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. 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 portfolio of light, synthetic, and heavy crude oil and natural gas 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 responsibly and sustainably 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	Select the number of past reporting years you will be providing emissions data for
From: 01/01/2018	To: 12/31/2018	No	n/a

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

Country/Region
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.

Currency
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

Organizational activities: Oil and Gas

(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
Biofuels
Carbon capture and storage/utilization

C1 Governance

Board oversight

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

Yes

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.
Question dependencies

Position of individual(s)	Please explain
Other, please specify: Corporate Management Committee	Our Corporate Management Committee (MC) is comprised of senior executives who share responsibilities normally associated with a CEO position and are responsible for climate-related issues. 3 members of the MC are also directors of the Company. The Board of Directors (BOD) is responsible for overseeing and ensuring that MC has appropriate and effective measures in place to manage climate-related risk. Nominating, Governance and Risk Committee of the BOD 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 Environment Committee of the BOD is responsible for ensuring that Management has effective design and implementation of

	environmental risk programs, controls and reporting systems. The BOD 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 Overseeing major capital expenditures, acquisitions	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 Environment 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, seven directors have relevant experience in the area of Carbon Policy and Emissions, and eight directors have relevant experience in the areas of health, safety and environment.

Management responsibility

(C1.2) Provide the highest management-level 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 (do not include the names of individuals).

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. 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.

Employee incentives

(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?	Types of incentives	Activity incentivized	Comment
All employees	Monetary reward	Other, please specify	The cash bonus awarded is based on the Corporation's and the individual's performance over the year in contributing to the Corporation meeting its yearly operating plans and its operating and financial goals as evidenced by corporate performance. GHG emissions intensity – Greenhouse gas emissions intensity (tonnes/boe) is one metric in the corporate performance scorecard on which performance bonuses are based.

C2 Risks and opportunities

Time horizons

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

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

Management processes

(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
Six-monthly or more frequently	> 6 years	Risk management (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 climate change scenario analyses from energy firms/agencies. These scenarios incorporate a wide range of assumptions on markets, policy, technology, efficiency and other key variables. We developed two internal scenarios to assess business risk and test resilience: a *Reference Scenario* based on current policies, and a stricter *Constrained Scenario* of "well below 2°C". Across the range of ambitious scenarios, it's expected that crude oil and natural gas demand will increase, and Canada is well positioned to be a global supplier of a premium, low carbon emissions intensity product 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.

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 our 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?

Risk type	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 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 one of the largest producers of natural gas in Canada representing 24% 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.
Downstream	Relevant, sometimes included	Canadian Natural is leading the crude oil and natural gas industry in Carbon Capture and Storage ("CCS") projects at major facilities. Our CCS projects include CO2 capture capacity at our Oil Sands Mining and Upgrading operations, a 70% interest in the Quest CCS facilities at the Scotford Upgrader and a 50% stake in the North West Redwater Sturgeon Refinery which, when fully online, will combine to capture 2.7 million tonnes of CO_2 per year. Canadian Natural's CCS projects are the equivalent to taking approximately 576,000 cars off the road annually makes Canadian Natural the fifth largest owner of CCS capacity in the global oil and gas sector based on data from the Global Carbon Capture and Storage Institute. With just these three projects, Canadian Natural's taken the equivalent of 2 million cars off the road, the equivalent to 5% of the entire vehicles in Canada. CO2 capture and sequestration facilities at Horizon are an important part of Horizon's tailings management process. Our oil sands long life low decline reserves provide a competitive advantage over other basins – enabling the application of technology solutions that set us on a pathway to net zero emissions in our oil sands operations.

(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 for management of climate change risks and opportunities 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.

Risk disclosure

(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.

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk1	Direct operations	Transition risk	Policy and legal: Increased pricing of GHG emissions	Policy and legal: Increased operating costs (e.g., higher compliance costs, increased insurance premiums)	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. The federal government is also developing (i) a comprehensive management system for air pollutants and has released regulations pertaining to certain boilers, heaters and compressor engines operated by the Company; and (ii) a Clean Fuel Standard, which may affect production and consumption of fuels in Canada. 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. The federal government is also developing (i) a comprehensive management system for air pollutants and has released regulations pertaining to certain boilers, heaters and compressor engines operated by the Company; and (ii) a Clean Fuel Standard, which may affect production and consumption of fuels in Canada. Provincial governments in British Columbia, Alberta and Saskatchewan have implemented or are implementing carbon pricing systems for certain industrial facilities. The government of Canada has determined that a federal “backstop” carbon pricing system applies beginning in 2019 in specific provinces and territories within Canada, including the provinces of Saskatchewan and Manitoba in which the Company operates. The federal backstop system will consist of an output-based pricing system for facilities that emit more than 25 kilotonnes CO2e annually, and a fuel charge that applies to facilities with emissions below this level. In the UK, GHG regulations have been in effect since 2005. In Phase 1 (2005 – 2007) of the UK National Allocation Plan, the Company operated below its CO2 allocation. In Phase 2 (2008 – 2012) the Company’s CO2 allocation	Short-term

					was decreased below the Company's operations emissions. 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.		
Likelihood	**Magnitude of impact**	**Are you able to provide a potential financial impact figure?**			**Potential financial impact figure (currency)**	**Potential financial impact figure - minimum (currency)**	**Potential financial impact figure - maximum (currency)**
Very likely	Unknown	No, we do not have this figure (or leave blank)			n/a		
Explanation of financial impact figure	**Management method**				**Cost of management**		**Comment**
	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.						

Identifier	**Where in value chain does risk driver occur?**	**Risk type**	**Primary climate-related risk driver**	**Type of financial impact**	**Company- specific description**		**Time horizon**
Risk 2	Direct operations	Transition risk	Policy and legal: Enhanced emissions-reporting obligations.	Policy and legal: Increased operating costs (e.g., higher costs for reporting obligations)	Canadian Natural continually assesses reporting levels to provide value to investors and stakeholders, and we align with recommendations from the Financial Stability Board (FSB) Task Force on Climate Related Financial Disclosures (TCFD).		Unknown
Likelihood	**Magnitude of impact**	**Are you able to provide a potential financial impact figure?**			**Potential financial impact figure (currency)**	**Potential financial impact figure - minimum (currency)**	**Potential financial impact figure - maximum (currency)**
Unknown	Unknown				-		
Explanation of financial impact figure	**Management method**				**Cost of management**		**Comment**

	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.		

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk 3	Direct operations	Transition risk	Technology: Costs to transition to lower emissions technology	Technology: Costs to adopt/deploy new practices and processes	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 is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation.	Unknown

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown		-		

Explanation of financial impact figure	Management method	Cost of management	Comment
	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.		

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk 4	Direct operations	Transition risk	Market: Other	Market: Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatment)	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.	Unknown

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown	-	-		

Explanation of financial impact figure	Management method	Cost of management	Comment
	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.		

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk 5	Direct operations	Transition risk	Reputation: Other	Reputation: Reduced revenue from	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	Unknown

				decreased production capacity (e.g., delayed planning approvals, supply chain interruptions)	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.		

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown	-	-	-	-

Explanation of financial impact figure	Management method	Cost of management	Comment
-	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.	-	-

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk 6	Direct operations	Physical risk	-	-	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.	Unknown

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown	-	-	-	-

Explanation of financial impact figure	Management method	Cost of management	Comment
-	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. A comprehensive corporate Emergency Management program is in place to ensure that we are properly prepared for the safe and well-coordinated response to potential accidents and incidents (e.g. flood and fire events). This program includes our Emergency Response Plans (ERPs) to ensure immediate initial response and efficient management of the situation until it has been resolved or until other resources can be mobilized to the site.	-	-

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk 7	Direct operations	Physical risk	-	-	Personnel safety. Equipment issues.	Unknown

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown	-	-	-	-

Explanation of financial impact figure	Management method	Cost of management	Comment
-	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.	-	-

Identifier	Where in value chain does risk driver occur?	Risk type	Primary climate-related risk driver	Type of financial impact	Company- specific description	Time horizon
Risk 8	Direct operations	Physical risk	-	-	Rising levels could affect onshore support facilities related to offshore exploration and production platforms.	Unknown

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown	-	-	-	-

Explanation of financial impact figure	Management method	Cost of management	Comment
-	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.	-	-

Opportunity disclosure

(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.

Question dependencies

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp1	Direct operations	Resource efficiency	Other	Reduced operating costs (e.g., through efficiency gains and cost reductions)	Canadian Natural is leading the crude oil and natural gas industry in Carbon Capture and Storage ("CCS") projects at major facilities. Our CCS initiatives will capture 2.7 million tonnes of CO2, making Canadian Natural the fifth largest owner of CCS capacity in the global oil and gas sector, based on data from the Global Carbon Capture and Storage Institute. CO2 capture and sequestration facilities at Horizon are an important part of Horizon's tailings management process. Our oil sands long life low decline reserves provide a competitive advantage over other basins – enabling the application of technology solutions that set us on a pathway to net zero emissions in our oil sands operations. 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. The Quest CCS facility has officially reached a new milestone, with 4 million tonnes of CO2 permanently captured and stored – equivalent to the annual emissions from 1 million cars. ● Enhanced Oil Recovery. At our Hays gas plant in Taber (southeast Alberta), we capture approximately 13,000 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 2019, supplying its CO2 as a feedstock to an independent company specializing in EOR.	Current

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Virtually certain	High	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
Reduction in compliance costs	Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. We have taken significant steps to reduce our GHG emissions with an integrated GHG management strategy that	-	Investment in CO2 capture and sequestration is significant part of Canadian Natural's Integrated GHG Management Strategy.

	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.		

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp2	Direct operations	Energy source	-	-	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.	Long-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
More likely than not	Unknown	--	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
Not yet determined.	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.		

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp3	Direct operations	Resource efficiency	Other	Reduced operating costs (e.g., through efficiency gains and cost reductions)	Canadian Natural is a founding member and active participant in Canada's Oil Sands Innovation Alliance (COSIA). Through COSIA, Canadian Natural, along 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	Current

					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.	

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
More likely than not	Unknown	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
Reduction in compliance costs	Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. 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.	-	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.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp4	Supply Chain	Resource efficiency	Other	Reduced operating costs (e.g., through efficiency gains and cost reductions)	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.	Short-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Virtually certain	Medium-high	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
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.	Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. 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 is a 50% partner in North West Redwater.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp5	Direct operations	Resource efficiency	Other	Reduced operating costs (e.g., through efficiency gains and cost reductions)	Canadian Natural has achieved a 72% reduction in absolute vent volumes at our Alberta primary heavy oil operations since 2014. This represents a significant voluntary reduction in methane emissions.	Current

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Virtually certain	Unknown	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
Reduction in compliance costs.	Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation in our heavy oil operations and pneumatic controller retrofit projects are part of our methane reduction plan. With 4,000 controller retrofits in 2018 and 2019, we target reductions of up to 400,000 tonnes of CO2 equivalent/year. 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.	-	Capital expenditure will be required to retrofit equipment and to tie in wells and deploy new technology (e.g. combustion) as appropriate.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp6	Supply Chain	Products and services	-	Other, please specify (carbon conversion technology support)	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 are testing their technologies and one of the few places in the world where carbon conversion technologies can be tested on a large, commercial scale.	Medium-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Likely	Unknown	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
-	Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. 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; • 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.	-	-

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp7	Direct operations	Resource efficiency	Other	Reduced operating costs (e.g., through efficiency gains and cost reductions)	Enhanced steam quality measurement and control to improve steam efficiencies at Primrose and Wolf Lake thermal operations.	Current

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Virtually certain	Medium	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
For a typical steam-assisted gravity drainage (SAGD) facility like Primrose, a steam quality improvement of 2% would result in an 8% decrease in boiler blowdown and up to a 1% reduction in greenhouse gas (GHG) emissions.	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.	-	-

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp8	Direct operations	Energy source	-	-	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. Lithium recovery – the recovery of lithium compounds from produced water in the Company's conventional oil and gas operations is also a potential opportunity, given the increase in demand for lithium for batteries.	Medium-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	High	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
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).	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.	-	Other partners involved include: Canada's Oil Sands Innovation Alliance (COSIA) members, Emissions Reduction Alberta, Alberta Energy, Sustainable Development Technology Canada, National Research Council

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 taking a waste process and creating economic value by increasing bitumen and solvent recovery, revenues through sales of minerals, and support for renewable sources of energy.			(NRC)/Industrial Research Assistance Program (IRAP) and Canadian investors.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp9	Direct operations	Resource efficiency	Other	Reduced operating costs (e.g., through efficiency gains and cost reductions)	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 once-through steam generators (OTSGs) to transform up to 90 per cent of water into steam using less water. The technology is now considered to be commercial.	Current

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Very likely	Medium	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
Reduced GHG emissions between two and seven 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.	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.	-	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.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp10	Direct operations	Energy source	-	-	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 (CO_2) emissions, and allow the implementation of more effective strategies	Medium-term

					to reduce GHG emissions. Work is well underway on evaluating several emissions profiles are through a range of methods: probes, thermal imaging, ground sensors, drones, aircraft and satellites. as well as computer models and meteorological data. Bringing this data together allows for cross-validation between multiple technologies, creating a truly holistic system of advanced sensors, laser and fiber optic technology as well as computer models and meteorological data to measure emissions with accuracy. The groups will deliver commercially proven technologies, guidelines for measurement and more accurate emissions profiles.	

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	High	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
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.	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.	-	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.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp11	Direct operations	Energy source	-	-	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. A feasibility study funded by industry members and Alberta Innovates-Energy Environment Solutions indicated that using MCFCs would potentially be far less energy-intensive and more cost effective than conventional post-combustion carbon capture methods. Building on that study, a COSIA joint industry project (JIP) carried out a preliminary front-end engineering design (pre-FEED) associated with installing and operating a 200-kilowatt pilot project. With increased interest from other partners and government, another JIP conducted a larger scale pre-FEED that evaluated the cost of piloting	Medium-term

					a 1.4 megawatt power generation project at an oil sands facility. The Athabasca Oil Sands Project (AOSP) upgrader has been identified as a potential pilot site.	

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	High	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
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.	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.	-	This project was initially undertaken by a collaboration of COSIA members and Alberta Innovates. Canadian Natural (majority owner of the AOSP), and Shell Canada, are currently working with industry to obtain additional participants for the 1.4MW unit to pilot. The project will also be partially funded by Emissions Reduction Alberta.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp12	Direct operations	Energy source	-	-	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.	Long-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	High	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
The CEFCO process is scientifically complex but it is 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.	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.	-	-

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp13	Direct operations	Energy source	-	-	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.	Long-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	High	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
New technology/methods for decarbonization of natural gas 4holds significant cost saving potential for oil producers, by creating valuable co-products for sale. Annual cost savings have potential to reach $150 million/year.	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.	-	Research related to this project has been conducted through COSIA, in partnership with the Gas Technology Institute (GTI) and Alberta Innovates.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp14	Direct operations	Products and services	-	-	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. The resulting study provides insights into high-value products, on four promising areas: carbon fibers (including graphene), asphalt and asphalt transportability, vanadium flow batteries for electricity storage and polymers.	Long-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Unknown	Unknown	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
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	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	-	-

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. Development of such materials could replace high-intensity manufacturing like steel and reduce weight of vehicles to increase fuel economy.	and trends.		

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp15	Direct operations	Resource efficiency	Use of more efficient production and distribution processes	Reduced operating costs (e.g., through efficiency gains and cost reductions)	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.	Short-term

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Likely	Medium-high	-	-	-	-

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
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.	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.	-	This project is supported by Emissions Reduction Alberta.

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp16	Direct Operations	Energy Source: Use of supportive policy incentives	Other	Reduced operating costs	Offsets system promote GHG reduction activities by providing financial incentive for emission reduction actions that go beyond regulatory requirements.	

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)
Likely	Medium	No			

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
	Regular review of offset protocol opportunities within the Company and participation in external initiatives to increase the number of available offset project types.		

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp17	Direct Operations	Energy Source: Use of new technologies	Other		The Company is piloting the use of enclosed combustors to burn small amounts of methane that otherwise would be vented. This reduces GHG emissions because of the lower GWP of CO2 compared to methane.	Immediate

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment
	Currently piloting this technology		

Identifier	Where in the value chain does the opportunity occur?	Opportunity type	Primary climate-related opportunity driver	Type of financial impact	Company-specific description	Time horizon
Opp18	Direct Operations	Energy Source: Participation in carbon market	Other	Reduced operating costs	We currently participate in carbon markets in both Alberta and the UK. The use of this market mechanism helps to reduce carbon abatement costs, and also provides a price signal (through the offset system) to activities that do not otherwise have a carbon price.	Immediate

Likelihood	Magnitude of impact	Are you able to provide a potential financial impact figure?	Potential financial impact figure (currency)	Potential financial impact figure - minimum (currency)	Potential financial impact figure - maximum (currency)

Explanation of financial impact figure	Strategy to realize opportunity	Cost to realize opportunity	Comment

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

Area	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 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. Additionally, we are a member of the Petroleum Technology Alliance Canada (PTAC) with 500 projects launched to date, worth ~$310 million.
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: Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. 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

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 has 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.

Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. 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 (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 fifth 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 in our heavy oil operations and pneumatic controller retrofit projects are part of our methane reduction plan. With 4,000 controller retrofits in 2018 and 2019, we target reductions of up to 400,000 tonnes of CO2 equivalent/year. Over the last five years, we have conserved 16.8 million tonnes of carbon dioxide equivalent (CO2e) — equivalent to removing 3.6 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's natural gas assets are an important part of our balanced portfolio. Natural gas is a reliable and affordable energy source for power generation, with less than half the carbon footprint of coal. Canada can help reduce net global emissions by supplying Liquefied Natural Gas (LNG) to global markets. These emissions reductions should receive recognition domestically and internationally as contributing towards Canada's climate change commitments.
- 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. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation.

(C3.1d) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenarios	Details
• *Other, please specify*	Canadian Natural reviews external climate change scenario analyses from energy firms/agencies. These scenarios incorporate a wide range of assumptions on markets, policy, technology, efficiency

	and other key variables. We developed two internal scenarios to assess business risk and test resilience: a Reference Scenario based on current policies, and a stricter Constrained Scenario of “well below 2°C". Across the range of ambitious scenarios, it’s expected that crude oil and natural gas demand will increase, and Canada is well positioned to be a global supplier of a premium, low carbon emissions intensity product 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.

(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. We have a defined plan to continuously improve our GHG emissions performance. Canadian Natural’s long-term aspirational goal is to produce with net zero emissions in our oil sands operations. In many cases, the GHG emissions intensity of Canadian Natural’s operations are already well below the average emissions intensity for all global crude oils. We are focused on advancements in technologies and ongoing investment in carbon capture initiatives to drive emissions intensity to be below the global average. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation.

Our 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 fifth 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. Since 2014, we have conserved 16.8 million tonnes of carbon dioxide equivalent (CO2e) — equivalent to removing 3.6 million passenger vehicles from the road over the same period. With 4,000 controller retrofits in 2018 and 2019, we target reductions of up to 400,000 tonnes of CO2 equivalent/year
- Canadian Natural’s natural gas assets are an important part of our balanced portfolio. Natural gas is a reliable and affordable energy source for power generation, with less than half the carbon footprint of coal. Canada can help reduce net global emissions by supplying Liquefied Natural Gas (LNG) to global markets. These emissions reductions should receive recognition domestically and internationally as contributing towards Canada’s climate change commitments.
- Technology and Innovation – Leveraging technology and innovation is key to driving sustainable operations and long-term value.
- Canadian Natural supports the development of responsible energy sources, including renewables, as part of the global energy mix that will be needed to meet the world’s energy needs. Renewable energy is supported by natural gas electricity, and as a lower GHG intensive source of energy, natural gas is an integral part of our plan and part of the pathway to long-term emission reductions. Natural gas has less than half the carbon footprint compared to coal and is an important part of the global plan to reduce GHG emissions. 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.

C4 Targets and performance

Targets

(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	Scope	% emissions in Scope	Targeted % reduction from base year	Metric	Base year	Start year
Int1	Scope 1+2 (location-based)	-100	-	Metric tons CO2e per unit of production	-	-

Normalized base year emissions covered by target (metric tons CO2e)	Target year	Is this a science-based target?	% of target achieved	Target status	Please explain	% change anticipated in absolute Scope 1+2 emissions	% change anticipated in absolute Scope 3 emissions
				-In progress	Canadian Natural's overall scope 1+2 emission intensity decreased by 5.0 % in 2018 compared to 2017. Canadian Natural targets continuous improvements in production efficiencies and associated GHG intensity reductions.	-5.0	-

Other climate-related targets

Target	KPI – Metric numerator	KPI – Metric denominator (intensity targets only)	Base year	Start year	Target year
Other: CNRL Emission Reduction Pathway	TCO2e	BOE			

KPI in baseline year	KPI in target year	% achieved in reporting year	Target Status	Please explain	Part of emissions target	Is this target part of an overarching initiative?

-	-	-	Underway	Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils.	-	Other, please specify Canadian Natural emission reduction pathway is aligned with Canadian Naturals Environmental Management System (EMS) and associated GHG emission reduction program. Extensive information is available online for this at https://www.cnrl.com/corporate-responsibility/environment/climate-change/ghg-emissions.html

Target	KPI – Metric numerator	KPI – Metric denominator (intensity targets only)	Base year	Start year	Target year
Methane Reduction Target	Heavy Oil Venting	year	2013	2012	2018

KPI in baseline year	KPI in target year	% achieved in reporting year	Target Status	Please explain	Part of emissions target	Is this target part of an overarching initiative?
172,729	47,462	73	Underway	72% reduction in absolute vent volumes since 2014. Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation in our heavy oil operations and pneumatic controller retrofit projects are part of our methane reduction plan. With 4,000 controller retrofits in 2018 and 2019, we target reductions of up to 400,000 tonnes of CO2 equivalent/year. Since 2014, we have conserved 16.8 million tonnes of carbon dioxide equivalent (CO2e) — equivalent to removing 3.6 million passenger vehicles from the road over the same period.	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.	Other, please specify (Alberta GHG regulations)

Emissions reduction initiatives

(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.
Change from 2018

Yes

Stage of development	Number of initiatives	Total estimated annual CO2e savings in metric tons CO2e (only for rows marked *)
Under investigation	24	Numerical field [enter a number from 0-999,999,999,999 using a maximum of 2 decimal places and no commas]
To be implemented*	1,838	755,732
Implementation commenced*	387	1,861,655
Implemented*	2,142	282,030
Not to be implemented	n/a	n/a

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

Initiative type	Description of initiative	Estimated annual CO2e savings (metric tons CO2e)	Scope	Voluntary/ Mandatory
Other, please specify Venting Reductions		1,958,587	Scope 1	Voluntary

Annual monetary savings (unit currency, as specified in C0.4)	Investment required (unit currency, as specified in C0.4)	Payback period	Estimated lifetime of the initiative	Comment
7,702,942	9,251,700	1 year < 2 years (1.2 years)	Ongoing	

Description of initiative drop-down options (column 2)

Select one of the following options:

Energy efficiency:Processes ● Oil/natural gas methane leak capture/prevention	Other, please specify

(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. 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, 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 climate change scenario analyses from energy firms/agencies. These scenarios incorporate a wide range of assumptions on markets, policy, technology, efficiency and other key variables. We developed two internal scenarios to assess business risk and test resilience: a Reference Scenario based on current policies, and a stricter Constrained Scenario of "well below 2°C". Across the range of ambitious scenarios, it's expected that crude oil and natural gas demand will increase, and Canada is well positioned to be a global supplier of a premium, low carbon emissions intensity product 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. 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.

Low-carbon products

(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	Description of product/ Group of products	Are these low-carbon product(s) or do they enable avoided emissions?	Taxonomy, project, or methodology used to classify product(s) as low-carbon or to calculate avoided emissions	% revenue from low-carbon product(s) in the reporting year	Comment
Product	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. Production of co-products from oil and gas (e.g., carbon fibre and metals such as titanium and lithium) support the renewable energy sector, and energy efficiency improvements overall.	Low-carbon product	Other (Alberta Coal Phase Out)		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

Methane reduction efforts

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

Methane reduction is one of the most cost-effective ways to decrease GHG emissions. Solution gas conservation in our heavy oil operations and pneumatic controller retrofit projects are part of our methane reduction plan. With 4,000 controller retrofits in 2018 and 2019, we target reductions of up to 400,000 tonnes of CO2 equivalent/year.

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.

A comprehensive program is underway to improve detection, monitoring and quantification of methane emissions from area sources, such as mine faces and tailings ponds, and enable more targeted reduction strategies. This project is supported by Emissions Reduction Alberta and is being executed in partnership with Alberta Based LuxMux, Boreal Laser, RWDI Air, the Southern Alberta Institute of Technology (SAIT), the University of Alberta and others.

Leak detection and repair

(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.

Flaring reduction efforts

(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. Canadian Natural and the entire Canadian oil and gas sector have delivered game-changing environmental performance. Canada's oil and gas sector recognized the need to reduce greenhouse gas emissions and we have leveraged technology and Canadian ingenuity to deliver impressive results. If the rest of the world achieved what the Canadian oil and gas industry has in terms of flaring standards, then GHG emissions would be reduced by 23%, equivalent to taking 110 million cars off the road. For reference, that's more than 3 times the number of vehicles on the road today in Canada.

C5 Emissions methodology

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

Scope 1 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)	Comment
21,946,381.4678	

Scope 2 emissions reporting

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

Scope 2, location-based	Scope 2, market-based	Comment
Select from: ● We are reporting a Scope 2, location-based figure ● We are not reporting a Scope 2, location-based figure	● We are reporting a Scope 2, market-based figure ● We have no operations where we are able to access electricity supplier emission factors or residual emission factors, and are unable to report a Scope 2, market-based figure ● We have operations where we are able to access electricity supplier emission factors or residual emissions factors, but are unable to report a Scope 2, market-based figure	
We are reporting a Scope 2, location-based figure	We have no operations where we are able to access electricity supplier emission factors or residual emission factors, and are unable to report a Scope 2, market-based figure	

Scope 2 emissions data

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

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
Numerical field [enter a range of 0-99,999,999,999 using a maximum of 2 decimal places and no commas]	Numerical field [enter a range of 0-99,999,999,999 using a maximum of 2 decimal places and no commas]	Text field [maximum 2,400 characters]
3,069,318		

Exclusions

(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	Relevance of Scope 1 emissions from this source	Relevance of location-based Scope 2 emissions from this source	Relevance of market-based Scope 2 emissions from this source (if applicable)	Explain why this source is excluded
Emissions from fuel consumed in light company vehicles	Emissions are not relevant	No emissions from this source		Estimated to be immaterial (<0.5%). Difficult to track accurately
Propane use for fuel on small sites	Emissions are not relevant	No emissions from this source		Estimated to be immaterial (<0.1%). Difficult to track accurately
Diesel used for backup / emergency generators in conventional operations	Emissions are not relevant	No emissions from this source		Estimated to be immaterial (<0.5%). Difficult to track accurately
Vapour emissions from spills of liquid hydrocarbons and accidental venting incidents	Emissions are not relevant	No emissions from this source		Estimated to be immaterial <1% total facility emissions
CH4 and N2O emissions from land use areas such as surface disturbance and drainage and material reclamation stockpiles	Emissions are not relevant	No emissions from this source		Estimated to be immaterial as per third party report. Not enough information is available to properly quantify on emission from boreal, or similar, landscapes.

Emissions from biologically sequestered carbon

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

No

Emissions intensities

(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	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change	Reason for change
1.12269	25,015,699.63	unit total revenue	1000	Location-based	15.55	Decreased	Higher Revenue due to higher commodity prices

Emissions intensities: Oil and gas

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

Unit of hydrocarbon category (denominator)	Metric tons CO2e from hydrocarbon category per unit specified	% change from previous year	Direction of change	Reason for change	Comment
Other, please specify (1000 BOE)	55.73	8.96	Decreased	Due to continued emission reduction projects and shift to a lower intensity product mix with the AOSP acquisition.	

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

Oil and gas business division	Estimated total methane emitted expressed as % of natural gas production or throughput at given division	Estimated total methane emitted expressed as % of total hydrocarbon production or throughput at given division	Comment
Upstream		0.45	

C7 Emissions breakdown

Scope 1 breakdown: GHGs

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

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

Greenhouse gas	Scope 1 emissions (metric tons in CO2e)	GWP Reference
CO2	16,635,611	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	197,467	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	1,418	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	2,802	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	347	IPCC Fourth Assessment Report (AR4 - 100 year)

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

Emissions category	Value Chain	Product	Gross Scope 1 CO2 emissions (metric tons CO2)	Gross Scope 1 methane emissions (metric tons CH4)	Total gross Scope 1 GHG emissions (metric tons CO2e)	Comment
Fugitives	Upstream	Unable to disaggregate	71,007	93,920	2,419,015	
Venting	Upstream	Oil	25,306	72,019	1,825,783	
Flaring	Upstream	Unable to disaggregate	860,717	1,602	900,777	
Combustion (excluding flaring)	Upstream	Unable to disaggregate	14,667,513	29,836	15,835,582	
Process (feedstock) emissions	Upstream	Oil	1,009,850	0	1,009,850	
Other (please specify)	Upstream	Oil	1,219	89	3,919	Waste and Wastewater emissions

Scope 1 breakdown: country

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

Country/Region	Scope 1 emissions (metric tons CO2e)
Canada	20,413,965
United Kingdom of Great Britain and Northern Ireland	851,545
Cote d'Ivoire	422,377
Gabon	258,494

Scope 1 breakdown: business breakdown

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide. Change from 2018

By business division

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

Business division	Scope 1 emissions (metric tons CO2e)
NA Conventional E&P	12,987,755
Oil Sands Mining	7,426,211
CNR International	1,532,416

Scope 1 breakdown: sector production activities

(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.

Sector production activity	Gross Scope 1 emissions, metric tons CO2e	Net Scope 1 emissions, metric tons CO2e*	Comment
Oil and gas production activities (upstream)**	21,946,381		All activities are upstream oil and gas related

Scope 2 breakdown: country

(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	3,069,318	0	9,831,821	204,834

Scope 2 breakdown: business breakdowns

(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 (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
NA Conventional E&P	14,668,606	
Oil Sands Mining	1,600,712	
CNR International	0	

Scope 2 breakdown: sector production activities

Question C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7 only applies to organizations with activities in the following sectors:

Oil & gas

(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.

Sector production activity	Scope 2, location-based, metric tons CO2e	Scope 2, market-based (if applicable), metric tons CO2e	Comment
Oil and gas production activities (upstream)*	3,069,318		All activities are Upstream oil and gas production related

Emissions performance

(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? Change from 2018

Increased

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.

Reason	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Proper accounting of heat imports from Cogen at Albian Oil sands facility. Also increased energy consumption to facilitate increased production.	1,526,648.35	• Increased	6.5%	The values used in this calculation were: Scope 1 + 2 Emissions 2017 = 23,489,051 Scope 1 + 2 Emissions 2018 = 25,015,699.63

(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

Energy-related activities

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

The energy-related activities that you select in response to C8.2 determine which energy breakdowns you will be prompted to respond to in the proceeding questions. Please note, if your response to C8.2 is amended, data in dependent questions may be erased.

Activity	Indicate whether your organization undertakes this energy-related activity
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.

Activity	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total MWh
Consumption of fuel (excluding feedstock	HHV (Higher Heating Value)	0	85,401,974	85,401,974

Consumption of purchased or acquired electricity	N/A	204,833.89	4,547,320.12	4,752,154.01
Consumption of purchased or acquired steam	N/A	0	5,284,504.37	5,284,504.37
Total energy consumption	N/A	204,833.89	95,438,635	95,643,466

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

Fuel application	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	Yes
Consumption of fuel for the generation of cooling	Yes
Consumption of fuel for co-generation or tri-generation	Yes

C9 Additional metrics

Oil and gas reserves methodology

(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 6 to 11, and 40 of the 2018 Annual report, attached.
For the annual production values in each hydrocarbon type, please see the 2018 Annual Report on pages 26 to 32, attached.

Oil and gas split by development type

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

Canadian Natural publishes production and reserves data in the Company's Annual Reports. For Reserves data, please see pages 6 to 11, and 40 of the 2018 Annual report, attached. For the annual production values in each hydrocarbon type, please see the 2018 Annual Report on pages 26 to 32, attached

Breakeven price (US$/BOE)

(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).

Transfer direction	CO2 transferred – reporting year (metric tons CO2)
CO2 transferred in	0
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)	13,650	100	2004	320,918
Other, please specify (CO2 sequestration in tailings)	81,639	100	2009	243,444

C10 Verification

Verification

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

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

(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	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported emissions verified (%)
Scope 1	Annual process	Complete	Reasonable assurance			Other, please specify (CCIR has replaced Alberta SGER)	55.69%

Scope 1	Annual process	Complete	Reasonable assurance			European Union Emissions Trading System (EU ETS)	3.88%
Scope 1	Annual process	Complete	Reasonable assurance			ISO14064-3	60.81%
Scope 2 location-based	Annual process	Complete	Reasonable assurance			Other, please specify (CCIR has replaced Alberta SGER)	56.24%

Other verified data

(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? Response options

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 CCIR 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 CCIR 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, British Columbia and UK 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 CCIR 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.

C11 Carbon pricing

Carbon pricing systems

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)? Change from 2018

Yes

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

- Alberta carbon tax
- Alberta SGER
- BC carbon tax
- EU ETS
- Other ETS, please specify (Nota Alberta SGER has been replaced with CCIR)

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

System name	% of Scope 1 emissions covered by the ETS	Period start date	Period end date
Alberta SGER (CCIR)	55.69%	01/01/2018	31/12/2018
EU ETS	3.88%	01/01/2018	31/12/2018

Allowances allocated	Allowances purchased	Verified emissions in metric tons CO2e	Details of ownership	Comment
11,475,958	1,629,810	12,221,606.77	Facilities we own and operate	
211,050	628,800	851,545	Facilities we own and operate	

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

Pricing system	Period start date	Period end date	% of emissions covered by tax	Total cost of tax paid	Comment
Alberta Carbon Tax	01/01/2018	31/12/2018			This tax applies to fuel purchases. Data for associated fuel purchases and the % allocated to the Alberta carbon tax is not readily available.
BC Carbon Tax	01/01/2018	31/12/2018	2.88%	$21,300,000	

(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. Canadian Natural is strongly committed to reducing GHG emissions with a long term aspirational target of net zero emissions in our oil sands operations. We support Canada's leadership in the Paris Agreement as a pathway to reduce GHG emissions and drive innovation. In many cases, the GHG emissions intensity of our operations is well below the average intensity for all global crude oils. 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 climate change scenario analyses from energy firms/agencies. These scenarios incorporate a wide range of assumptions on markets, policy, technology, efficiency and other key variables. We developed two internal scenarios to assess business risk and test resilience: a Reference Scenario based on current policies, and a stricter Constrained Scenario of "well below 2°C". Across the range of ambitious scenarios, it's expected that crude oil and natural gas demand will increase, and Canada is well positioned to be a global supplier of a premium, low carbon emissions intensity product 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.

Project-based carbon credits

(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	Project type	Project identification	Verified to which standard
Credit origination	CO2 usage	Hays/Enchant CO2 EOR	Other, please specify (Alberta Offset System)
Credit origination	Fugitive	Pneumatic Replacement Projects	Other, please specify (Alberta Offset System)
Credit origination	Fugitive	Instrument Air Conversion Projects	Other, please specify (Alberta Offset System)
Credit Purchase	Other, please specify (Carbon Capture and Storage)	Quest Carbon Capture and Storage Project	Other, please specify (Alberta Offset System)

Number of credits (metric tons CO2e)	Number of credits (metric tons CO2e): Risk adjusted volume	Credits cancelled	Purpose, e.g. compliance
66,952	66,952	No	Compliance
941	941	No	Compliance
215	215	No	Compliance
346,108	346,108	No	Compliance

Internal price on carbon

(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	GHG Scope	Application	Actual price(s) used (Currency /metric ton)	Variance of price(s) used	Type of internal carbon price	Impact & implication
Other, please specify (assessing project economics)	• Scope 1 • Scope 2	At a project level, for those projects that face a carbon cost or have an opportunity to generate carbon credits	-	-	Shadow price	-

C12 Engagement

Value chain 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	Details of engagement	% of suppliers by number	% total procurement spend (direct and indirect)	% Scope 3 emissions as reported in C6.5	Rationale for the coverage of your engagement	Impact of engagement, including measures of success	Comment
Compliance & onboarding	Other, please specify	-	-	-	-	-	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.

Public policy engagement

(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	Support with minor exceptions	Support overall focus on methane emission reductions. Working with the Canadian Association of Petroleum Producers and directly	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

		with policy makers and regulators to provide advice and analysis on potential regulations.	the incentive-based portion of the hybrid approach
Carbon tax	Support with minor exceptions	Working with the Canadian Association of Petroleum Producers and directly with policy makers and regulators to provide advice and analysis on potential regulations.	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) 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).
Article 6 of Paris Agreement	Support policies that enable the use of ITMOs (Internationally Transferred Mitigation Outcome)	Working with the Canadian Association of Petroleum Producers and directly with Canadian policy makers and regulators to provide advice on the importance of ITMOs to achieving global GHG reductions.	Enable ITMOs under the Paris Agreement. Production of many Canadian products, including oil and natural gas, are at a lower GHG intensity than many competing suppliers globally, meaning that increased Canadian production would help lower global GHG emissions by displacing higher-intensity production.

(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	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you influenced, or are you attempting to influence their position?
Canadian Association of Petroleum Producers (CAPP)	Consistent	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.	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.
Oil & Gas UK	Consistent	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.	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:

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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.

Communications

(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	Status	Attach the document	Page/Section reference	Content elements	Comment
In mainstream reports	Complete	Cnq-2018-annual information0-form-pdf		• Governance • Strategy • Risks & Opportunities • Emissions figures	
In other regulatory filings	Complete	cnq-2018-annual-report.pdf		• Governance • Strategy • Risks & Opportunities • Emissions figures	
In voluntary communications	Complete	2018-stewardship-report-to-stakeholders.pdf		• Governance • Strategy • Risks & Opportunities • Emissions figures	

C14 Signoff

Signoff

(C14.1) Provide details for the person that has signed off (approved) your CDP climate change response.

Job title	Corresponding job category
VP Regulatory, Stakeholder and Environmental Affairs	Other, please specify (VP reg, Stakeholder and Envt Affairs)