilized) of reciprocating compression and sweet gas streams (< 1% H2S). In British Columbia, the procedure applies to any location that has more than 250 hp (rated) of reciprocating compression and streams with gas containing greater than 10% CH4 plus CO2 by weight. These thresholds result in more than 200 facilities being addressed by the FEMC.

Canadian Natural's FEMC program is comprised of the following strategies:

1. Regular targeted monitoring using hand held gas detectors is performed on component with a medium to high leak potential, on a quarterly or annual basis depending on specific component types.

2. Following maintenance or adjustment, all affected components are leak checked using hand held gas detectors.

3. Comprehensive leak surveys of facilities are performed once every 3 to 5 years using an infrared leak imaging camera and Hi Flow Sampler to detect and quantify fugitive emissions and provide a check of any components not specifically addressed in steps 1 or 2.

(C-OG4.8) If flaring is relevant to your oil and gas production activities, describe your organization's efforts to reduce flaring, including any flaring reduction targets.

Canadian Natural's strategy for managing GHG emissions focuses on improving energy conservation and efficiency, reducing emissions intensity, supporting associated research and development, and adopting innovative technologies. To support this strategy, we have flaring, venting, fuel and natural gas conservation programs in place.

C5. Emissions methodology

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions.

American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry, 2009
Canadian Association of Petroleum Producers, Calculating Greenhouse Gas Emissions, 2003
European Union Emission Trading System (EU ETS): The Monitoring and Reporting Regulation (MMR) – General guidance for installations
ISO 14064-1

C6. Emissions data

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?

Gross global Scope 1 emissions (metric tons CO2e): 21502804

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We have no operations where we are able to access electricity supplier emission factors or residual emissions factors and are unable to report a Scope 2, market-based figure

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?

Scope 2, location-based: 1,986,247

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

Yes

(C6.4a) Provide details of the sources of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure.

Source

Emissions from fuel consumption in light company vehicles

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial (< 0.5%). Difficult to track accurately.

Source

Propane use for fuel and heat on small sites

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial (< 0.1%).No emissions from this source

Source

Diesel use for backup / emergency generators in Conventional operations

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial (< 0.5%). Difficult to track accurately

Source

GHG emissions from fire suppression systems

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial <1% total facility emissions

Source

Vapour emissions from spills of liquid hydrocarbons and accidental venting incidents

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial <1% total facility emissions

Source

N2O emissions from waste water treatment facilities where estimated to be less than 1 tCO2e/year

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial <1% total facility emissions

Source

CH4 and N2O emissions from land use areas such as surface disturbance and drainage and material reclaim stockpiles

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Explain why the source is excluded

Estimated to be immaterial as per third party report

(C6.7) Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

No

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

1.33

Metric numerator (Gross global combined Scope 1 and 2 emissions)

21,502,804

Metric denominator

unit total revenue

Metric denominator: Unit total

1,000

Scope 2 figure used

Location-based

% change from previous year

28.3

Direction of change

Decreased

Reason for change

Higher Revenue due to higher commodity process and production volumes

(C-OG6.12) Provide the intensity figures for Scope 1 emissions (metric tons CO2e) per unit of hydrocarbon category.

Unit of hydrocarbon category (denominator)

Other, please specify (1000's BOE)

Metric tons CO2e from hydrocarbon category per unit specified

61.22

% change from previous year

4

Direction of change

Decreased

(C-OG6.13) Report your methane emissions as percentages of natural gas and hydrocarbon production or throughput.

Oil and gas business division

Upstream

Estimated total methane emitted expressed as % of total hydrocarbon production or throughput at given division

0.5

C7. Emissions breakdowns

(C7.1) Does your organization have greenhouse gas emissions other than carbon dioxide?

Yes

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	16,036,110	Other, please specify (Alberta Government, Technical Guidance) Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014
CH4	5,076,171	Other, please specify (Alberta Government, Technical Guidance) Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014
N2O	413,126	Other, please specify (Alberta Government, Technical Guidance) Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014
HFCs	3,002	Other, please specify (Alberta Government, Technical Guidance) Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014
SF6	408	Other, please specify (Alberta Government, Technical Guidance) Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014

(C-OG7.1b) Break down your total gross global Scope 1 emissions from oil and gas value chain production activities by greenhouse gas type.

	Gross Scope 1 CO2 emissions (metric tons CO2)	Gross Scope 1 methane emissions (metric tons CH4)	Gross Scope 1 emissions (metric tons CO2e)	Comment
Fugitives (Gas: Total)	71,233	94,879	2,433,220	
Fugitives (Gas: Venting)	209,070	76,446	2,120,208	
Fugitives (Gas: Flaring)	1,116,732	1,731	1,160,007	
Combustion (Oil: Upstream, excluding flaring)	14,065,735	29,907	15,225,886	Contains combustion from upstream oil and gas operations (not separated out)
Process emissions	571,837		571,837	
Emission not elsewhere classified	1,503	84	4,250	Waste and wastewater Emissions.

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
Canada	19,716,165
United Kingdom of Great Britain and Northern Ireland	947,476
Cote d'Ivoire	335,221
Gabon	503,942

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By business division

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
NA Conventional E&P	13,297,870
Oil Sands Mining	6,418,295
CNR International	1,786,639

(C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-TO7.4/C-TS7.4) Break down your organization's total gross global Scope 1 emissions by sector production activity in metric tons CO2e.

	Gross Scope 1 emissions, metric tons CO2e	Comment
Oil and gas production activities (upstream)	21,502,804	All activities are Upstream oil and gas production related

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Canada	1,986,247	0	9,013,244	54,225

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By business division

(C7.6a) Break down your total gross global Scope 2 emissions by business division.

Business division	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
NA Conventional E&P	1,685,615	0
Oil Sands Mining	300,632	0
CNR International	0	0

(C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7) Break down your organization's total gross global Scope 2 emissions by sector production activity in metric tons CO2e.

	Scope 2, location-based, metric tons CO2e	Comment
Oil and gas production activities (upstream)	1,986,247	All activities are Upstream oil and gas production related

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Increased

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

C8. Energy

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertakes this energy-related activity
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	Yes
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	Yes

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)		80,333,040	80,333,040
Consumption of purchased or acquired electricity		54,225	3,823,139	3,877,364
Consumption of purchased or acquired steam			51,901,080	51,901,080
Total energy consumption		54,225	136,057,260	136,111,485

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of steam	Yes
Consumption of fuel for the generation of cooling	Yes

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for co-generation or tri-generation	Yes

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

-

(C8.2f) Provide details on the electricity, heat, steam and/or cooling amounts that were accounted for at a low-carbon emission factor in the market-based Scope 2 figure reported in C6.3.

Basis for applying a low-carbon emission factor

Grid mix of renewable electricity

Low-carbon technology type

Hydropower

MWh consumed associated with low-carbon electricity, heat, steam or cooling

186,697

Emission factor (in units of metric tons CO2e per MWh)

0.0147

Comment

Scope 2 emissions associated with low carbon, renewable electricity in BC

C9. Additional metrics

(C-OG9.2b) Explain which listing requirements or other methodologies you use to report reserves data. If your organization cannot provide data due to legal restrictions on reporting reserves figures in certain countries, please explain this.

Canadian Natural publishes production and reserves data in the Company's Annual Reports.

For Reserves data, please see pages 12 to 18 of the 2017 Annual report, attached.

For the annual production values in each hydrocarbon type, please see the 2017 Annual Report on page 29, (available online).

(C-OG9.2e) Provide an indicative percentage split for production, 1P, 2P, 3P reserves, and total resource base by development types.

Comment - Canadian Natural publishes production and reserves data in the Company's Annual Reports. For Reserves data, please see pages 12 to 18 of the 2017 Annual report, attached. For the annual production values in each hydrocarbon type, please see the 2017 Annual Report on page 29, attached.

(C-OG9.8) Is your organization involved in the sequestration of CO2?

Yes

(C-OG9.8a) Provide, in metric tons CO2, gross masses of CO2 transferred in and out of the reporting organization (as defined by the consolidation basis).

	CO2 transferred – reporting year (metric tons CO2)
CO2 transferred in	12,890
CO2 transferred out	0

(C-OG9.8b) Provide gross masses of CO2 injected and stored for the purposes of CCS during the reporting year according to the injection and storage pathway.

Injection and storage pathway	**Injected CO2 (metric tons CO2)**	**Percentage of injected CO2 intended for long-term (>100 year) storage**	**Year in which injection began**	**Cumulative CO2 injected and stored (metric tons CO2)**
CO2 used for enhanced oil recovery (EOR) or enhanced gas recovery (EGR)	17,382	100	January 1 2004	307,268
Other, please specify (CO2 sequestration in tailings)	12,890	100	January 1 2009	161,805

C10. Verification

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	No third-party verification or assurance
Scope 3	No third-party verification or assurance

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 and/or Scope 2 emissions and attach the relevant statements.

Scope

Scope 1

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Relevant standard

Alberta Specified Gas Emitters Regulation (SGER)

Proportion of reported emissions verified (%)

52

Scope

Scope 1

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Relevant standard

European Union Emissions Trading System (EU ETS)

Proportion of reported emissions verified (%)

4

Scope

Scope 1

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Reasonable assurance

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

6

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

Yes

(C10.2a) Which data points within your CDP disclosure have been verified, and which verification standards were used?

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C6. Emissions data	Year on year change in emissions (Scope 1)	Alberta facilities which emit 100,000 tCO2e/year and more are subject to Alberta's SGER regulations. BC facilities which emit 25,000 tCO2e/year or more are subject to the GGIRCA regulations. As such, these facilities are subject to emission verification which complies with ISO 14064-3 verification standard. UK facilities are verified under the European Union Emissions Trading System (EU ETS)	Facility emission calculation, reporting and verification all meet the applicable verification standard required to comply with regional regulations. Alberta, British Columbia and UK calculation methodologies, metering, meter maintenance and data management process are all verified. Alberta also has production verified.

C5. Emissions performance	Year on year emissions intensity figure	Alberta facilities which emit 100,000 tCO2e/year and more are subject to Alberta's SGER regulations. As such, these facilities are subject to emission verification which complies with ISO 14064-3 verification standard.	Facility emission calculation, reporting and verification all meet the applicable verification standard required to comply with regional regulations. Alberta, calculation methodologies, metering, meter maintenance and data management process are all verified. Alberta also has production verified.
C7. Emissions breakdown	Year on year change in emissions (Scope 1)	Alberta facilities which emit 100,000 tCO2e/year and more are subject to Alberta's SGER regulations. BC facilities which emit 25,000 tCO2e/year or more are subject to the GGIRCA regulations. As such, these facilities are subject to emission verification which complies with ISO 14064-3 verification standard.	Facility emission calculation, reporting and verification all meet the applicable verification standard required to comply with regional regulations. Alberta, and British Columbia calculation methodologies, metering, meter maintenance and data management process are all verified. Alberta also has production verified.
C5. Emissions performance	Change in Scope 1 emissions against a base year (not target related)	Alberta facilities which emit 100,000 tCO2e/year and more are subject to Alberta's SGER regulations. As such, these facilities are subject to emission verification which complies with ISO 14064-3 verification standard.	Facility emission calculation, reporting and verification all meet the applicable verification standard required to comply with regional regulations. Alberta, calculation methodologies, metering, meter maintenance and data management process are all verified. Alberta also has production verified

C11. Carbon pricing

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

Yes

(C11.1a) Select the carbon pricing regulation(s) which impacts your operations.

Alberta carbon tax
Alberta SGER
BC carbon tax
EU ETS

(C11.1b) Complete the following table for each of the emissions trading systems in which you participate.

Alberta SGER

% of Scope 1 emissions covered by the ETS

52.27

Period start date

January 1 2017

Period end date

December 31 2017

Allowances allocated

9,105,181

Allowances purchased

992,996

Verified emissions in metric tons CO2e

11,239,107

Details of ownership

Facilities we own and operate

EU ETS

% of Scope 1 emissions covered by the ETS

4.41

Period start date

January 1 2017

Period end date

December 31 2017

Allowances allocated

239,365

Allowances purchased

649,755

Verified emissions in metric tons CO2e

947,476

Details of ownership

Facilities we own and operate

(C11.1c) Complete the following table for each of the tax systems in which you participate.

Alberta carbon tax

Period start date

January 1 2017

Period end date

February 1 2201

% of emissions covered by tax

Total cost of tax paid

Comment

This tax applies to fuel purchases. Data for associated fuel purchases an the % allocated to the Alberta carbon tax is not readily available.

BC carbon tax

Period start date

January 1 2017

Period end date

December 31 2017

% of emissions covered by tax

3.52

Total cost of tax paid

22,700,000

(C11.1d) What is your strategy for complying with the systems in which you participate or anticipate participating?

Canadian Natural uses a multi-disciplinary risk management process which considers climate change risks and opportunities as part of our business evaluation. Our business strategy is influenced by incorporating knowledge of climate change risks, including current and potential policies and regulations, into decisions made by our Management Committee. Our governance approach includes:

- Management Committee is responsible for the identification, assessment and management of climate change risks.
- Management Committee and the GHG Operations Strategy Committee provide direction and guidance to business units on climate-related risk assessment and project implementation.
- GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation.
- Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions.
- Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems.
- Board of Directors is responsible for overseeing and ensuring that the Management Committee has appropriate and effective measures in place to manage climate-related risk.

Climate risk management also occurs at the asset level through recurring project reviews, technology reviews, and economic evaluations including forecasting GHG intensity and compliance costs, and reviewing abatement projects.

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology.

With a strong commitment to continuously reducing GHG emissions intensity, Canadian Natural has developed a pathway to reduce emissions intensity to be below the global crude average. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that involves:

- integrating emissions reduction in project planning and operations;
- leveraging technology to create value and enhance performance;
- investing in research and development and supporting collaboration;
- focusing on continuous improvement to drive long-term emissions reductions;
- leading in carbon capture and sequestration/storage (CCS) projects;
- engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions; and

- considering and developing new business opportunities and trends.

Canadian Natural reviews external scenario analyses of climate change from energy firms/agencies and on that basis developed two internal scenarios in order to assess business risk. Across the range of ambitious climate change scenarios, the expectation is that there will be substantial global production and consumption of crude oil and natural gas for decades to come. As result of Canadian Natural's GHG management strategy, our reserves face limited risk even under more ambitious climate change scenarios.

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

Yes

(C11.2a) Provide details of the project-based carbon credits originated or purchased by your organization in the reporting period.

Credit origination or credit purchase

Credit origination

Project type

CO2 usage

Project identification

Hays/Enchant CO2 EOR

Verified to which standard

Other, please specify (Alberta Offset System)

Number of credits (metric tonnes CO2e)

66,952

Number of credits (metric tonnes CO2e): Risk adjusted volume

66,952

Credits cancelled

No

Purpose, e.g. compliance

Compliance

(C11.3) Does your organization use an internal price on carbon?

Yes

(C11.3a) Provide details of how your organization uses an internal price on carbon.

Objective for implementing an internal carbon price
Other, please specify (assessing project economics)

GHG Scope
Scope 1
Application
At a project level, for those projects that face a carbon cost or have an opportunity to generate carbon credits
Actual price(s) used (Currency /metric ton)
Variance of price(s) used
Type of internal carbon price
Shadow price
Impact & implication
-

C12. Engagement

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, other partners in the value chain

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Compliance & onboarding

Details of engagement

Other, please specify

Comment

Contractors and Service Providers must meet or exceed Canadian Natural's approach to business. The Company engages with top tier supplies and contractors with regards to environmental policies and procedures. The Company expects that suppliers and partners will manage emissions performance and other environmental parameters using sound business practices

(C12.1c) Give details of your climate-related engagement strategy with other partners in the value chain.

Contractors and Service Providers must meet or exceed Canadian Natural's approach to business. The Company engages with top tier supplies and contractors with regards to environmental policies and procedures. The Company expects that suppliers and partners will manage emissions performance and other environmental parameters using sound business practices.

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

Direct engagement with policy makers
Trade associations
Funding research organizations

(C12.3a) On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Regulation of methane emissions	Support with minor exceptions	Support overall focus on methane emission reductions. Working with the Canadian Association of Petroleum Producers and directly with policy makers and regulators to provide advice and analysis on potential regulations.	Support outcome based approach to methane regulation. Advocating for an incentive-based period for reducing methane emissions prior to regulations coming into effect. Methane regulations should be implemented in a staged approach to reflect the reductions that are delivered through the incentive-based portion of the hybrid approach
Carbon tax	Support with minor	Working with the Canadian Association of Petroleum Producers and directly with policy	Support carbon pricing programs (which may or may not include a carbon tax), if there is allowance for competitiveness impacts on energy-intensive trade-exposed (EITE)

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
	exceptions	makers and regulators to provide advice and analysis on potential regulations.	sectors, and if a significant portion of revenue is used for developing technologies that will reduce carbon emissions. • Propose measures for EITE sectors to minimize competitiveness impact and reduce carbon leakage (e.g., performance standards based on benchmarking; offsetting fiscal measures).

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

Canadian Association of Petroleum Producers (CAPP)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

CAPP's Climate Change Policy Principles: Balanced "3E" policy should deliver Economic growth, Environmental protection, and a secure and reliable Energy supply. Efficiency - Policy should be designed to drive efficient actions required to achieve emission objectives. Technology - Policy should stimulate investment in the technologies necessary for significant reductions in GHG emissions in Canada. Predictability and stability - Predictable policy built on stable principles should support long term capital investments in the upstream oil and gas sector and create jobs for Canadians. Competitiveness - Policy should maintain competitiveness of Canadian industry, ensure compatibility with major trading and economic partners (particularly with the U.S., our largest trading partner), and compliance should be achievable within the context of growing production. Distributional fairness - Policy should distribute cost burden equitably among sectors and jurisdictions across the economy. Harmonization - Policy should be harmonized across jurisdictions within Canada, to an extent that is both reasonable and practical. Administrative simplicity - Policy should be simple and minimize the administrative burden on industry to the greatest extent possible.

How have you, or are you attempting to, influence the position?

The Company is working with relevant parties, such as CAPP and Oil & Gas UK, to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development.

Trade association

Oil & Gas UK.

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Efficiency - Policy should be designed to drive efficient actions required to achieve emission objectives. Technology - Policy should stimulate investment in the technologies necessary for significant reductions in GHG emissions. Predictability and stability - Predictable policy built on stable principles should support long term capital investments in the upstream oil and gas sector and create jobs. Distributional fairness - Policy should distribute cost burden equitably among sectors and jurisdictions across the economy. Administrative simplicity - Policy should be simple and minimize the administrative burden on industry to the greatest extent possible.

How have you, or are you attempting to, influence the position?

The Company is working with relevant parties, such as CAPP and Oil & Gas UK, to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development.

(C12.3d) Do you publicly disclose a list of all research organizations that you fund?

No

(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

Canadian Natural uses a multi-disciplinary risk management process which considers climate change risks and opportunities as part of our business evaluation. Our business strategy is influenced by incorporating knowledge of climate change risks, including current and potential policies and regulations, into decisions made by our Management Committee. Our governance approach includes:

- Management Committee is responsible for the identification, assessment and management of climate change risks.
- Management Committee and the GHG Operations Strategy Committee provide direction and guidance to business units on climate-related risk assessment and project implementation.
- GHG Operations Strategy Committee is responsible for climate change strategy and issue prioritization, as well as overseeing our working groups that manage and coordinate GHG reduction and technology projects across the Company. This committee also assesses and provides input on current and developing GHG policy and regulation.
- Nominating, Governance and Risk Committee of the Board reviews the status of risk monitoring activities, including climate-related regulatory and operational risks, and the steps Management has taken to implement mitigating actions.
- Health, Safety, Asset Integrity and Environmental Committee of the Board is responsible for ensuring that Management has effective design and implementation of environmental risk programs, controls and reporting systems.

- Board of Directors is responsible for overseeing and ensuring that the Management Committee has appropriate and effective measures in place to manage climate-related risk.

Climate risk management also occurs at the asset level through recurring project reviews, technology reviews, and economic evaluations including forecasting GHG intensity and compliance costs, and reviewing abatement projects.

Canadian Natural believes that the world needs all types of energy, including oil and natural gas, to meet increasing demand. As the world transitions to a lower carbon economy, there will be better, lower carbon ways of producing and consuming oil and natural gas. Canadian Natural's large, diversified and balanced portfolio is well-positioned to be resilient in a lower carbon economy. With a portfolio that consists of long life low decline assets representing a reserve life of 50 years, we will continue to create long-term value and opportunities to drive lower GHG emissions through continuous improvement and investments in technology. Canadian Natural reviews external scenario analyses of climate change from energy firms/agencies and on that basis developed two internal scenarios in order to assess business risk. Across the range of ambitious climate change scenarios, the expectation is that there will be substantial global production and consumption of crude oil and natural gas for decades to come.

Canada's crude oil and natural gas resources are safely and responsibly developed with world-leading standards under comprehensive regulatory oversight, emissions regulations and programs, carbon pricing regimes and investments in carbon capture and storage. As the world's demand for energy increases, Canada is well-positioned to be a global leader in supplying crude oil and natural gas in a lower carbon energy future.

At Canadian Natural, we believe that strong environmental policy, regulation and performance standards, together with innovation and technology, are necessary for an effective approach to GHG emissions management. We continue to work with industry, government and other stakeholders to maintain a cost and carbon competitive oil and natural gas sector and we engage proactively in policy and regulation to effectively manage climate risks and opportunities.

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Publication

In mainstream reports

Status

Complete

Attach the document

cnq-2017-annual-information-form.pdf

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures

Publication

In other regulatory filings

Status

Complete

Attach the document

cnq-2017-annual-report.pdf

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures

Publication

In voluntary sustainability report

Status

Complete

Attach the document

2017-stewardship-report-to-stakeholders.pdf

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures