

Module: Introduction**Page: Introduction**

CC0.1**Introduction**

Please give a general description and introduction to your organization.

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

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

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

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

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

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

Our Environment team works together with Management and all our operating divisions to ensure environmental stewardship is factored into our decision-making process. In 2010, we initiated an Environmental Excellence Program to enhance our environmental performance, improve communications and awareness and manage potential impacts to land, water and air. We are seeing positive and improved results across our operations.

Our Environmental Excellence Initiative focuses on working together by proactively managing our footprint, protecting biodiversity, using water efficiently, reducing

greenhouse gas (GHG) and other air emissions, and our liabilities. 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 emphasize environmental awareness through employee training, due diligence and communications on environmental priorities.

CC0.2

Reporting Year

Please state the start and end date of the year for which you are reporting data.

The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.

We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year.

Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed

Fri 01 Jan 2016 - Sat 31 Dec 2016

CC0.3

Country list configuration

Please select the countries for which you will be supplying data. If you are responding to the Electric Utilities module, this selection will be carried forward to assist you in completing your response.

Select country

CC0.4**Currency selection**

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

CAD (\$)

CC0.6**Modules**

As part of the request for information on behalf of investors, companies in the electric utility sector, companies in the automobile and auto component manufacturing sector, companies in the oil and gas sector, companies in the information and communications technology sector (ICT) and companies in the food, beverage and tobacco sector (FBT) should complete supplementary questions in addition to the core questionnaire.

If you are in these sector groupings, the corresponding sector modules will not appear among the options of question CC0.6 but will automatically appear in the ORS navigation bar when you save this page. If you want to query your classification, please email respond@cdp.net.

If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below in CC0.6.

Further Information

Module: Management

Page: CC1. Governance

CC1.1

Where is the highest level of direct responsibility for climate change within your organization?

Board or individual/sub-set of the Board or other committee appointed by the Board

CC1.1a

Please identify the position of the individual or name of the committee with this responsibility

The Vice President of Regulatory, Stakeholder & Environmental Affairs is responsible for climate change strategy and issues, and reports monthly to the Management Committee, a group comprised of Canadian Natural's senior executives. Quarterly and annual Stewardship Reports are provided to the Health, Safety and Environment (HSE) Committee of the Board of Directors. In addition, an Integrated Air Emissions Working Group, reporting to the Vice President of Regulatory, Stakeholder & Environmental Affairs has been established within Canadian Natural that meets regularly to review developments related to emissions policy and reporting issues. The working group reviews Company strategies and policies, as well as management, reporting and audit systems.

CC1.2

Do you provide incentives for the management of climate change issues, including the attainment of targets?

Yes

CC1.2a

Please provide further details on the incentives provided for the management of climate change issues

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
All employees	Monetary reward	Other: GHG emissions intensity	Greenhouse gas intensity (tonnes/boe) is one measure in the corporate performance scorecard on which performance bonuses are based.

Further Information

Page: CC2. Strategy

CC2.1

Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities

Integrated into multi-disciplinary company wide risk management processes

CC2.1a

Please provide further details on your risk management procedures with regard to climate change risks and opportunities

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
Six-monthly or more frequently	Board or individual/sub-set of the Board or committee appointed by the Board	Canada, UK, West Africa	3 to 6 years	Risk management with regards to climate change risks and opportunities is monitored quarterly.

CC2.1b

Please describe how your risk and opportunity identification processes are applied at both company and asset level

Canadian Natural incorporates environmental risks and opportunities into all phases of our projects. Canadian Natural works co-operatively and effectively with communities, governments and stakeholders to reduce potential impacts of our operations.

Canadian Natural participates in both the Canadian federal and provincial regulated GHG emissions reporting programs. We continue to quantify annual GHG emissions for internal reporting. We continue to invest in people, proven and new technologies, facilities and infrastructure to recover and process crude oil and natural gas resources efficiently and in an environmentally sustainable manner.

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. Management is responsible for identifying opportunities to reduce emissions as well as identifying key business risks, providing appropriate management of risks and enforcement through policies and procedures. 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 reports are presented quarterly to senior management and Board of Directors

Risk management also occurs at the asset level through recurring project reviews and economic evaluations including forecast GHG intensity and compliance costs and review of abatement projects. Project specific risks and opportunities (e.g., financial incentive opportunities for GHG reduction projects; risk of increased compliance costs) are identified and evaluated in project decision making. These risks and opportunities are reported to Management Committee for incorporation into GHG strategies.

CC2.1c**How do you prioritize the risks and opportunities identified?**

Canadian Natural uses a multi-disciplinary risk management process which considers climate change risks and opportunities as part of the Company's evaluation of business risk and opportunities. Canadian Natural GHG emission reduction strategy is an integrated corporate approach that involves:

- 1) Integrating emission reduction in project planning and operations
- 2) Leveraging technology to create value and enhance performance
- 3) Investing in research and development and supporting collaboration
- 4) Focusing on continuous improvement to drive long-term emissions reductions
- 5) Leading in Carbon Capture and Sequestration/Storage
- 6) Engaging proactively in policy and regulation to manage climate risks and opportunities, including trading capacity and offsetting emissions.

Internally, the Company is pursuing an integrated emissions reduction strategy, to ensure that it is able to comply with existing and future emissions reduction requirements, for both GHGs and air pollutants (such as sulphur dioxide and oxides of nitrogen). The Company continues to develop strategies that reduce GHG emissions and enable management of the risks and opportunities associated with new GHG and air emissions policies. 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. In 2016, we established a cross-functional Methane Steering Committee to coordinate methane reduction projects and track policy/regulatory development.

CC2.1d

Please explain why you do not have a process in place for assessing and managing risks and opportunities from climate change, and whether you plan to introduce such a process in future

Main reason for not having a process	Do you plan to introduce a process?	Comment
--------------------------------------	-------------------------------------	---------

CC2.2

Is climate change integrated into your business strategy?

Yes

CC2.2a

Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process

Canadian Natural, along with Canada's Oil Sands Innovation Alliance (COSIA) and other industry partners, is committed to lowering our GHG emissions, comparable to emissions of crude oil from global sources. As a founding member and active participant in COSIA, Canadian Natural, along with 10 other oil sands operators, is sharing valuable research and development information and technologies. This is an unparalleled collaboration effort to improve industry's environmental performance in the course of our operations.

COSIA's 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.

To date, companies have shared 936 distinct technologies and innovations that cost approximately \$1.3 billion to improve environmental performance through COSIA. 154 technologies, costing over \$200 million to develop, have been shared in the GHG EPA portfolio alone.

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.

Our 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 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. We are tracking the development of policies and regulations at the national and provincial level that are driven by commitments under the Paris Agreement. Our target is to reduce the emissions intensity of the products that we produce. With investments in technology, we are confident Alberta can continue to grow its industry while reducing emissions.

To that end, Canadian Natural has invested \$1.9 billion to date in tailings research, technologies, and project construction at Horizon that reduce both our land and our GHG footprint. Overall, we invested \$549 million into research and development in 2016. In 2015, our \$527 million investment made us the largest R&D crude oil and natural gas investor, ranking us 5th* in Canada across all industries. These results are attributed in part to our core belief that supporting research while developing and adopting innovative technology is the best way to reduce GHG emissions.

- Corporate GHG emissions intensity has decreased by 16 per cent over the last five years
- 71 per cent reduction in heavy oil venting in Alberta since 2012 as a result of solution gas conservation projects. 62 percent reduction occurred between 2014 and 2016. We have conserved over 18.4 million tonnes CO₂e in the last five years.
- Canadian Natural is leading oil and natural gas industry in Carbon Capture and Sequestration (CCS) projects at major facilities. At Horizon, over 130,000

tonnes of CO2 has been injected and sequestered in tailings from 2009 and 2015. We capture and sequester 22,000 tonnes of CO2 per year through an enhanced oil recovery project at our Hays Gas Plant in Taber, Alberta.

- Our incremental gains and strong culture of innovation are delivering significant CO2 reductions through continuous improvement initiatives

Looking ahead, Canadian Natural's strategic advantage is our large, diversified, balanced portfolio of assets. Our natural gas assets are a key element in the pathway to a low carbon future. Canadian Natural is the largest producer of natural gas in Canada representing 35% of total production in 2016 on a barrel of oil equivalent basis. As a reliable and affordable energy source, natural gas delivers improved environmental performance because it has less than half the carbon footprint of coal. To this end, the development, export, and usage of natural gas to replace higher-emitting sources of greenhouse gases is part of the strategy for Canadian Natural and Canada's pathway to a low carbon future.

Long-life, low decline assets create long-term value and opportunities to lower GHG emissions. Canadian Natural's manufacturing like oil sands projects create a platform for step-changes that have a long-term positive impact on reducing environmental footprint. With our long-life, low decline assets representing a reserve life of over 50 years and our dedication to continuous improvement, the investments we make today translate into long-term value in positive environmental impacts for decades to come.

With abundant, affordable, and reliable energy essential to modern life and the expectation that demand for crude oil and natural gas will continue to increase, Canadian Natural's long-life, low-decline oil sands production will be an important part of the global energy supply. 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.

CC2.2b

Please explain why climate change is not integrated into your business strategy

CC2.2c

Does your company use an internal price on carbon?

Yes

CC2.2d

Please provide details and examples of how your company uses an internal price on carbon

We use an internal price of carbon based on current government policy for each area we operate in to evaluate returns on future projects under different potential carbon regulations, and we also use an internal price of carbon in evaluating emission reduction projects. Carbon pricing does not automatically drive emission reductions, nor does it automatically incent innovation without unduly harming competitiveness. For these reasons, Canadian Natural supports a hybrid approach which combines regulatory and incentive-based measures to drive technology and innovation, and best practices. Incentive-based measures may include offset credits or technology funding for commercialization and pilot projects. Emissions from smaller facilities are better and more efficiently managed through both direct regulatory and incentive-based measures because there are a large number of small facilities that tend to have shorter lifespans and fewer opportunities for emission reductions after the facility is constructed and the economics of emissions reduction for such facilities are challenged. Outcome-based, rather than technology-specific, regulations and standards are better for larger facilities. Large emitters have economies of scale, longer time horizons, and more opportunities for emissions reductions.

CC2.3

Do you engage in activities that could either directly or indirectly influence public policy on climate change through any of the following? (tick all that apply)

- Direct engagement with policy makers
- Trade associations
- Funding research organizations

CC2.3a

On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Regulation of methane emissions	Support with minor exceptions	<ul style="list-style-type: none"> • Support overall focus on methane emission reductions • Working with the Canadian Association of Petroleum Producers and directly with policy makers and regulators to provide advice and analysis on potential regulations 	<ul style="list-style-type: none"> • Support provincial hybrid approaches to methane regulation. Advocating for an incentive-based period for reducing methane emissions prior to regulations coming into effect. • Methane regulations should be implemented in a staged approach to reflect the reductions that are delivered through the incentive-based portion of the hybrid approach.
Carbon tax	Support with minor exceptions	<ul style="list-style-type: none"> • Working with the Canadian Association of Petroleum Producers and directly with policy makers and regulators to provide advice and 	<ul style="list-style-type: none"> • 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

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
		analysis on potential regulations	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)

CC2.3b

Are you on the Board of any trade associations or provide funding beyond membership?

Yes

CC2.3c

Please 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, or are you attempting to, influence the position?
Canadian Association of Petroleum Producers (CAPP), Oil & Gas UK	Consistent	CAPP's Climate Change Policy Principles Balance 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.	The Company is working with relevant parties, such as CAPP and Oil & Gas UK, to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development.

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
		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.	

CC2.3d

Do you publicly disclose a list of all the research organizations that you fund?

No

CC2.3e

Please provide details of the other engagement activities that you undertake

CC2.3f

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?

To ensure that the processes and activities we have in place are consistent with our climate change strategy, we are committed to GHG emissions reduction through the following integrated corporate approach:

- 1) Integrating emission reduction in project planning and operations
 - Environmental considerations and planning is incorporated into all phases of our projects.
 - We consider the life cycle costs of emission reductions in decision-making during project development.

- Capital is invested to reduce GHG emissions.
- 2) Leveraging technology to create value and enhance performance
 - Canadian Natural believes that developing and adopting innovative technology will drive emission reductions and improve efficiencies. Actions we take in Canada can be transferred globally to amplify the overall GHG reductions.
- 3) Investing in research and development
 - Through significant investments in research and technologies, Canadian Natural identifies, evaluates and develops technologies that will achieve the greatest, cost effective impact on emissions reductions.
 - A substantial portion of Canadian Natural's research and development activities is in collaboration with industry, academia and government. Working together drives everyone up the technology curve exponentially faster.
- 4) Focusing on continuous improvement to drive long-term emissions reductions
 - Being innovative in day-to-day operational practices achieves incremental gains, increases productivity and improves environmental performance.
 - Incremental gains deliver significant GHG reductions.
 - By improving energy conservation and efficiency, we deliver substantial and long-term emissions reductions.
- 5) Leading in Carbon Capture and Sequestration/Storage (CCS)
 - By taking waste CO₂ from our operations and utilizing it as an input to improve performance, we are leveraging technology to create value in tailings management and for enhanced oil recovery.
 - In this way, CCS is a key element in the pathway for oil and natural gas to be part of a low carbon future.
 - Canadian Natural operates or has an ownership stake in carbon capture and storage or carbon capture and utilization projects including the Horizon CO₂ in tailings project, the Quest CCS project and the Sturgeon Refinery carbon capture project. Once the Sturgeon project is fully operational, these projects will capture and sequester about 2.7 million tonnes of CO₂ per year, the equivalent of removing 562,000 cars from the road.
- 6) Engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions
 - We apply trading mechanisms to ensure compliance with requirements now in effect.
 - Canadian Natural, directly and through industry groups and associations, is working with Canadian legislators and regulators as they develop and implement new GHG emissions laws and regulations to enhance GHG reduction performance.
 - We are working with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development.

As a founding member and active participant in Canada's Oil Sands Innovation Alliance (COSIA) and one of their largest COSIA contributors and a board member of Petroleum Technology Alliance of Canada (PTAC), Canadian Natural has an important role in helping to meet the industry's goal by leveraging technology and innovation to reduce emissions. With COSIA's Greenhouse Gas Environmental Priority Area (EPA) investigating ways to reduce energy use and associated GHG emissions through the development of innovative technologies for oil sands in situ and mining operations. We are working at PTAC to facilitate innovation, collaborative research and technology development, demonstration and deployment in support of a responsible Canadian hydrocarbon energy industry.

For example, Canadian Natural recently participated in a collaborative process with other producers and environmental organizations to provide policy advice to the Government of Alberta. In November 2015, Alberta announced an unprecedented Climate Leadership Plan that incents ongoing innovation and technology investment in the crude oil and natural gas sector. Canadian Natural supports the Province of Alberta's strong leadership to reduce emissions from the crude oil and natural gas sector. This plan, along with stringent climate frameworks in several other Canadian jurisdictions, positions Alberta and Canada among the most responsible crude oil and natural gas producing jurisdictions globally. Demonstrating that governments and the energy industry can work together to develop leading climate policy and regulation contributing to long-term responsible resource development serves as a model for other nations – amplifying Canada's climate leadership internationally.

CC2.3g

Please explain why you do not engage with policy makers

Further Information

Page: CC3. Targets and Initiatives

CC3.1

Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?

Intensity target

CC3.1a

Please provide details of your absolute target

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO2e)	Target year	Is this a science-based target?	Comment
----	-------	-------------------------	----------------------------	-----------	--	-------------	---------------------------------	---------

CC3.1b

Please provide details of your intensity target

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Target year	Is this a science-based target?	Comment
Int1	Scope 1	95%		Metric tonnes CO2e per unit of production				No, and we do not anticipate setting one in the next 2 years	As a company and an industry, our investments in technology and innovation will drive further global reductions in reducing the emissions intensity of oil sands comparable to crude oil from other sources. We have made significant progress on reducing our emissions using a defined pathway. COSIA companies have implemented innovative practices and technologies in addition to the ones we are exploring in order to reach the goal of crude oil that is produced with lower greenhouse gas emissions than global sources of oil. Canadian Natural has project specific targets at selective operations, and a corporate emissions reduction target to reduce CO2 emission intensity and to meet any regulated requirements. Canadian Natural's overall target is to reduce the Scope 1 intensity of our different product streams over time. Because the product mix changes, an overall intensity metric would not be meaningful as a year to year comparison. 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.

CC3.1c

Please also indicate what change in absolute emissions this intensity target reflects

ID	Direction of change anticipated in absolute Scope 1+2 emissions at target completion?	% change anticipated in absolute Scope 1+2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion?	% change anticipated in absolute Scope 3 emissions	Comment
----	---	--	---	--	---------

CC3.1d

Please provide details of your renewable energy consumption and/or production target

ID	Energy types covered by target	Base year	Base year energy for energy type covered (MWh)	% renewable energy in base year	Target year	% renewable energy in target year	Comment
----	--------------------------------	-----------	--	---------------------------------	-------------	-----------------------------------	---------

CC3.1e

For all of your targets, please provide details on the progress made in the reporting year

ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Int1			Canadian Natural's overall scope 1+2 emission intensity increased by 0.8% in 2016 compared to 2015.

CC3.1f

Please explain (i) why you do not have a target; and (ii) forecast how your emissions will change over the next five years

CC3.2

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

CC3.2a

Please 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 you reporting low carbon product/s or 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	% R&D in 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.	Low carbon product	Other:	13%	Less than or equal to 10%	

CC3.3

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

Yes

CC3.3a

Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings

Stage of development	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	378	
To be implemented*	363	749381
Implementation commenced*	407	2446969
Implemented*	30	120757
Not to be implemented		

CC3.3b

For those initiatives implemented in the reporting year, please provide details in the table below

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Energy efficiency: Processes	Canadian Natural has participated in an engine fuel gas management program which reduces Scope 1 emissions by installing equipment to reduce NOx emissions on compressors while increasing uptime and better controlling fuel usage thus also reducing methane emissions. The project has been running over the last several years.	11096	Scope 1	Voluntary				Ongoing	
Low carbon energy installation	Canadian Natural has installed electric drive compressors at our Septimus facility, thereby reducing Scope 1 emissions year over year by using cleaner power.	71228	Scope 1	Voluntary				Ongoing	
Waste recovery	Canadian Natural has a strong solution gas recovery program running at our heavy oil facilities in Alberta and Saskatchewan. Gas is conserved from crude oil production that would otherwise be vented. Scope 1 emissions are reduced.	2446969	Scope 1	Voluntary Mandatory				Ongoing	
Other	At Canadian Natural's Hays Gas Plant Formation CO2 is sent to injection wells off site to be used for enhanced oil recovery.	22287	Scope 1	Voluntary				Ongoing	
Energy efficiency: Processes	A key priority of Canadian Natural's operational responsibility is a commitment to environmental excellence. One of the ways we demonstrate this commitment at Horizon is through our partnership with Inter Pipeline Ltd. (formerly Williams Energy Canada), to capture the off-gas (natural gas liquids and olefins) produced at the upgrader. Construction on the	95000	Scope 1	Voluntary				Ongoing	Joint venture with Inter Pipeline Ltd.

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
	liquids extraction plant at Horizon was completed in the fall of 2015 and it began operating in February 2016. This project helps us reduce greenhouse gas (GHG) and sulphur dioxide (SO2) emissions from our operations. In 2016, we avoided almost 95,000 tonnes of CO2. We are targeting a reduction of approximately 200,000 tonnes of CO2 emissions and 2,000 tonnes of SO2 per year, following Horizon's expansion to 250,000 barrels per day in 2017. The plant captures and further processes the off-gas, extracting the natural gas liquids (NGLs) including propane, butane and condensate, and the olefins propylene, butylene and olefinic condensate, from the off-gas. These NGLs and olefins are transported via pipeline to the Redwater facility. The remaining gas, now cleaner, is sent back to our upgrader to be mixed back in with natural gas, which is then used as fuel. At the end of this process, Canadian Natural has a cleaner burning fuel source and lower overall emissions.								

CC3.3c

What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Employee engagement	Our Field Operations teams provide valuable input on new opportunities.
Partnering with governments on technology development	Canadian Natural is participating in the Algal Carbon Conversion (ACC) Project as an observer in the first stage of deployment of a biorefinery. This project will capture carbon dioxide (CO2) and waste heat, and treat them with algae to release bio-oil. An economic and engineering assessment was initiated by our company with the National Research Council of Canada (NRC) and Pond Technologies, a Canadian algae technology company in 2013. The NRC, Pond Technologies and St. Marys Cement began testing this technology in 2016 at a pilot-scale biorefinery at St Marys Cement plant in Ontario. Canadian Natural will share in the results from the activities at the St Marys Cement plant, and further participate in the planning and development of a later stage two deployment, anticipated for an oil sands operation. The objective of this project is to generate bio-oil to be used for biofuels and bioplastics — and, at an oil sands operation, blended into heavy oil or synthetic crude oil. The leftover biomass can then be used to feed livestock and for land reclamation.
Compliance with regulatory requirements/standards	Provincial and Federal governments have announced GHG emissions reduction targets from the oil and gas industry. Canadian Natural is evaluating technologies that have the potential to help achieve these targets.
Other	Canadian Natural tracks the development of new technologies and evaluates their feasibility for our operations. We evaluate different carbon price scenarios to identify available reduction options. We work closely with offset aggregators to understand new project opportunities.

CC3.3d

If you do not have any emissions reduction initiatives, please explain why not

Further Information

Page: CC4. Communication

CC4.1

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	Page/Section reference	Attach the document	Comment
In mainstream reports (including an integrated report) but have not used the CDSB Framework	Complete	Pages 45-47	https://www.cdp.net/sites/2017/67/2667/Climate Change 2017/Shared Documents/Attachments/CC4.1/cnq-2016-annual-report.pdf	
In other regulatory filings	Complete	Pages 10-12	https://www.cdp.net/sites/2017/67/2667/Climate Change 2017/Shared Documents/Attachments/CC4.1/annual-information-form-2016.pdf	
In voluntary communications	Underway - previous year attached	Pages 26-27	https://www.cdp.net/sites/2017/67/2667/Climate Change 2017/Shared Documents/Attachments/CC4.1/2015-report-to-stakeholders_web.pdf	

Further Information

Module: Risks and Opportunities

Page: CC5. Climate Change Risks

CC5.1

Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

- Risks driven by changes in regulation
- Risks driven by changes in physical climate parameters
- Risks driven by changes in other climate-related developments

CC5.1a

Please describe your inherent risks that are driven by changes in regulation

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Emission reporting obligations	<p>In Alberta, GHG regulations came into effect July 1, 2007, affecting facilities emitting more than 100 kilotonnes of CO₂e annually. Four of the Company's facilities, the Horizon facility, the Primrose/Wolf Lake in situ heavy crude oil facilities, the Hays sour natural gas plant, and the Wapiti gas plant are subject to compliance under the regulations. The Kirby South in situ heavy crude oil facility will be subject to compliance under the regulations in 2016.</p> <p>Saskatchewan is expected to release GHG regulations that would require the North Tangleflags in-situ heavy oil facility to meet a reduction target for its GHG</p>	Increased operational cost	1 to 3 years	Direct	Very likely	Unknown		<p>The Company, through CAPP, is working with Canadian legislators and regulators as they develop and implement new GHG emissions laws and regulations. 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 GHGs 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. In addition, the Company is working</p>	<p>The additional requirements of enacted or proposed GHG legislation on the Company's operations will increase capital expenditures and production expense, especially those related to Horizon and the Company's other existing and planned large oil sands projects. Depending on the legislation enacted, this may have an adverse effect on the Company's financial condition.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	emissions intensity.							with relevant parties to ensure that new policies encourage technological innovation, energy efficiency, and targeted research and development while not impacting competitiveness	
Air pollution limits		Increased operational cost	3 to 6 years	Direct	Very likely	Unknown		Canadian Natural supports the Oil Sands Emissions Limit that is being implemented by the Government of Alberta. We believe this will contribute to improved environmental performance delivered through technology improvements.	Unknown due to policy uncertainty
Carbon taxes		Increased operational cost	1 to 3 years	Direct	Very likely	Unknown		Working with the Canadian Association of Petroleum Producers and directly with policy makers and regulators to provide advice and analysis on potential regulations. We support carbon	Unknown due to policy uncertainty

Risk driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								pricing programs, if there is allowance for competitiveness impacts on energy-intensive-trade-exposed sectors, and if a significant portion of revenue is used for developing technologies that will reduce carbon emissions.	
Cap and trade schemes		Increased operational cost	1 to 3 years	Direct	Very likely	Unknown		Working with the Canadian Association of Petroleum Producers and directly with policy makers and regulators to provide advice and analysis on potential regulations. We support carbon pricing programs (which could include cap and trade schemes), if there is allowance for competitiveness impacts on energy-intensive-trade-exposed sectors, and if a significant portion of revenue is used for developing	Unknown due to policy uncertainty

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								technologies that will reduce carbon emissions.	

CC5.1b

Please describe your inherent risks that are driven by changes in physical climate parameters

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in mean (average) temperature	Changes in weather patterns	Increased operational cost	Unknown	Direct	Unknown	Unknown		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.	minimal
Sea level rise	Issues on international drilling / operations platforms and FPSO's.	Increased operational cost	Unknown	Direct	Unknown	Unknown		Canadian Natural recognizes that climate change issues pose risks that are unpredictable although, due to the geographically diverse nature of our operations	minimal

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								Canadian Natural does not see weather related issues as having a substantive impact.	
Change in temperature extremes	Personnel safety. Equipment issues.	Increased operational cost	Unknown	Direct	Unknown	Unknown		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	Minimal

CC5.1c

Please describe your inherent risks that are driven by changes in other climate-related developments

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Uncertainty in market signals	Unpredictable business outcomes due to climate issues	Other:	Unknown	Direct	Unknown	Unknown		Canadian Natural engages in scenario planning exercises to help identify and define various risks to the business, and then develops a variety of potential responses and strategies to manage those risks. The strategy is based on our 6 core principles for GHG emissions management: •Integrating emission reduction in project	Unknown due to degree of management methods that will be implemented.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								<p>planning and operations.</p> <ul style="list-style-type: none"> •Leveraging technology to create value and enhance performance. Development and adoption of innovative technology drives emission reductions and improves efficiencies. •Investing in R&D. Many of our R&D activities occur in collaboration with industry, academia and government. •Focusing on continuous improvement to drive long-term emissions reductions. By improving energy conservation and operational efficiencies in our day-to-day practices, we deliver substantial and long-term emissions reductions. •Leading in CCS. By taking waste CO2 from our operations and utilizing it for operational input, CCS is a key element in the pathway for oil and natural gas to be part of a low carbon future. •Engaging proactively in policy and regulation to effectively manage climate risks and opportunities, including trading capacity and offsetting emissions. We work together with industry, governments, Indigenous groups and non-governmental organizations to develop climate policies that encourage 	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								technological innovation, energy efficiency, and R&D, while maintaining industry competitiveness.	
Changing consumer behavior		Other:	Unknown	Direct	Unknown	Unknown		Many independent analysts expect demand for crude oil and natural gas to grow, remaining an important part of the global energy mix for the foreseeable future. The International Energy Agency (IEA) has a number of global demand models and under the most stringent scenario (450 Scenario) that takes into account new policies to meet Paris commitments, there will need to be significant oil resources developed to meet expected demand. The world will continue to need energy and new crude oil and natural gas development – Canada is well positioned to meet this demand. Canadian oil and natural gas is produced under some of the highest standards in the world, including strict emissions regulations and programs, carbon pricing regimes and investments in carbon capture and storage. This positions Canada to be a preferred global source of environmentally responsible oil and natural gas, and an	Unknown due to degree of management methods that will be implemented.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								important part of a low carbon energy future. Canadian Natural participated in a collaborative process with other producers and environmental organizations to provide policy advice to the Government of Alberta. Canadian Natural supports the Province of Alberta's strong leadership to reduce emissions from the oil and natural gas sector. Alberta's Climate Leadership Plan, along with stringent climate frameworks in several other Canadian jurisdictions, positions Alberta and Canada among the most responsible crude oil and natural gas producing jurisdictions globally.	
Other drivers	Relative carbon intensities of different fuels	Other:	Unknown	Direct	Unknown	Unknown		Natural gas is a key element in the pathway to a low carbon future. Canadian Natural is the largest producer of natural gas in Canada representing 35% of total production in 2016 on a barrel of oil equivalent basis. As a reliable and affordable energy source, natural gas delivers improved environmental performance because it has less than half the carbon footprint of coal. To this end, the development, export, and usage of natural	Unknown due to degree of management methods that will be implemented.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								gas to replace higher-emitting sources of greenhouse gases is part of the strategy for Canada's pathway to a low carbon future. Long-life, low decline assets create long-term value and opportunities to lower GHG emissions. Canadian Natural's manufacturing like oil sands projects create a platform for step-changes that have a long-term positive impact on reducing environmental footprint. With our long-life, low decline assets representing a reserve life of over 50 years and our dedication to continuous improvement, the investments we make today translate into long-term value in positive environmental impacts for decades to come.	
Other drivers	Relative carbon intensities of different fuels	Other:	Unknown	Direct	Unknown	Unknown		Natural gas is a key element in the pathway to a low carbon future. Canadian Natural is the largest producer of natural gas in Canada representing 35% of total production in 2016 on a barrel of oil equivalent basis. As a reliable and affordable energy source, natural gas delivers improved environmental performance because it has less than half the carbon footprint of coal. To	Unknown due to degree of management methods that will be implemented.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								<p>this end, the development, export, and usage of natural gas to replace higher-emitting sources of greenhouse gases is part of the strategy for Canada's pathway to a low carbon future. Long-life, low decline assets create long-term value and opportunities to lower GHG emissions. Canadian Natural's manufacturing like oil sands projects create a platform for step-changes that have a long-term positive impact on reducing environmental footprint. With our long-life, low decline assets representing a reserve life of over 50 years and our dedication to continuous improvement, the investments we make today translate into long-term value in positive environmental impacts for decades to come.</p>	

CC5.1d

Please explain why you do not consider your company to be exposed to inherent risks driven by changes in regulation that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC5.1e

Please explain why you do not consider your company to be exposed to inherent risks driven by changes in physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC5.1f

Please explain why you do not consider your company to be exposed to inherent risks driven by changes in other climate-related developments that have the potential to generate a substantive change in your business operations, revenue or expenditure

Further Information

Page: CC6. Climate Change Opportunities

CC6.1

Have you identified any inherent climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

- Opportunities driven by changes in regulation
- Opportunities driven by changes in physical climate parameters
- Opportunities driven by changes in other climate-related developments

CC6.1a

Please describe your inherent opportunities that are driven by changes in regulation

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Fuel/energy taxes and regulations	Reduction in GHG compliance costs due to reduction in emissions.	Reduced operational costs	1 to 3 years	Direct	Likely	Low	Reduction of current cost to purchase a clean CO2 stream. Reduction of compliance costs.	An innovative method for reducing CO2 emissions is the process of adding CO2 to our tailings lines at Horizon. We have been adding purchased waste CO2 to our tailings at Horizon since 2009 to enhance the solids settling rate, reduce our footprint and sequester CO2 in the process. Over 130,000 tonnes of CO2 have been injected from 2009 to 2015. A CO2 recovery plant (replacing the purchased CO2) being commissioned in 2017 will have the capacity to recover 438,000 tonnes of CO2 annually from our hydrogen plant, the equivalent of	The CO2 capture facility is a significant investment as part of Horizon's phase II/III expansion

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								<p>removing the emissions of 77,000 cars from the road. We are further proactively managing the fines going into the tailings by injecting CO2 in our innovative Non-Segregating Tailings (NST), commissioned in late 2015. This process optimizes fines capture and accelerates tailings dewatering, while recovering warm water that is re-used in the bitumen production process. The NST process is expected to achieve multiple operational and environmental benefits, including:</p> <ul style="list-style-type: none"> •GHG emissions reduction as less natural gas consumption is required when 	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								warm process water is reused •CO2 sequestration in the tailings pond; and •Tailings pond size reduction to approximately half the size it would have been without these technologies. A process is underway to obtain verification and credit for this type of CCS process.	
Fuel/energy taxes and regulations	Reduction in capital costs due to improved technology	Reduced capital costs	>6 years	Direct	More likely than not	Unknown	Canadian Natural is pursuing a number of opportunities where technologies are being applied that offer improved environmental performance in our operations and reduce our carbon footprint. Improved	Canadian Natural is participating in the Algal Carbon Conversion (ACC) Project as an observer in the first stage of deployment of a biorefinery. This project will capture carbon dioxide (CO2) and waste heat, and treat them with algae to release bio-oil. In 2013, an economic and	Not yet determined

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							<p>technology which lowers emissions has the potential to lower both capital and operating costs.</p>	<p>engineering assessment was initiated by our company with the National Research Council of Canada (NRC) and Pond Technologies, a Canadian algae technology company. The NRC, Pond Technologies and St. Marys Cement began testing this technology in 2016 at a pilot-scale biorefinery at St Marys Cement plant in Ontario. Canadian Natural will share in the results from the activities at the St Marys Cement plant, and further participate in the planning and development of a later stage two deployment, anticipated for an oil sands operation. The objective of this project is to</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								generate bio-oil to be used for biofuels and bioplastics — and, at an oil sands operation, blended into heavy oil or synthetic crude oil. The leftover biomass can then be used to feed livestock and for land reclamation.	
Voluntary agreements	Reduction in capital costs due to improved technology	Reduced capital costs	>6 years	Direct	More likely than not	Unknown	Canadian Natural is a founding member and active participant in Canada's Oil Sands Innovation Alliance (COSIA). Through COSIA, oil sands operators are sharing valuable R&D information and technologies. COSIA's aspiration is to produce crude	COSIA's members share technologies, research and innovation. To date, companies have shared 936 distinct technologies and innovations that cost approximately \$1.3 billion to improve environmental performance through COSIA. 154 technologies, costing over \$200 million to develop, have been shared in the GHG EPA portfolio alone.	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							<p>oil with lower GHG emissions than global sources of crude oil. COSIA's GHG group 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</p>		

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							come, all while delivering the safe, secure, reliable and environmentally responsible energy the world needs.		
Other regulatory drivers	Partnership with North West Upgrading. New technology reduces GHG emissions for upgraded products.	Increased production capacity	1 to 3 years	Indirect (Supply chain)	Virtually certain	Medium-high	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.	The Company has a 50% interest in the North West 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.	Canadian Natural is a 50% partner in North West Redwater
Voluntary agreements	Reduction in methane	Reduced operational costs	>6 years	Direct	Likely	Unknown	Capital expenditure will	Canadian Natural has project	Not yet determined

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	emissions under non-regulated period						be required to retrofit equipment	specific targets at selective operations, and a corporate emissions reduction target to reduce CO2e emission intensity and to meet any regulated requirements. Canadian Natural's overall target is to reduce the Scope 1 intensity of our different product streams over time. This includes methane emissions. Voluntary methane emissions reduction programs that are being developed include retrofitting pneumatic devices.	
Voluntary agreements	Funding Xprize sponsorship	New products/business services	3 to 6 years	Indirect (Supply chain)	Likely	Unknown	unknown	In addition to current projects and innovative operating practices, we support the	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								<p>US\$20 million NRG COSIA Carbon XPRIZE. This global competition is intended to identify new technologies that will transform CO2 emissions from industrial facilities into valuable and usable products. The governments of Canada and Alberta, together with industry partners and the Shepard Energy Centre (a joint venture of ENMAX and Capital Power); have invested in the development of a \$20 million Alberta Carbon Conversion Technology Centre (ACCTC). The ACCTC is a facility where NRG COSIA Carbon XPRIZE finalists will test their technologies</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								and one of the few places in the world where carbon conversion technologies can be tested on a large, commercial scale.	
Other regulatory drivers	Hays CO2 injection	Reduced operational costs	1 to 3 years	Direct	Very likely	Unknown	unknown	At Canadian Natural's Hays gas plant, Formation CO2 is sent to injection wells off site to be used for enhanced oil recovery.	Not yet determined
Voluntary agreements	Liquid Extraction Plant at Horizon	Reduced operational costs	1 to 3 years	Direct	Virtually certain	Low	Reduction of GHG related compliance costs due to use of a cleaner burning fuel source.	Canadian Natural's operational responsibility is a commitment to environmental excellence. One of the ways we demonstrate this commitment at Horizon is through our partnership with Inter Pipeline Ltd. (formerly Williams Energy Canada), to capture the off-gas (natural gas liquids and	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								<p>olefins) produced at the upgrader. Construction on the liquids extraction plant at Horizon was completed in the fall of 2015 and it began operating in February 2016. This project helps us reduce greenhouse gas (GHG) and sulphur dioxide (SO2) emissions from our operations. In 2016, we avoided almost 95,000 tonnes of CO2. We are targeting a reduction of approximately 200,000 tonnes of CO2 emissions and 2,000 tonnes of SO2 per year, following Horizon's expansion to 250,000 barrels per day in 2017. The plant captures and further processes the off-gas,</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								extracting the natural gas liquids (NGLs) including propane, butane and condensate, and the olefins propylene, butylene and olefinic condensate, from the off-gas. These NGLs and olefins are transported via pipeline to Inter Pipeline's Redwater facility. The remaining gas, now cleaner, is sent back to our upgrader to be mixed back in with natural gas, which is then used as fuel. At the end of this process, Canadian Natural has a cleaner burning fuel source and lower overall emissions.	

CC6.1b

Please describe your inherent opportunities that are driven by changes in physical climate parameters

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in temperature extremes	Canadian Natural plans for extreme weather events within its operations. The Company should not be impacted by climate changes.	Other:	>6 years	Direct	Unknown	Unknown	The opportunities associated with a change in physical climate parameters are difficult to quantify and would likely be offset by additional risks such as increased regulatory compliance or Environmental obligations. Market price signals will drive additional or fewer projects. Due to this uncertainty, these opportunities do not drive our business plans. The Company has not evaluated the potential financial implications of each of the drivers.	Not applicable	Not applicable

CC6.1c

Please describe your inherent opportunities that are driven by changes in other climate-related developments

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Changing consumer behavior	Addition of alternative fuels to the portfolio, such as bio-fuel.	New products/business services	>6 years	Direct	Unknown	Unknown		Canadian Natural is participating in the Algal Carbon Conversion (ACC) Project as an observer in the first stage of deployment of a biorefinery. This project	Not yet determined

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								<p>will capture carbon dioxide (CO2) and waste heat, and treat them with algae to release bio-oil. In 2013, an economic and engineering assessment was initiated by our company with the National Research Council of Canada (NRC) and Pond Technologies, a Canadian algae technology company. The NRC, Pond Technologies and St. Marys Cement began testing this technology in 2016 at a pilot-scale biorefinery at St Marys Cement plant in Ontario. Canadian Natural will share in the results from the activities at the St Marys Cement plant, and further participate in the planning and development of a later stage two deployment, anticipated for an oil sands operation. The objective of this project is to generate bio-oil to be used for biofuels and bioplastics — and, at an oil sands operation, blended into heavy oil or</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								synthetic crude oil. The leftover biomass can then be used to feed livestock and for land reclamation.	

CC6.1d

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in regulation that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC6.1e

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC6.1f

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in other climate-related developments that have the potential to generate a substantive change in your business operations, revenue or expenditure

Further Information

Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading

Page: CC7. Emissions Methodology

CC7.1

Please provide your base year and base year emissions (Scopes 1 and 2)

Scope	Base year	Base year emissions (metric tonnes CO2e)
Scope 1		
Scope 2 (location-based)		
Scope 2 (market-based)		

CC7.2

Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use

Please select the published methodologies that you use

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

CC7.2a

If you have selected "Other" in CC7.2 please provide details of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

CC7.3

Please give the source for the global warming potentials you have used

Gas	Reference
CO2	Other: Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014
CH4	Other: Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014
N2O	Other: Alberta Government, Technical Guidance for Completing Specified Gas Compliance Reports, Ver 7, Table 2, GWP values for 2014

CC7.4

Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data at the bottom of this page

Fuel/Material/Energy	Emission Factor	Unit	Reference
Other: Fuel gas	2.121	Other: Metric t CO2e per e3m3	CAPP 2003, Form GHG SF
Other: Flared gas	2.583	Other: Metric t CO2e per e3m3	CAPP 2003, Form GHG SF
Other: Vented gas	16.512	Other: Metric t CO2e per e3m3	CAPP 2003, Form GHG SF, based on 97.3% methane content in vent gas
Other: Fugitive Emissions	7922	Other: Metric t CO2e per e3m3	Internal estimate, based on 3rd party study

Further Information

Page: **CC8. Emissions Data - (1 Jan 2016 - 31 Dec 2016)**

CC8.1

Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Operational control

CC8.2

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

18774161

CC8.3

Please describe your approach to reporting Scope 2 emissions

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

CC8.3a

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
1790864		

CC8.4

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

CC8.4a

Please 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 the source is excluded
Emissions from fuel consumption in light company vehicles	Emissions are not relevant	No emissions from this source	No emissions from this source	Estimated to be immaterial (< 0.5%). Difficult to track accurately.
Propane use for fuel and heat on small sites	Emissions are not relevant	No emissions from this source	No emissions from this source	Estimated to be immaterial (< 0.1%).
Diesel use for backup / emergency generators in Conventional operations.	Emissions are not relevant	No emissions from this source	No emissions from this source	Estimated to be immaterial (< 0.5%). Difficult to track accurately

CC8.5

Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	More than 5% but less than or equal to 10%	Data Gaps Assumptions Metering/ Measurement Constraints Other: emission	It is impractical to meter all emission sources. Other sources of uncertainty are: • Volumetric data (especially for vent volumes which are typically not metered), • Composition of fuel gas burned, • Accuracy of emission factors for N2O and CH4 (especially for compressor engines), • Fugitive emissions which are estimates at almost every facility.

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
		factors	
Scope 2 (location-based)	Less than or equal to 2%	Metering/ Measurement Constraints Other: emission factors	Metering is believed to be accurate to within prescribed specifications. Emissions from electricity generation will be dependent on accuracy of emission factors used.
Scope 2 (market-based)	Less than or equal to 2%		No market-based Scope 2 emissions.

CC8.6

Please indicate the verification/assurance status that applies to your reported Scope 1 emissions

Third party verification or assurance process in place

CC8.6a

Please provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements

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 Scope 1 emissions verified (%)
Annual process	Complete	Reasonable assurance			ISO14064-3	51
Annual process	Complete	Reasonable assurance			European Union Emissions Trading System (EU ETS)	5

CC8.6b

Please provide further details of the regulatory regime to which you are complying that specifies the use of Continuous Emission Monitoring Systems (CEMS)

Regulation	% of emissions covered by the system	Compliance period	Evidence of submission

CC8.7

Please indicate the verification/assurance status that applies to at least one of your reported Scope 2 emissions figures

No third party verification or assurance

CC8.7a

Please provide further details of the verification/assurance undertaken for your location-based and/or market-based Scope 2 emissions, and attach the relevant statements

Location-based or market-based figure?	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 Scope 2 emissions verified (%)
--	--	--------------------------------------	-----------------------------------	----------------------	------------------------	-------------------	---

CC8.8

Please identify if any data points have been verified as part of the third party verification work undertaken, other than the verification of emissions figures reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Other: calculation methodologies	Verified for Alberta, British Columbia and UK emissions reporting
Other: production	verified for Alberta emissions reporting
Other: metering and meter maintenance	Verified for Alberta, British Columbia and UK emissions reporting
Other: data management process	Verified for Alberta, British Columbia and UK emissions reporting

CC8.9

Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

No

CC8.9a

Please provide the emissions from biologically sequestered carbon relevant to your organization in metric tonnes CO2

Further Information

Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)

CC9.1

Do you have Scope 1 emissions sources in more than one country?

Yes

CC9.1a

Please break down your total gross global Scope 1 emissions by country/region

Country/Region	Scope 1 metric tonnes CO2e
Canada	16746350
United Kingdom	1007401
Africa	1020410

CC9.2

Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)

By business division

CC9.2a

Please break down your total gross global Scope 1 emissions by business division

Business division	Scope 1 emissions (metric tonnes CO2e)
North America Conventional Exploration & Production	12837350
Oil Sands Mining	3909000
CNR International	2027811

CC9.2b

Please break down your total gross global Scope 1 emissions by facility

Facility	Scope 1 emissions (metric tonnes CO2e)	Latitude	Longitude
----------	--	----------	-----------

CC9.2c

Please break down your total gross global Scope 1 emissions by GHG type

GHG type	Scope 1 emissions (metric tonnes CO2e)
----------	--

CC9.2d

Please break down your total gross global Scope 1 emissions by activity

Activity	Scope 1 emissions (metric tonnes CO2e)

Further Information

Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)

CC10.1

Do you have Scope 2 emissions sources in more than one country?

No

CC10.1a

Please break down your total gross global Scope 2 emissions and energy consumption by country/region

Country/Region	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes 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)

CC10.2

Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

By business division

CC10.2a

Please break down your total gross global Scope 2 emissions by business division

Business division	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
North America Conventional Exploration & Production	1502370	0
Oil Sands Mining	288494	0
CNR International	0	0

CC10.2b

Please break down your total gross global Scope 2 emissions by facility

Facility	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
----------	--	--

CC10.2c

Please break down your total gross global Scope 2 emissions by activity

Activity	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
----------	--	--

Further Information

Page: CC11. Energy

CC11.1

What percentage of your total operational spend in the reporting year was on energy?

CC11.2

Please state how much heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year

Energy type	MWh
Heat	0
Steam	0
Cooling	0

CC11.3

Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year

65817072

CC11.3a

Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Natural gas	58057026
Diesel/Gas oil	2423244
Refinery gas	5336801

CC11.4

Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

Basis for applying a low carbon emission factor	MWh consumed associated with low carbon electricity, heat, steam or cooling	Emissions factor (in units of metric tonnes CO2e per MWh)	Comment
Other	162048	0.0147	Scope 2 emissions associated with low carbon, renewable electricity in BC

CC11.5

Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

Total electricity consumed (MWh)	Consumed electricity that is purchased (MWh)	Total electricity produced (MWh)	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
7374145	2893756	4480388	0	0	Cogeneration units at Primrose & Wolf Lake, Horizon. Generators at Canadian Natural Resources International

Further Information

Page: **CC12. Emissions Performance**

CC12.1

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

Decreased

CC12.1a

Please 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	Emissions value (percentage)	Direction of change	Please explain and include calculation
Emissions reduction activities			
Divestment			

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation
Acquisitions			
Mergers			
Change in output			
Change in methodology			
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other			

CC12.1b

Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

CC12.2

Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
1.85	metric tonnes CO2e	1000	Location-based	11.9	Increase	Lower revenue due to lower commodity prices and lower production volumes. The appropriate measure of emissions intensity for our company is tonnes CO2e per barrel of oil equivalent as shown in response to question 12.3.

CC12.3

Please provide any additional intensity (normalized) 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 from previous year	Reason for change
.0697	metric tonnes CO2e	barrel of oil equivalent (BOE)	1	Location-based	0.8	Increase	

Further Information

Page: **CC13. Emissions Trading**

CC13.1

Do you participate in any emissions trading schemes?

Yes

CC13.1a

Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO₂e	Details of ownership
European Union ETS	Fri 01 Jan 2016 - Sat 31 Dec 2016	311743	0	1007401	Facilities we own and operate

CC13.1b

What is your strategy for complying with the schemes in which you participate or anticipate participating?

As a primary strategy, Canadian Natural strives to reduce emissions wherever possible. The Company believes in supporting emerging technology.

For the Alberta system, the company strategy is to use a combination of banked credits and purchased credits from the Climate Change and Emissions Management Fund. These purchases are used by the Climate Change and Emissions Management Corporation to fund technology advancement projects for the province.

For the EU ETS, the strategy is to meet compliance through a combination of internal reduction projects and the purchase of EUAs or CERs.

CC13.2

Has your organization originated any project-based carbon credits or purchased any within the reporting period?

Yes

CC13.2a

Please provide details on 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	Number of credits (metric tonnes CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits canceled	Purpose, e.g. compliance
Credit origination	Fossil fuel switch	Septimus and Noel electrification	Other: ISO 14065	71228	71228	Yes	Voluntary Offsetting
Credit origination	Energy efficiency: industry	REMVue engine fuel management	Other: ISO 14065	11096	11096	Yes	Voluntary Offsetting

Further Information

Page: **CC14. Scope 3 Emissions**

CC14.1

Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Purchased goods and services	Not relevant,	0		0.00%	The company has no

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
	explanation provided				downstream operations
Capital goods	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Upstream transportation and distribution	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Waste generated in operations	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Business travel	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Employee commuting	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Upstream leased assets	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Downstream transportation and distribution	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Processing of sold products	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Use of sold products	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
End of life treatment of sold products	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Downstream leased assets	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Franchises	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Investments	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Other (upstream)	Not relevant, explanation provided	0		0.00%	The company has no downstream operations
Other (downstream)	Not relevant,	0		0.00%	The company has no

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
	explanation provided				downstream operations

CC14.2

Please indicate the verification/assurance status that applies to your reported Scope 3 emissions

No emissions data provided

CC14.2a

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

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 Scope 3 emissions verified (%)

CC14.3

Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

No, we don't have any emissions data

CC14.3a

Please identify the reasons for any change in your Scope 3 emissions and for each of them specify how your emissions compare to the previous year

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
------------------------------	-------------------	------------------------------	---------------------	---------

CC14.4

Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)

Yes, our suppliers

Yes, other partners in the value chain

CC14.4a

Please give details of methods of engagement, your strategy for prioritizing engagements and measures of success

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.

CC14.4b

To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
--------------------	---------------------	--	----------------------

CC14.4c

Please explain why you do not engage with any elements of your value chain on GHG emissions and climate change strategies, and any plans you have to develop an engagement strategy in the future

Further Information

Module: Sign Off

Page: CC15. Sign Off

CC15.1

Please provide the following information for the person that has signed off (approved) your CDP climate change response

Name	Job title	Corresponding job category
Bill Clapperton	Vice President, Regulatory, Stakeholder and Environmental Affairs	Environment/Sustainability manager

Further Information

Module: Oil & Gas

Page: OG0. Reference information

OG0.1

Please identify the significant petroleum industry components of your business within your reporting boundary (select all that apply)

Exploration, production & gas processing

Further Information

Page: OG1. Production, reserves and sales by hydrocarbon type - (1 Jan 2016 - 31 Dec 2016)

OG1.1

Is your organization involved with oil & gas production or reserves?

Yes

OG1.2

Please provide values for annual gross and net production by hydrocarbon type (in units of BOE) for the reporting year in the following table. The values required are aggregate values for the reporting organization

Product	Gross production (BOE)	Net production (BOE)	Production consolidation boundary	Comment

OG1.3

Please provide values for reserves by hydrocarbon type (in units of BOE) for the reporting year. Please indicate if the figures are for reserves that are proved, probable or both proved and probable. The values required are aggregate values for the reporting organization

Product	Country/region	Reserves (BOE)	Date of assessment	Proved/Probable/Proved+Probable
---------	----------------	----------------	--------------------	---------------------------------

OG1.4

Please explain which listing requirements or other methodologies you have used to provide reserves data in OG1.3. If your organization cannot provide data due to legal restrictions on reporting reserves figures in certain countries, please explain this

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

For Reserves data, please see pages 12 to 17 of the 2016 Annual report, attached.

For the annual production values in each hydrocarbon type, please see the 2016 Annual Report on page 28, attached.

OG1.5

Please provide values for annual sales of hydrocarbon types (in units of BOE) for the reporting year in the following table. The values required are aggregate values for the reporting organization

Product	Sales (BOE)	Comment
Other: Refer to Annual Report		

OG1.6

Please provide the average breakeven cost of current production used in estimation of proven reserves

Hydrocarbon/project	Breakeven cost/BOE	Comment
---------------------	--------------------	---------

OG1.7

In your economic assessment of hydrocarbon reserves, resources or assets, do you conduct scenario analysis and/or portfolio stress testing consistent with a low-carbon energy transition?

No

OG1.7a

Please describe your scenario analysis and/or portfolio stress testing, the inputs used and the implications for your capital expenditure plans and investment decisions

OG1.7b

Please explain why you have not conducted any scenario analysis and/or portfolio stress testing consistent with a low-carbon energy transition

Canadian Natural uses an internal price of carbon to evaluate returns on future projects under different potential carbon regulations and to model the impact on our portfolio. We also use an internal price of carbon in evaluating emission reduction projects. Carbon pricing does not automatically drive emission reductions, nor does it automatically incent innovation without unduly harming competitiveness. For these reasons, Canadian Natural supports a hybrid approach which combines regulatory and incentive-based measures to drive technology and innovation, and best practices. Incentive-based measures may include offset credits or technology funding for commercialization and pilot projects. Emissions from smaller facilities are better and more efficiently managed through both direct regulatory and incentive-based measures because there are a large number of small facilities that tend to have shorter lifespans and fewer opportunities for emission reductions after the facility is constructed and the economics of emissions reduction for such facilities are challenged. Outcome-based, rather than technology-specific, regulations and standards are better for larger facilities. Large emitters have economies of scale, longer time horizons, and more opportunities for emissions reductions.

Natural gas is a key element in the pathway to a low carbon future. Canadian Natural is the largest producer of natural gas in Canada representing 35% of total production in 2016 on a barrel of oil equivalent basis. As a reliable and affordable energy source, natural gas delivers improved environmental performance because it has less than half the carbon footprint of coal. To this end, the development, export, and usage of natural gas to replace higher-emitting sources of greenhouse gases is part of the strategy for Canada's pathway to a low carbon future.

Long-life, low decline assets create long-term value and opportunities to lower GHG emissions. Canadian Natural's manufacturing like oil sands projects create a platform for step-changes that have a long-term positive impact on reducing environmental footprint. With our long-life, low decline assets representing a reserve life of over 50 years and our dedication to continuous improvement, the investments we make today translate into long-term value in positive environmental impacts for decades to come.

Further Information

Attachments

[https://www.cdp.net/sites/2017/67/2667/Climate Change 2017/Shared Documents/Attachments/ClimateChange2017/OG1.Production,reservesandsalesbyhydrocarbontype\(1Jan2016-31Dec2016\)/cnq-2016-annual-report.pdf](https://www.cdp.net/sites/2017/67/2667/Climate%20Change%202017/Shared%20Documents/Attachments/ClimateChange2017/OG1.Production,reservesandsalesbyhydrocarbontype(1Jan2016-31Dec2016)/cnq-2016-annual-report.pdf)

Page: OG2. Emissions by segment in the O&G value chain - (1 Jan 2016 - 31 Dec 2016)

OG2.1

Please indicate the consolidation basis (financial control, operational control, equity share) used to report the Scope 1 and Scope 2 emissions by segment in the O&G value chain. Further information can be provided in the text box in OG2.2

Segment	Consolidation basis for reporting Scope 1 emissions	Consolidation basis for reporting Scope 2 emissions
Exploration, production & gas processing	Operational Control	Operational Control

OG2.2

Please provide clarification for cases in which different consolidation bases have been used and the level/focus of disclosure. For example, a reporting organization whose business is solely in storage, transportation and distribution (STD) may use the text box to explain why only the STD row has been completed

The Company uses a single consolidation base

OG2.3

Please provide masses of gross Scope 1 carbon dioxide and methane emissions in units of metric tonnes CO₂ and CH₄, respectively, for the organization's owned/controlled operations broken down by value chain segment

Segment	Gross Scope 1 carbon dioxide emissions (metric tonnes CO ₂)	Gross Scope 1 methane emissions (metric tonnes CH ₄)
Exploration, production & gas processing	13370016	202110

OG2.4

Please provide masses of gross Scope 2 GHG emissions in units of metric tonnes CO₂e for the organization's owned/controlled operations broken down by value chain segment

Segment	Gross Scope 2 emissions (metric tonnes CO ₂ e)	Comment
Exploration, production & gas processing	1790864	

Further Information

Page: OG3. Scope 1 emissions by emissions category - (1 Jan 2016 - 31 Dec 2016)

OG3.1

Please confirm the consolidation basis (financial control, operational control, equity share) used to report Scope 1 emissions by emissions category

Segment	Consolidation basis for reporting Scope 1 emissions by emissions category
Exploration, production & gas processing	Operational Control

OG3.2

Please provide clarification for cases in which different consolidation bases have been used to report by emissions categories (combustion, flaring, process emissions, vented emissions, fugitive emissions) in the various segments

Only Operational Control is used as a consolidation base.
Canadian Natural discloses consolidated company wide Scope 1 GHG emissions.

OG3.3

Please provide masses of gross Scope 1 carbon dioxide and methane emissions released into the atmosphere in units of metric tonnes CO₂ and CH₄, respectively, for the whole organization broken down by emissions category

Emissions category	Gross Scope 1 carbon dioxide emissions (metric tonnes CO ₂)	Gross Scope 1 methane emissions (metric tonnes CH ₄)
Combustion	11424053	27528
Flaring	1203031	1530
Process emissions	549901	0
Vented emissions	99312	87478
Fugitive emissions	92219	79

OG3.4

Please describe your organization's efforts to reduce flaring, including any flaring reduction targets set and/or its involvement in voluntary flaring reduction programs, if flaring is relevant to your operations

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.

Further Information

Page: OG4. Transfers & sequestration of CO2 emissions - (1 Jan 2016 - 31 Dec 2016)

OG4.1

Is your organization involved in the transfer or sequestration of CO2?

Yes

OG4.2

Please indicate the consolidation basis (financial control, operational control, equity share) used to report transfers and sequestration of CO2 emissions

Activity	Consolidation basis
Transfers	Operational Control
Sequestration of CO2 emissions	Operational Control

OG4.3

Please provide clarification for cases in which different consolidation bases have been used (e.g. for a given activity, capture, injection or storage pathway)

Only Operational Control is used as a consolidation base.

OG4.4

Using the units of metric tonnes of CO₂, please provide gross masses of CO₂ transferred in and out of the reporting organization (as defined by the consolidation basis). Please note that questions of ownership of the CO₂ are addressed in OG4.6

Transfer direction	CO ₂ transferred – Reporting year
CO ₂ transferred in	16146
CO ₂ transferred out	

OG4.5

Please provide clarification on whether any oil reservoirs and/or sequestration system (geological or oceanic) have been included within the organizational boundary of the reporting organization. Provide details, including degrees to which reservoirs are shared with other entities

The oil reservoir in Southern Alberta into which Canadian Natural injects CO₂ for enhanced oil recovery is included within the boundary of the reporting organization. Therefore "CO₂ transferred out" is not applicable and not reported in the table above. The reservoir is not shared with another entity.

The tailings pond at the Horizon Oil Sands project is included in the boundary of the reporting organization. The reservoir and the tailing ponds are not shared with other entities.

OG4.6

Please explain who (e.g. the reporting organization) owns the transferred emissions and what potential liabilities are attached. In the case of sequestered emissions, please clarify whether the reporting organization or one or more third parties owns the sequestered emissions and who has potential liability for them

In 2016, Canadian Natural purchased and injected 16,146 tonnes of CO2 into tailings at our Horizon Oil Sands operation, as part of the development of CO2 injection into tailings. Canadian Natural owns and is responsible for this injected CO2. Canadian Natural has the potential liability for any emissions, should they occur.

The question of transferred emissions is not applicable to CO2 injection at the Hays Enhanced Oil Recovery (EOR) project in southern Alberta since the injected CO2 is not transferred in or out of the boundary of the project. CO2 is captured from Hays gas stream separation. It is within the boundary of the reporting organization. Canadian Natural has the potential liability for any emissions, should they occur.

OG4.7

Please provide masses in metric tonnes of gross CO2 captured for purposes of carbon capture and sequestration (CCS) during the reporting year according to capture pathway. For each pathway, please provide a breakdown of the percentage of the gross captured CO2 that was transferred into the reporting organization and the percentage that was transferred out of the organization (to be stored)

Capture pathway in CCS	Captured CO2 (metric tonnes CO2)	Percentage transferred in	Percentage transferred out
Gas stream separation from natural gas purification	22287		

OG4.8

Please provide masses in metric tonnes of gross CO2 injected and stored for purposes of CCS during the reporting year according to injection and storage pathway

Injection and storage pathway	Injected CO2 (metric tonnes CO2)	Percentage of injected CO2 intended for long-term (>100 year) storage	Year in which injection began	Cumulative CO2 injected and stored (metric tonnes CO2)
CO2 used for enhanced oil recovery (EOR) or enhanced gas recovery (EGR)	22287	100%	2004	
Other: CO2 sequestration in tailings	16146	100%	2009	

OG4.9

Please provide details of risk management performed by the reporting organization and/or third party in relation to its CCS activities. This should cover pre-operational evaluation of the storage (e.g. site characterization), operational monitoring, closure monitoring, remediation for CO2 leakage, and results of third party verification

For the Hays EOR project, monitoring is carried out per the requirements of the Alberta Energy Regulator set out in the approval for the recovery scheme. The Company monitors CO2 concentrations in all wells within and surrounding the project in order to measure performance in the scheme. surrounding wellbores are sampled for elevated CO2 to assess the containment within the reservoir and to inspect the injection line. Alberta Energy regulator completes annual audits to ensure accuracy. The volume of CO2 injected is verified to a reasonable level of assurance by our third party verifier, and accepted as part of the Specified Gas Emitters Regulation (SGER) by Alberta Environment and Sustainable Resources Development (AESRD).

For the Horizon CO2 tailings injection, monitoring and testing is carried out as part of the research and development of this sequestration method.

Further Information

Page: OG5. Emissions intensity - (1 Jan 2016 - 31 Dec 2016)

OG5.1

Please provide estimated emissions intensities (Scope 1 + Scope 2) associated with current production and operations

Year ending	Segment	Hydrocarbon/product	Emissions intensity (metric tonnes CO2e per thousand BOE)	% change from previous year	Direction of change from previous year	Reason for change
2016	Exploration, production & gas processing	Conventional non-associated natural gas Associated natural gas Natural gas condensate Natural gas liquids (NGL) Liquefied Petroleum Gas (LPG)	0.0697	0.8	Increase	

Year ending	Segment	Hydrocarbon/product	Emissions intensity (metric tonnes CO2e per thousand BOE)	% change from previous year	Direction of change from previous year	Reason for change
		Coalbed methane Shale gas Light oil Medium oil Heavy oil Bitumen (oil sands) Synthetic oil				

OG5.2

Please clarify how each of the emissions intensities has been derived and supply information on the methodology used where this differs from information already given in answer to the methodology questions in the main information request

We only operate in the “exploration, production & gas processing” activity, so all emissions and intensities reported above are assigned to this activity. No difference from information already given in answer to the main information request.

Further Information

Page: OG6. Development strategy - (1 Jan 2016 - 31 Dec 2016)

OG6.1

For each relevant strategic development area, please provide financial information for the reporting year

Strategic development area	Describe how this relates to your business strategy	Sales generated	EBITDA	Net assets	CAPEX	OPEX	Comment
							For information on capital allocations, please see the 2016 Annual Report.

OG6.2

Please describe your future capital expenditure plans for different strategic development areas

Strategic development area	CAPEX	Total return expected from CAPEX investments	Comment
Renewable energy, excluding Biomass and Biofuels			Canadian Natural currently does not have revenue from renewable or clean energy technologies. The Company has R&D expenses in the development of renewable and clean energy technology, but the projects are currently in the pilot stage.

OG6.3

Please describe your current expenses in research and development (R&D) and future R&D expenditure plans for different strategic development areas

Strategic development area	R&D expenses – Reporting year	R&D expenses – Future plans	Comment
Other: New Technologies			Canadian Natural looks for ways to reduce the Company's environmental footprint through the development and deployment of new technologies to reduce GHG emissions. The Company does this independently and through its membership in certain industry and research organizations. Examples of such projects include injection of CO ₂ into tailings at the Horizon Oil Sands to improve tailings properties and to sequester CO ₂ ,

Strategic development area	R&D expenses – Reporting year	R&D expenses – Future plans	Comment
			the testing of solar-powered pumps (to replace gas pneumatic pumps), the electrification of a new gas plant in British Columbia to take advantage of the low-carbon electricity supply in British Columbia, and the use of CO2 for enhanced oil recovery.

Further Information

Page: OG7. Methane from the natural gas value chain

OG7.1

Please indicate the consolidation basis (financial control, operational control, equity share) used to prepare data to answer the questions in OG7

Segment	Consolidation basis
Exploration, production & gas processing	Operational Control

OG7.2

Please provide clarification for cases in which different consolidation bases have been used

Only Operational Control has been used to consolidate data

OG7.3

Does your organization conduct leak detection and repair (LDAR), or use other methods to find and fix fugitive methane emissions?

Yes

OG7.3a

Please describe the protocol through which methane leak detection and repair, or other leak detection methods, are conducted, 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.

OG7.3b

Please explain why not and whether you plan on conducting leak detection and repair, or other methods to find and fix fugitive methane emissions

OG7.4

Please indicate the proportion of your organization's methane emissions inventory estimated using the following methodologies (+/- 5%)

Methodology	Proportion of total methane emissions estimated with methodology	What area of your operations does this answer relate to?
Direct detection and measurement		
Engineering calculations	>75%	All
Source-specific emission factors (IPCC Tier 3)		
IPCC Tier 1 and/or Tier 2 emission factors		

OG7.5

Please use the following table to report your methane emissions rate

Year ending	Segment	Estimate total methane emitted expressed as % of natural gas production or throughput at given segment	Estimate total methane emitted expressed as % of total hydrocarbon production or throughput at given segment
2015	Exploration, production & gas processing		0.61%

OG7.6

Does your organization participate in voluntary methane emissions reduction programs?

Yes

OG7.6a

Please describe your organization's participation in voluntary methane emissions reduction programs

Voluntary methane emissions reduction programs that are being developed include retrofitting pneumatic devices and gas conservation from primary heavy oil beyond the requirements of AER Directive 60.

OG7.7

Did you have a methane-specific emissions reduction target that was active (ongoing or reached completion) in the reporting year and/or were methane emissions incorporated into targets reported in CC3?

Yes, methane emissions were incorporated into targets reported in CC3

OG7.7a

If you have a methane-specific emissions reduction target that is not detailed as a separate target in CC3, please provide those details here, addressing all of the metrics requested in table CC3.1a or CC3.1b (for an absolute or intensity target, respectively)

OG7.7b

If methane emissions were incorporated into targets reported in CC3 (but not detailed as a separate target), please indicate which target ID(s) incorporate methane emissions, and specify the portion of those targets that is comprised of methane

OG7.7c

Please explain: (i) why you do not have a methane-specific emissions reduction target or do not incorporate methane into your targets reported in CC3; and (ii) forecast how your methane emissions will change over the next five years

Further Information

CDP